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The economic performance of Portuguese and Spanish regions: A network dynamics approach

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Abstract. This paper contributes to further understanding the economic performance of Portuguese and Spanish regions, using a stochastic network approach. The empirical analysis is made at the territorial level of NUT 3 regions and covers the period 1995-2008. The performance of regions is based on GDP per capita at Purchasing Power Standards. The network analysis is based on a metric space built from the correlation coefficients between the log-difference of annual growth rates. The metric space and the corresponding topological coefficients are compared with the independent performance of randomly generated data. The metric space is graphically represented along the 3 dominant eigenvalues and the strongest connections are selected and represented in a network of Iberian regions. The main purpose of this research is to find the most relevant geographical and demographic determinants of regional development, namely a "border effect", an "interiority (without border) effect", a "coastal effect", a "metropolitan effect" and an "ultra periphery effect".

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1. Introduction

This paper deals with the economic performance of Portuguese and Spanish regions at NUTS 3 level, in the time period 1995-2008. After a long history of division, conflicts, misunderstanding and weak economic relations, the two Iberian countries started a period of partnership and strong economic integration in 1986, after both becoming members of the European Economic Communities, now European Union. A thorough analysis of the changes in economic relationships between Portugal and Spain before and after European integration is made in Diéguez and Caramelo (2001). According to these authors, one of the main repercussions of this political event was felt in the common border areas of these countries, that finally started to cooperate, after centuries of hostility, or mutual ignorance at best. However, they recognize that it is far from exhausted the full potential of economic cooperation between these regions, which is corroborated in Carvalho and Mourato (2010), that call attention to the weak interregional commercial flows in cause. This result is not unexpected, as McCallum (1995) has already taken a similar conclusion, when assessing the importance of national borders to Canadian-US regional trade patterns.

The main purpose of this paper is to empirically quantify the strength (or weakness) of a "border effect" in the dynamics of regional performance in the Iberian Peninsula, at the NUTS 3 level. In accomplishing this task, we also try to measure geographic and demographic effects, dividing the remaining regions (those not around the common border between Portugal and Spain) in "coastal" and "interior" (a self explained division) and large "metropolitan" ones (those with urban areas with a population of more than 700.000 persons in Spain, and more than 300.000 in Portugal). Initially, we also isolated the two capital regions (Lisbon and Madrid) but the preliminary results proved to be ineffective this further division.

The paper proceeds as follows. The next section describes the data and the classification of regions. In section 3 we make a descriptive analysis of the average annual growth rate of GDP per head, identifying the top and bottom regions along this criterion in the overall period and in sub-periods 1995-2001 and 2001-2008, and assessing the existence (or absence) of sigma and beta regional convergence in the context of the Iberian Peninsula (taking all the NUTS 3 regions of Portugal and Spain as the reference ensemble). In Section 4 we apply a network approach to uncover the regional economic dynamics. Using a metric related the correlation coefficients between the GDP per capita if the Iberian regions, a method is applied to reconstruct a metric space from empirical data. Having a metric defined in the space of regions, network topological coefficients are used to extract further information from the data, namely illustrating the relative strength of the administrative, geographic and demographic effects on the regional development process. Section 5 ends the paper with some concluding remarks.

2. Data and classification of regions

The data for the empirical results of this work is based on the values of GDP per head at purchasing power standards for the regions of Portugal and Spain, at the NUTS 3 level, and were obtained from the Regional Database of EUROSTAT: Regional Economic Accounts (available at: http://ec.europa.eu/eurostat). For the details about this database see EUROSTAT (2010).

The period covered is 1995-2008, but in some exercises we divide this period in two phases: 1995-2001 and 2001-2008, namely when we are searching for the top and bottom economic growth regions. Particularly in Portugal, there is a clear change in global and (therefore) regional economic performance between the 1990's and the following decade, as will be clear in the next section. In Spain, this change in economic growth momentum occurred much later, and it was not practically felt until 2008 (only after the global macroeconomic crisis of 2009).

The regional level at which the analysis of this paper is made is NUTS 3, because it is preferable to assess the regional economic performance at the most detailed level as possible, and the NUTS 2 level is not adequate for this purpose.

There are 30 NUTS level 3 regions in Portugal, 28 in mainland and 2 autonomous regions (Madeira and Azores islands). All of them are included in the database. In Spain there are 59 NUTS level 3 regions: 47 in mainland, two archipelagos (Baleares islands – 3 NUTS 3 regions; Canarias islands – 7 NUTS 3 regions) and two (NUTS 3) enclave cities in Northern Africa (Ceuta and Melilla). As the values for GDP per head in the NUTS 3 regions of Baleares and Canarias are not available for the whole period in the EUROSTAT database, we work with the values for the NUT 2 level in these cases. So, our database has 81 regions, 30 of Portugal and 51 of Spain.

The next step is to classify the regions according to our analytical purpose. As we give priority to assessing the (political and administrative) effect on regional growth performance of the existence of a common border, we begin by isolating the 17 regions affected by this criterion (10 in Portugal and 7 in Spain), and call them (common) “Frontier” regions.

The next criterion was of a pure geographical nature, dividing the regions in those having some part of its territory with a see cost (“Coastal” regions) and those having not (“Interior” regions). This is an obvious classification that does not deserve much explanation. However, we complement this classification with a further criterion, a demographic one due to the agglomeration economies associated to the literature on the new economic geography (Krugman, 1991; Krugmam and Venables, 1995) and endogenous growth (Lucas, 1988). A autonomous category is created for large “Metropolitan” regions, being considered (relatively) large those having more than 700.000 inhabitants in Spain and more than 300.000 in Portugal (but we admit that a low separating level may be considered and tested). Combining both criteria we have then 38 (non common frontier) interior regions (10 in Portugal; 28 in Spain), 22 (non common frontier) coastal regions (6 in Portugal; 16 in Spain) and 12 large metropolitan regions (3 in Portugal; 9 in Spain).

Finally, being particularly different, for political, administrative and geographical reasons, we group in a separated category the so called (ultra-)”Peripheral” regions of Madeira, Azores, Baleares, Canarias, Ceuta and Melilla.

A list with all the regions considered, the corresponding NUTS 3 code and the classification label (with the first letter, P or E, meaning the country, and the second letter, F, C, I, M or P, corresponding to the above regional definitions) is presented in Appendix 1.

3. Regional economic growth and convergence

The first and most direct assessment of relative regional economic growth in the Iberian Peninsula is to compare the annual average growth of GDP per head of the 81 Spanish and Portuguese regions. When we look at these numbers, the most significant conclusion is the clear dominance of the country effect, with the Spanish regions representing a great majority of the top 20 growth examples (Table 3.1) and the

Portuguese regions representing the most part of the 20 bottom growth cases (Table 3.2).

< Take in Table 3.1 >

< Take in Table 3.2 >

However, this global picture hides an important change in individual growth experiences, with a significant deterioration of regional (and of course, national) growth conditions in Portugal between the sub-periods 1995-2001 (Table 3.3 and 3.4) and 2001-2008 (Tables 3.5 and 3.6), giving rise to what many Portuguese economists now call the “lost decade”. On the other side and as it is also well known, in Spain this deterioration in growth momentum appears much later, and is not seen in these results.

< Take in Table 3.3 >

< Take in Table 3.4 >

< Take in Table 3.5 >

< Take in Table 3.6 >

As most of Portuguese regions start from low levels of economic development, it comes with no surprise the apparent lack of real convergence in this period, in the context of all the Iberian regions, both in the sigma version, measured by the coefficient of variation of GDP per capita (Figure 3.1), as in the beta kind of convergence (Figure 3.2), given by the absence of negative correlation between annual average growth and initial level of GDP per capita (for a technical description of these notions of convergence, and many empirical examples, see Barro and Sala-i-Martin, 2005).

< Take in Figure 3.1 >

< Take in Figure 3.2 >

The other effects to be assessed in this empirical paper, administrative (border), geographical (coastal versus interior, or peripheral) or demographic (metropolitan areas) appear not to be determinant in the growth process of NUTS 3 regions. All these examples punctuate the (relative) growth successes and low performance cases (not really un-successes, as there are rare examples of negative average regional growth in this period).

And so, in order to better understand the strength of these factors in the regional growth dynamics of Portuguese and Spanish regions, the next section describes the application of a network approach.

4. Iberian regional performance through a network approach

Using a stochastic geometry technique over the time evolution of the GDP per head values of a set of Portuguese and Spanish regions, it is possible to identify a geometric structure which is conveniently described by a network approach.

The stochastic geometry technique is simply stated in the following terms:

1) pick a set of *N* regions and their historical data over a chosen time interval and
2) considering the vectors $\vec{p}(k)$ with the GDP per head yearly values of each region (*k*), define a normalized vector

$$\vec{\rho}(k) = \frac{\vec{p}(k) - \langle \vec{p}(k) \rangle}{\sqrt{n\left(\langle \vec{p}^{\,2}(k) \rangle - \langle \vec{p}(k) \rangle^{2}\right)}} \tag{1}$$

where *n* is the number of components (number of time labels) in the vector $\vec{p}$ and < > the average value of the observations over time,

3) compute an Euclidian distance ($d_{k,l}$) between each pair of regions

$$d_{k,l} = \sqrt{2(1 - C_{kl})} = \left\| \vec{\rho}(k) - \vec{\rho}(l) \right\| \tag{2}$$

where C_{kl} is the correlation coefficient between the pair of regions (*k* and *l*) computed along the chosen time interval (of length *n*).

The fact that $d_{k,l}$ is a properly defined distance gives a meaning to geometric notions and geometric tools in the study of the set of regions. Given this set of distances, the question now is reduced to an embedding problem: one asks what is the smallest manifold containing the set. If the proportion of systematic information present in correlations between regions is small, then the corresponding manifold will be a low-dimensional entity.

The following stochastic geometry technique was used for this purpose.

1) after the distances ($d_{k,l}$) are calculated for the set of N regions, they are embedded in R^{N-1} with coordinates $\vec{x}(k)$.

2) the center of mass $\vec{R}$ is then computed and the coordinates reduced to the center of mass

$$\vec{R} = \frac{\sum_k \vec{x}(k)}{k} \tag{3}$$

$$\vec{y}(k) = \vec{x}(k) - \vec{R} \tag{4}$$

3) the matrix

$$T_{ij} = \sum_k \vec{y}_i(k)\vec{y}_j(k) \tag{5}$$

is diagonalized to obtain the set of normalized eigenvalues and eigenvectors $\{\lambda_i, \vec{e}_i\}$.

4) the eigenvectors $\vec{e}_i$ define the characteristic directions of the set of regions and their coordinates $z_i(k)$ are obtained by the projection

$$z_i(k) = \vec{y}_i \bullet \vec{e}_i \tag{6}$$

5) the characteristic directions correspond to the eigenvalues (λ_i) that are clearly different from those obtained from surrogate data. They define a reduced subspace of dimension *d*, which carries the systematic information related to the correlation structure of the regional space.

This corresponds to the identification of empirically constructed variables that drive the set of regions, and, in this framework, the number of surviving eigenvalues is the effective characteristic dimension of this regional space.

As regional spaces can be described as low dimension objects, the geometric analysis is able to provide crucial information about their dynamics. Different applications of this technique, namely for the identification of periods of stasis and of mutation of financial markets have been described in Araújo et al. (2007 and 2008) and Vilela Mendes et al. (2003). In Lopes et al. (2011) this technique is used to assess the clustering behavior implicit on sectoral gross output dynamics.

In this paper we apply such a dimensional reduction for the identification of strongly and weakly correlated regions, accordingly to the simultaneous evolution of their GDP *per capita* values along a certain time interval.

4.1 From a geometrical to a topological approach

The existence of a distance metric allows for the application of a topological approach in order to identify a network of regions associated to the low-dimensional regional space. From the matrix of distances $d_{k,l}$ computed in the reduced *d*-dimensional space, we apply the hierarchical clustering process to construct the minimal spanning tree (*MST*) that connects the *N* regions. Then the Boolean graph *B* is defined by setting

$$\begin{aligned} &b(k,l)=1 \quad if \quad d(k,l)\le L \\ &b(k,l)=0 \quad otherwise \end{aligned} \tag{7}$$

where *L* is the smallest threshold distance value that assures connectivity of the whole network in the hierarchical clustering process.

4.2 Regional spaces and their corresponding networks of regions

Results were computed using actual data, which consists in the set of yearly GDP *per capita* values of 81 regions with a time window of 13 years, from 1995 to 2008. We also compute results from surrogate data, i.e. data generated by permuting the GDP *per capita* values of each region randomly in time. As each region is independently permuted, time correlations among regions disappear, while the resulting surrogate data preserve the mean and the variance that characterize actual data.

Comparing results obtained from actual data with results computed from surrogate data has shown that the regional space has only three dimensions (the corresponding manifold can be contained in a 3-dimensional space). Figure 4.1 shows the projection of the coordinates of the set of 81 regions on these three characteristic directions.

< Take in Figure 4.1 >

In this figure the Portuguese regions are identified as “1” while the Spanish regions are identified as “2”. It is clear that the two sets of regions (Portuguese and Spanish) seem to occupy different slots in the 3-dimensional space.

In the 3-dimensional space presented in Figure 4.2, the 81 Portuguese and Spanish regions are represented according to the geographical and demographic classification described in section 2, according to the following legend: 1:Coastal, 2:Border, 3:Interior, 4:Metropolitan, 5:Peripheral. When the region is a Portuguese one it is represented in large, while Spanish regions have a smaller representation. Again, the observation of the 3-dimensional space of regions seems to lead to the identification of a tendency towards the occupation of different space slots depending on the country: Portuguese regions seem to be concentrated in the right side of the plot while the Spanish ones are mostly in the left. Moreover, the Interior regions seem to spread all over the 3-dimensional space, while the Border regions are slightly less uniformly distributed on this space.

< Take in Figure 4.2 >

When the geometric distances computed in the reduced 3-dimensinal space are used to define the projected Boolean graph *B* (as in Equation *7*), it was empirically found that the set of 81 regions correspond to a highly connected network (the network degree is around N/2) where the lack of sparseness makes unadvised the computation of typical topological coefficients as clustering and path length.

Due to the same reason, in graphically representing the derived network of regions we opt to sort the whole set of $\frac{N(N-1)}{2}$ distances in ascending order and to exclude the links between regions whose distance occupy a ranking position greater than *2N* in the sorted list. In so doing, the degree of the network equals *2* and overloading the graph with a huge amount of links is avoided, allowing for the observation of some linkage patterns as the images in figures 4.3, 4.4 and 4.5 show. These three images present the same network under different drawing options (Pajek was used as the drawing tool).

< Take in Figure 4.3 >

< Take in Figure 4.4 >

The network presented in Figures 4.3 and 4.4 shows that almost every metropolitan region remains connected after the suppression of the less stronger ($\frac{N(N-1)}{2} - 2N$) links, showing that, in what concerns the simultaneous evolution of the GDP values, the group of Metropolitan regions is the most strongly correlated one. Its degree of linkage is high either considering the links with regions that are inside or outside the Metropolitan group. Conversely, the Interior and the Border groups are very weakly connected ones.

The drawing option adopted in Figure 4.5 allows for the observation that Spanish regions are more connected than the Portuguese ones, showing that country matters when links are defined as function of the correlation between regions performance. This result confirms the findings obtained when assessing the growth and convergence dynamics of the Iberia Peninsula regions (section 3).

< Take in Figure 4.5 >

Another interesting result is that not only Spanish regions are more connected than the Portuguese ones but also that they tend to be strongly correlated with their national counterparts than with the Portuguese regions, independently of how similar are them in terms of their corresponding regional classification.

5. Concluding remarks

In this paper an empirical study of the economic performance of Portuguese and Spanish regions is made, using a traditional growth and convergence analysis and a stochastic network approach.

The study is conducted at the territorial level of NUT 3 regions and covers the period 1995-2008. The economic performance of regions is based on GDP per head at Purchasing Power Standards and the data was obtained from the Regional Accounts available for free at the site of Eurostat.

Besides the obvious criterion of country belonging, a classification was made based on geographical and demographic caractheristics, being the regions divided in Interior, Coastal, (common-) Border, Metropolitan and Peripheral, in order to test if these caractheristics have significant growth effects.

The growth assessment consisted in picking the top twenty and the bottom twenty growth examples in the overall period and in two sub-periods: 1995-2001 and 2001-2008, after ranking all the regions according to the value of its annual average GDP *per capita* growth. The main findings are the presence of a significant “country effect” (with

Spanish regions generally overcoming Portuguese ones) and the apparent absence of clear geographic or demographic effects (with a diversified group of regions, both in “winners” and “(relative) loosers” groups. Consistent with the described “country effect”, the results point to an absence of both of the so-called sigma and beta regional convergence, when we use all the Iberian Peninsula regions as the reference set.

The network analysis was based on a metric space built from the correlation coefficients between the log-difference of annual growth rates. The metric space and the corresponding topological coefficients were compared with the independent performance of randomly generated data. The metric space is graphically represented along the 3 dominant eigenvalues and the strongest connections are selected and represented in a network of Iberian regions. Our main results showed the presence of a “metropolitan effect” on regional GDP per head dynamics.

A further step of this research will be to assess the network dynamics of economic (GDP) and demographic (population) evolutions that support the trends studied thus far.

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Tables:

Table 3.1 Top 20 growth regions: 1995-2008

N	REGION	NUT3	CLA.	Gr95-08
81	Madeira (PT)	PT300	PP	7,815
30	Badajoz	ES431	EB	6,675
9	Vizcaya	ES213	EL	6,165
49	Ceuta (ES)	ES630	EP	6,134
4	Pontevedra	ES114	EB	5,965
7	Álava	ES211	EI	5,959
8	Guipúzcoa	ES212	EC	5,885
6	Cantabria	ES130	EC	5,858
41	Cádiz	ES612	EC	5,845
40	Almería	ES611	EC	5,727
5	Asturias	ES120	EC	5,714
44	Huelva	ES615	EB	5,708
24	Zamora	ES419	EB	5,671
43	Granada	ES614	EC	5,563
1	A Coruña	ES111	EC	5,546
80	Açores (PT)	PT200	PP	5,521
18	León	ES413	EI	5,511
46	Málaga	ES617	EC	5,477
19	Palencia	ES414	EI	5,414
16	Ávila	ES411	EI	5,367

Table 3.2 Bottom 20 growth regions: 1995-2008

N	REGION	NUT3	CLA.	Gr95-08
79	Lezíria do Tejo	PT185	IP	4,273
53	Cávado	PT112	FP	4,264
60	Algarve	PT150	FP	4,260
22	Soria	ES417	IE	4,252
75	Alentejo Litoral	PT181	LP	4,252
39	Illes Balears	ES530	PE	4,221
52	Minho-Lima	PT111	FP	4,115
69	Beira Interior Sul	PT169	FE	4,089
72	Médio Tejo	PT16C	IP	4,025
63	Pinhal Litoral	PT163	LP	4,021
35	Tarragona	ES514	LE	3,989
76	Alto Alentejo	PT182	FP	3,958
62	Baixo Mondego	PT162	LP	3,936
74	Península de Setúbal	PT172	MP	3,538
57	Entre Douro e Vouga	PT116	IP	3,457
55	Grande Porto	PT114	MP	3,405
71	Oeste	PT16B	LP	3,350
61	Baixo Vouga	PT161	LP	3,325
28	Guadalajara	ES424	IE	3,261
54	Ave	PT113	IP	3,253

Table 3.3 Top 20 growth regions: 1995-2001

N	REGION	NUT3	CLA.	Gr95-01
81	Madeira (PT)	PT300	PP	9,586
40	Almería	ES611	EL	8,428
77	Alentejo Central	PT183	PF	8,384
30	Badajoz	ES431	EF	7,803
65	Dão-Lafões	PT165	PI	7,712
68	Beira Interior Norte	PT168	EF	7,679
80	Açores (PT)	PT200	PP	7,186
8	Guipúzcoa	ES212	EL	7,099
34	Lleida	ES513	EI	7,065
41	Cádiz	ES612	EL	7,053
37	Castellón	ES522	EL	6,991
7	Álava	ES211	EI	6,859
15	Madrid	ES300	EM	6,856
6	Cantabria	ES130	EL	6,752
46	Málaga	ES617	EL	6,752
67	Serra da Estrela	PT167	PI	6,752
48	Murcia	ES620	EL	6,613
36	Alicante	ES521	EL	6,591
44	Huelva	ES615	EF	6,529
38	Valencia	ES523	EL	6,522

Table 3.4 Bottom 20 growth regions: 1995-2001

N	REGION	NUT3	CLA.	Gr95-01
74	Península de Setúbal	PT172	PM	5,150
19	Palencia	ES414	EI	5,144
50	Melilla (ES)	ES640	EP	5,129
69	Beira Interior Sul	PT169	EF	5,089
17	Burgos	ES412	EI	5,079
45	Jaén	ES616	EI	5,004
24	Zamora	ES419	EF	4,996
16	Ávila	ES411	EI	4,989
75	Alentejo Litoral	PT181	PL	4,973
76	Alto Alentejo	PT182	PF	4,912
54	Ave	PT113	PI	4,770
1	A Coruña	ES111	EL	4,686
61	Baixo Vouga	PT161	PL	4,573
22	Soria	ES417	EI	4,507
42	Córdoba	ES613	EI	4,456
55	Grande Porto	PT114	PM	4,307
31	Cáceres	ES432	EF	4,178
66	Pinhal Interior Sul	PT166	PI	4,158
28	Guadalajara	ES424	EI	3,468
78	Baixo Alentejo	PT184	PF	2,350

Table 3.5 Top 20 growth regions: 2001-2008

N	REGION	NUT3	CLA.	Gr01-08
81	Madeira (PT)	PT300	PP	6,320
1	A Coruña	ES111	EL	6,288
24	Zamora	ES419	EF	6,254
78	Baixo Alentejo	PT184	PF	6,167
49	Ceuta (ES)	ES630	EP	5,902
9	Vizcaya	ES213	EL	5,895
5	Asturias	ES120	EL	5,870
18	León	ES413	EI	5,773
30	Badajoz	ES431	EF	5,718
16	Ávila	ES411	EI	5,692
19	Palencia	ES414	EI	5,647
31	Cáceres	ES432	EF	5,635
66	Pinhal Interior Sul	PT166	PI	5,533
4	Pontevedra	ES114	EF	5,529
43	Granada	ES614	EL	5,528
50	Melilla (ES)	ES640	EP	5,329
17	Burgos	ES412	EI	5,327
2	Lugo	ES112	EL	5,217
7	Álava	ES211	EI	5,194

Table 3.6 Bottom 20 growth regions: 2001-2008

N	REGION	NUT3	CLA.	Gr01-08
51	Canarias (ES)	ES700	EP	3,061
52	Minho-Lima	PT111	PF	2,947
60	Algarve	PT150	PF	2,901
33	Girona	ES512	EL	2,809
53	Cávado	PT112	PF	2,798
68	Beira Interior Norte	PT168	EF	2,731
55	Grande Porto	PT114	PM	2,639
36	Alicante	ES521	EL	2,625
62	Baixo Mondego	PT162	PL	2,466
39	Illes Balears	ES530	EP	2,420
72	Médio Tejo	PT16C	PI	2,398
37	Castellón	ES522	EL	2,395
63	Pinhal Litoral	PT163	PL	2,388
61	Baixo Vouga	PT161	PL	2,267
35	Tarragona	ES514	EL	2,252
74	Península de Setúbal	PT172	PM	2,176
54	Ave	PT113	PI	1,970
71	Oeste	PT16B	PL	1,779
57	Entre Douro e Vouga	PT116	PI	1,371
77	Alentejo Central	PT183	PF	1,078

Figures:

Figure 3.1: Sigma (non-)convergence: GDPpc – coefficient of variation

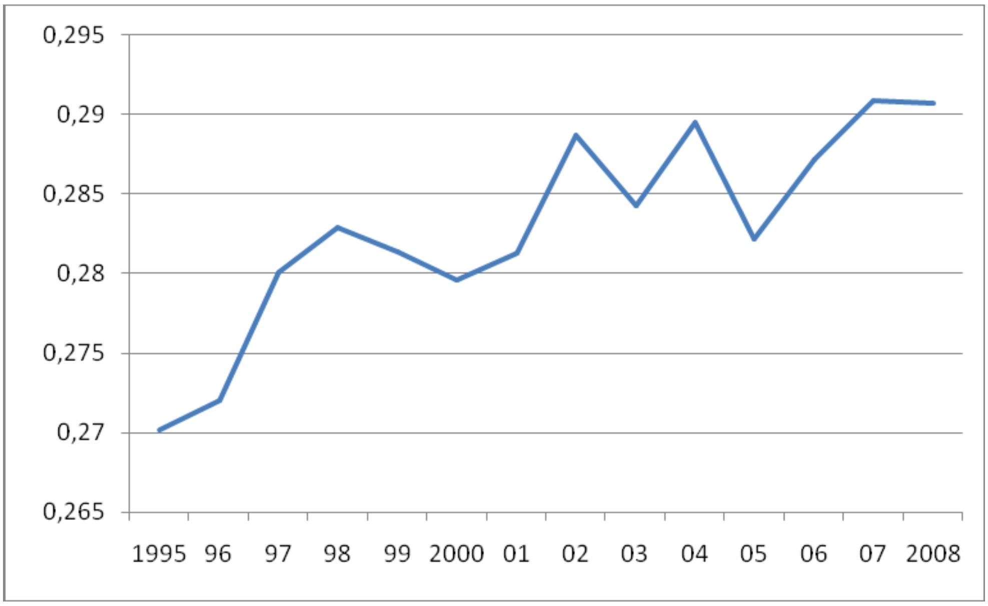


Figure 3.2: Beta (non-)convergence: GDPpc – Annual growth vs initial level

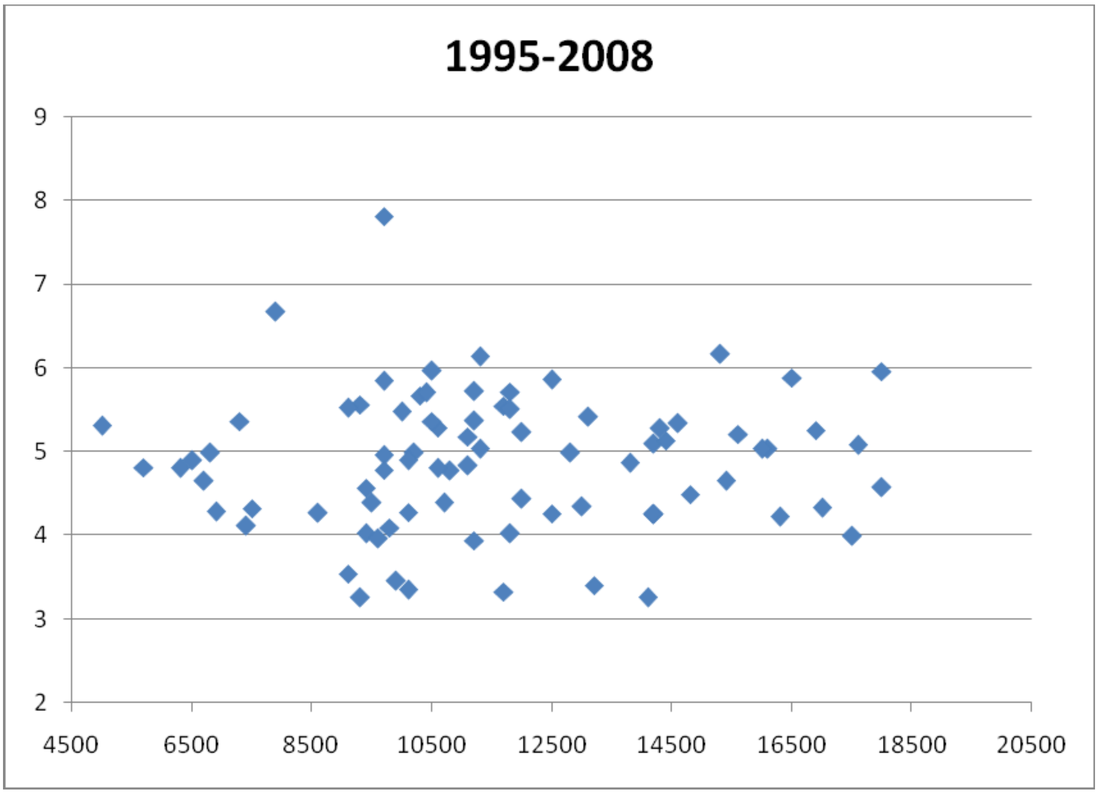
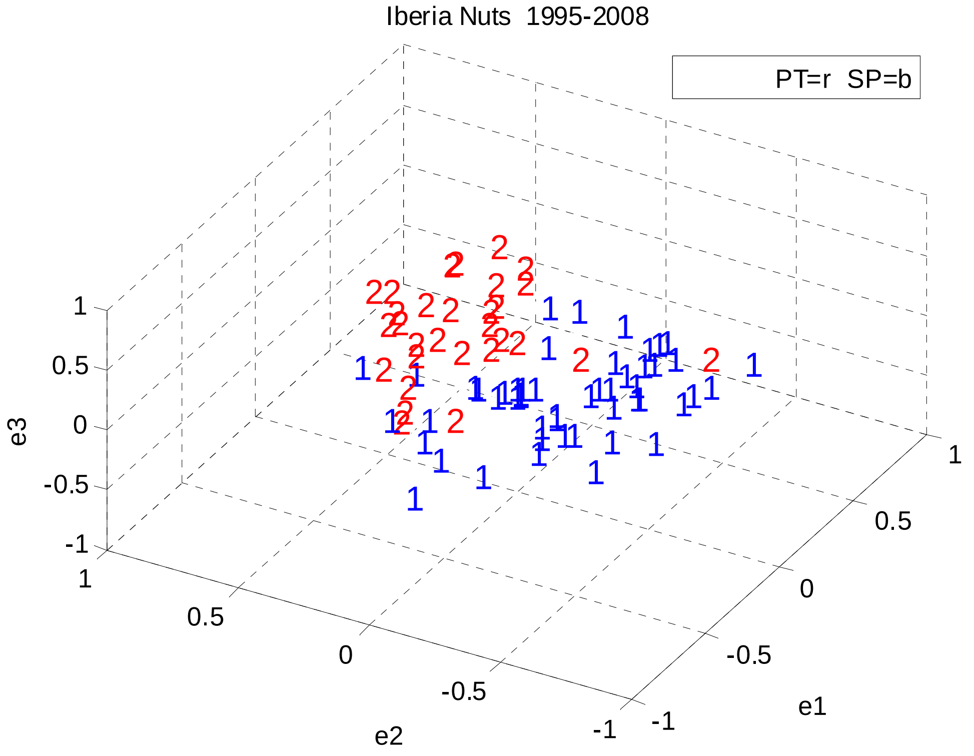
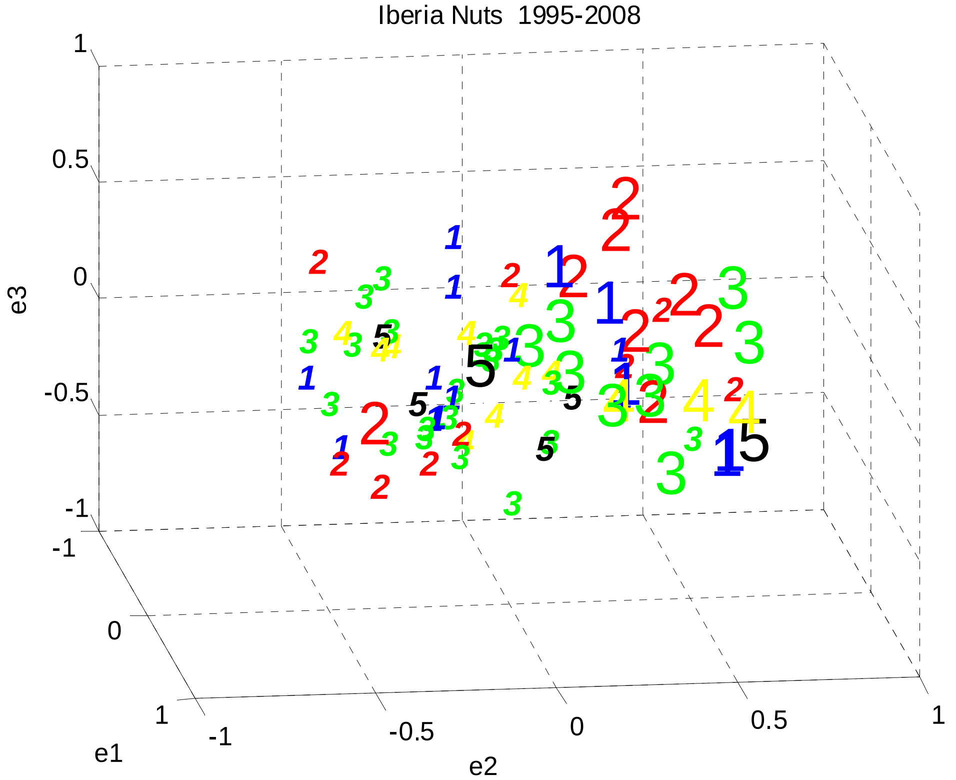


Figure 4.1: Projection of the 81 regions' coordinates on the 3 characteristic directions



Legend: 1 - Spain (blue); 2 – Portugal (red)

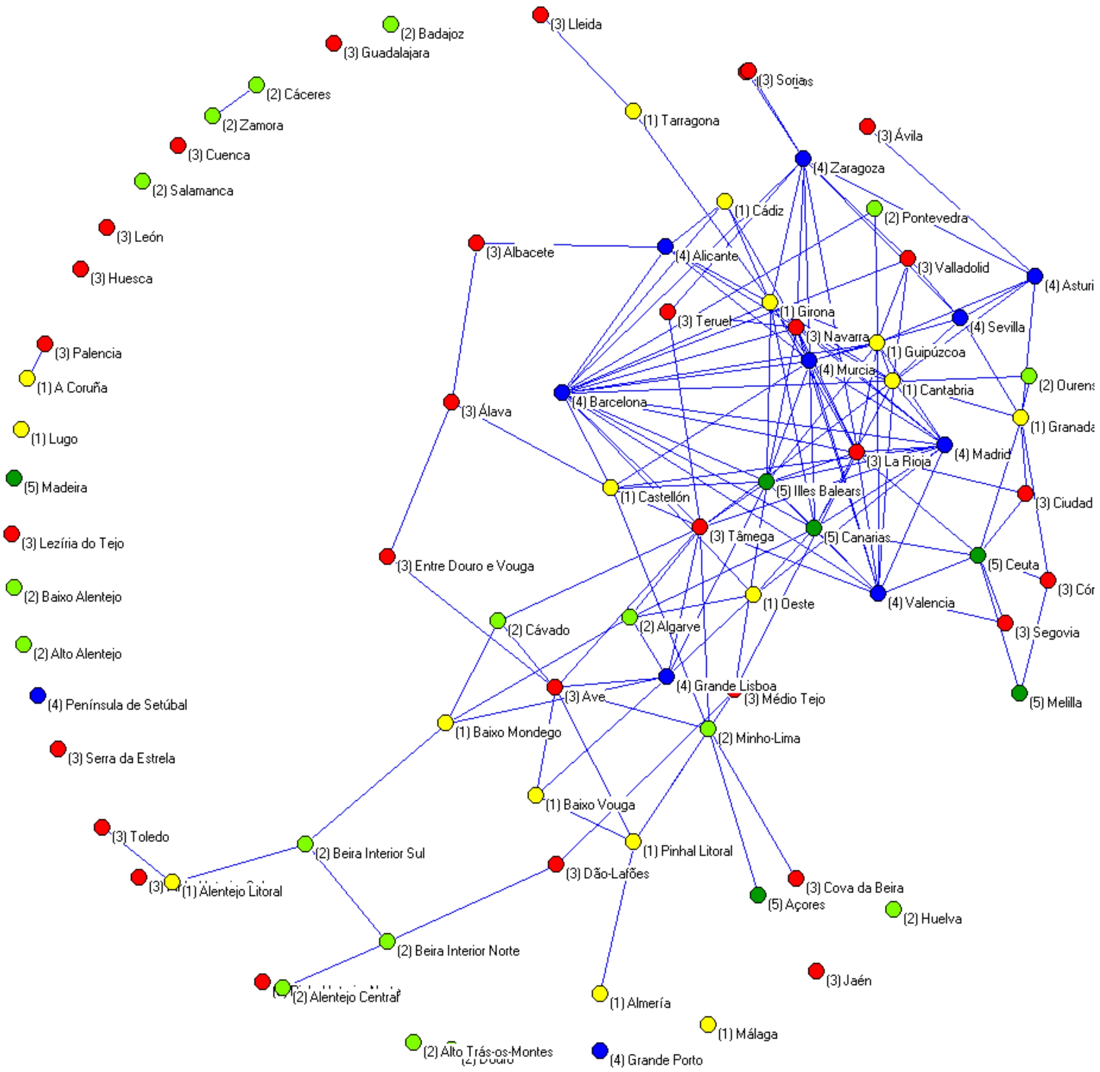
Figure 4.2: Projection by kind of (geographic and demographic) region



Legend: 1: Coastal (blue), 2: Border (red), 3: Interior (green), 4: Metropolitan (yellow), 5: Peripheral (black);

Portugal (large numbers), Spain (small numbers)

Figure 4.3: The network of regions: geographical and demographic effects (strongest 162 (*2N*) links)



Legend: Border: light green; Interior: red; Coastal: yellow; Metropolitan: blue; Peripheral: dark green

Figure 4.4: The network of regions (represented on a ring)

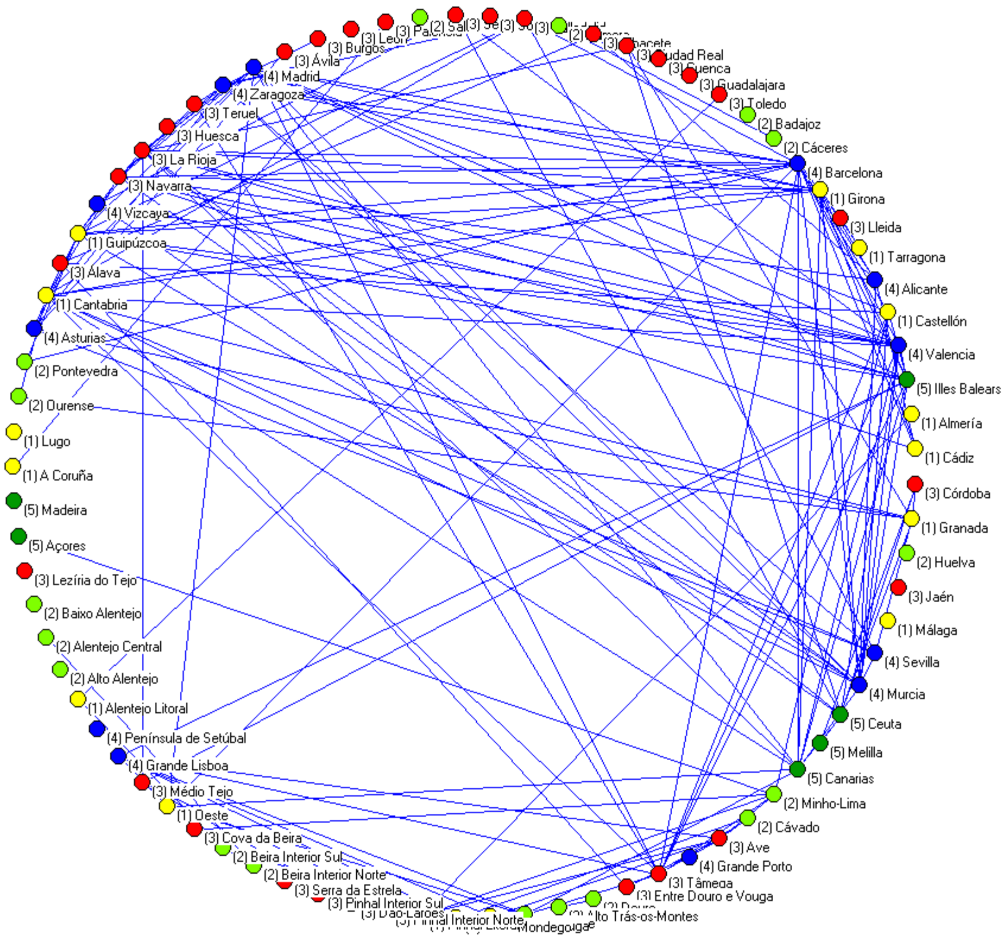
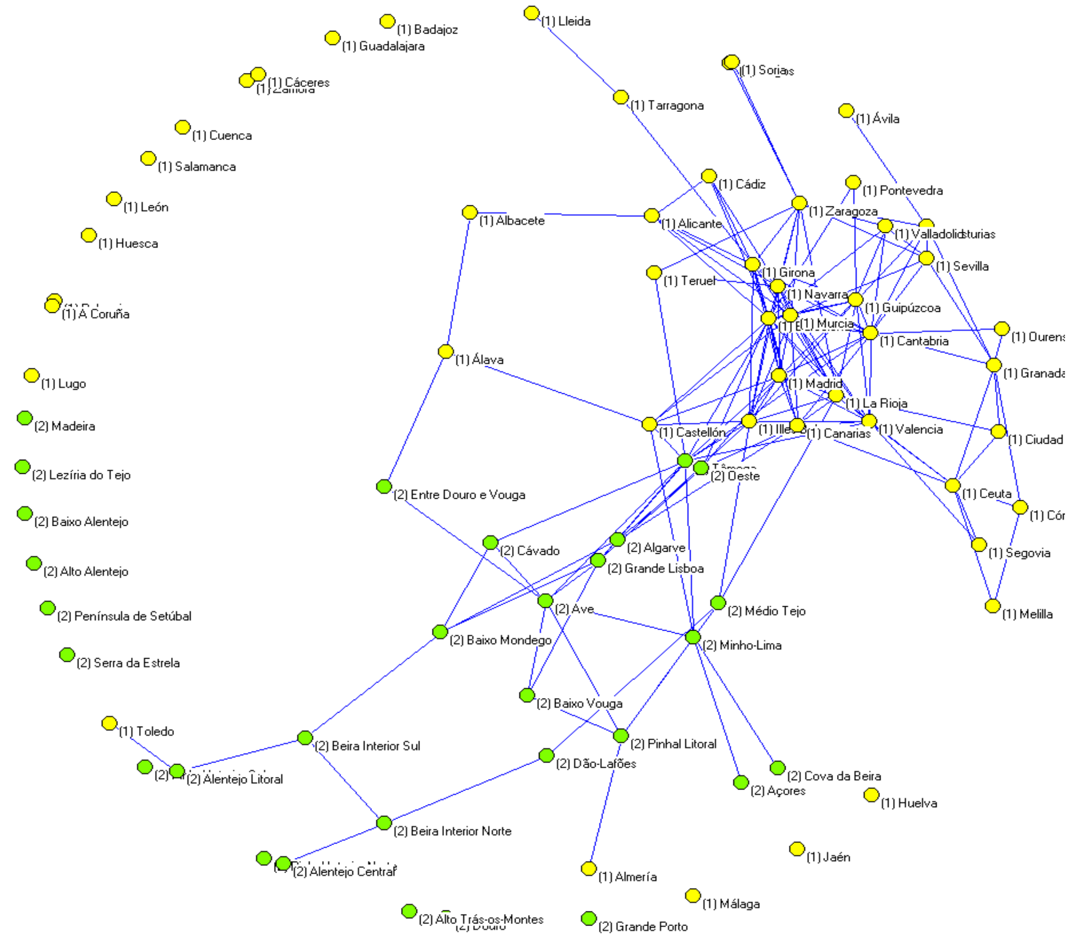


Figure 4.5: The network of Regions: country effect

Legend:



Legend: Spain: yellow; Portugal: green

Appendix 1: Portuguese and Spanish NUTS 3 level regions and classification (cont.)

N	REGION	NUT3	CLA.
42	Córdoba	ES613	EI
43	Granada	ES614	EL
44	Huelva	ES615	EF
45	Jaén	ES616	EI
46	Málaga	ES617	EM
47	Sevilla	ES618	EM
48	Murcia	ES620	EL
49	Ceuta (ES)	ES630	EP
50	Melilla (ES)	ES640	EP
51	Canarias (ES)	ES700	EP
52	Minho-Lima	PT111	PF
53	Cávado	PT112	PF
54	Ave	PT113	PI
55	Grande Porto	PT114	PM
56	Tâmega	PT115	PI
57	Entre Douro e Vouga	PT116	PI
58	Douro	PT117	PF
59	Alto Trás-os-Montes	PT118	PF
60	Algarve	PT150	PF
61	Baixo Vouga	PT161	PL
62	Baixo Mondego	PT162	PL
63	Pinhal Litoral	PT163	PL
64	Pinhal Interior Norte	PT164	PI
65	Dão-Lafões	PT165	PI
66	Pinhal Interior Sul	PT166	PI
67	Serra da Estrela	PT167	PI
68	Beira Interior Norte	PT168	PF
69	Beira Interior Sul	PT169	PF
70	Cova da Beira	PT16A	PI
71	Oeste	PT16B	PL
72	Médio Tejo	PT16C	PI
73	Grande Lisboa	PT171	PM
74	Península de Setúbal	PT172	PM
75	Alentejo Litoral	PT181	PL
76	Alto Alentejo	PT182	PF
77	Alentejo Central	PT183	PF
78	Baixo Alentejo	PT184	PF
79	Lezíria do Tejo	PT185	PI
80	Açores (PT)	PT200	PP
81	Madeira (PT)	PT300	PP