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WHAT SAID THE NEW ECONOMIC GEOGRAPHY ABOUT PORTUGAL?

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ABSTRACT

With this work we try to analyse the agglomeration process in Portugal, using the New Economic Geography models, in a linear and in a non linear way. In a non linear way, of referring, as summary conclusion, that with this work the existence of increasing returns to scale and low transport cost, in the Portuguese regions, was proven and, because this, the existence of agglomeration in Portugal. This work aims, also, to study the Portuguese regional agglomeration process, using the linear form of the New Economic Geography models. We pretend, yet, to explain the complementarily of clustering models, associated with the New Economic Geography, and polarization associated with the Keynesian tradition, describing the mechanisms by which these processes are based. As a summary conclusion, we can say which the agglomeration process shows some signs of concentration in Lisboa e Vale do Tejo (which is evidence of regional divergence in Portugal) and the productivity factor significantly improves the results that explain the regional clustering in Portugal (despite being ignored in the models of New Economic Geography). So, we can refer which the new economic geography said that in Portugal there is divergence between the continental regions.

Keywords: new economic geography; linear and non linear models; Portuguese regions.

1. INTRODUCTION

With this study we mainly aimed to analyze the process of agglomeration across regions (NUTS II) of Portugal, using non linear models of New Economic Geography, in particular, developments considered by (1)Krugman (1991), (2)Thomas (1997), (3)Hanson (1998) and (4)Fujita et al. (2000). We will also try to compare the results obtained by the empirical models developed by each of these authors ((5)Martinho, 2011a).

In a theoretical context, it is intended to explain the complementarily of clustering models, associated with the New Economic Geography, and polarization associated with the Keynesian tradition, describing the mechanisms by which these processes are based. It is pretended also studying the Portuguese regional agglomeration process, using the linear form the New Economic Geography models that emphasize the importance of factors in explaining the spatial concentration of economic activity in certain locations ((6)Martinho, 2011b).

2. THE NON LINEAR MODEL

Taking in to account the procedures referred in Martinho (2011a), we use the Krugman (1991), Thomas (1997) and Fujita et al. (2000) equations, respectively, as following (reduced and linearized):

$$\Delta\log(w_{it})=\sigma^{-1}\left[\begin{array}{l}\log(\sum_j Y_{jt}w_{jt}^{\frac{\sigma-1}{\mu}}e^{-\tau(\sigma-1)d_{ij}})-\\ \log(\sum_j Y_{jt-1}w_{jt-1}^{\frac{\sigma-1}{\mu}}e^{-\tau(\sigma-1)d_{ij}})\end{array}\right]+\Delta\nu_{it}\text{, (1)}$$

$$\Delta\log(w_{it})=\sigma^{-1}\left[\begin{array}{l}\log(\sum_j Y_{jt}^{\frac{\sigma(\mu-1)+1}{\mu}}H_{jt}^{\frac{(1-\mu)(\sigma-1)}{\mu}}w_{jt}^{\frac{\sigma-1}{\mu}}e^{-\tau(\sigma-1)d_{ij}})-\\ \log(\sum_j Y_{jt-1}^{\frac{\sigma(\mu-1)+1}{\mu}}H_{jt-1}^{\frac{(1-\mu)(\sigma-1)}{\mu}}w_{jt-1}^{\frac{\sigma-1}{\mu}}e^{-\tau(\sigma-1)d_{ij}})\end{array}\right]+\Delta\eta_{it}\text{, (2)}$$

$$\Delta \log(w_{it}) = \sigma^{-1}\left[\begin{array}{l}\log(\sum_j Y_{jt} w_{jt}^{\frac{\sigma-1}{\mu}} T_{ijt}^{-(\sigma-1)}) - \\ \log(\sum_j Y_{jt-1} w_{jt-1}^{\frac{\sigma-1}{\mu}} T_{ijt-1}^{-(\sigma-1)})\end{array}\right] + \Delta\psi_{it}, \quad (3)$$

In these equations, Yi is the income in region i, wi the wage in region i and dij is the distance between each pair of locations. Hi the supply of housing in the region i and Tij transport costs between regions i and j. The parameters to be estimated, these models are σ the elasticity of substitution between manufactured goods, μ the share of expenditure on manufactured goods and τ the transport costs to send a unit of manufactured goods in a unit distance. η_i, ν_i and ψ_i are error terms.

3. THE LINEAR MODEL

Considering only the equation of real wages, from the equations of static equilibrium, we obtain, in a reduced form the equation (4) and in a linear form the equation (5), taking in to account the procedures of Martinho (2011b).

$$\omega_r = \left[\sum_s Y_s T_{rs}^{1-\sigma} G_s^{\sigma-1}\right]^{1/\sigma} \left[\sum_s \lambda_s (w_s T_{sr})^{1-\sigma}\right]^{-\mu/(1-\sigma)}, \quad (4)$$

$$\log(\omega_r) = \frac{1}{\sigma}\log\left[\sum_s Y_s T_{rs}^{1-\sigma} G_s^{\sigma-1}\right] - \frac{\mu}{(1-\sigma)}\log\left[\sum_s \lambda_s (w_s T_{sr})^{1-\sigma}\right], \quad (5)$$

3.1. EQUATION LINEARIZED AND REDUCED OF THE REAL WAGES, WITH THE VARIABLES INDEPENDENT NATIONALLY AGGREGATED

Thus, the equation of real wages that will be estimated in its linear form, will be a function of the following explanatory variables:

$$\ln \omega_{rt} = f_0 + f_1 \ln Y_{pt} + f_2 \ln T_{rpt} + f_3 \ln G_{pt} + f_4 \ln \lambda_{pt} + f_5 \ln w_{pt} + f_6 \ln T_{prt} + f_7 \ln P_{rt}, \quad (6)$$

where:

- ω_{rt} is the real wage in region r (5 regions) for each of the manufacturing industries (9 industries);
- Ypt is the gross value added of each of the manufacturing industries at the national level;
- Gpt is the price index at the national level;
- λ_{pt} is the number of workers in each industry, at national level;
- Wpt is the nominal wage for each of the industries at the national level;
- Trpt is the flow of goods from each of the regions to Portugal;
- Tprt is the flow of goods to each of the regions from Portugal;
- Prt is the regional productivity for each industry;
- p indicates Portugal and r refers to each of the regions.

3.2. LINEARIZED AND REDUCED EQUATION OF REAL WAGES, WITH THE VARIABLES INDEPENDENT REGIONALLY DISAGGREGATED

Following it is presented the equation of real wages reduced and in a linear form, but now with the independent variables disaggregated at regional level, in other words, considered only for the region being analyzed, and not for the whole of Portugal, as in the previous equation. Although this equation does not consider the effect of nearby regions of r in this region, aims to be a simulation to determine the effect of the regions in their real wages, that is:

$$\ln \omega_{rt} = f_0 + f_1 \ln Y_{rt} + f_2 \ln T_{rpt} + f_3 \ln G_{rt} + f_4 \ln \lambda_{rt} + f_5 \ln w_{rt} + f_6 \ln T_{prt} \text{, (7)}$$

where:

- ω_{rt} is the real wage in the region r, for each of the manufacturing industries;
- Yrt is the gross value added of each of the manufacturing industries at the regional level;
- Grt is the price index at the regional level;
- λ_{rt} is the number of workers in each industry, at regional level;
- Wrt is the nominal wage per employee in each of the manufacturing industries at regional level;
- Trpt is the flow of goods from each region to Portugal;
- Tprt is the flow of goods to each of the regions from Portugal.

3.3. EQUATION OF THE AGGLOMERATION

In the analysis of the Portuguese regional agglomeration process, using models of New Economic Geography in the linear form, we pretend to identify whether there are between Portuguese regions, or not, forces of concentration of economic activity and population in one or a few regions (centripetal forces). These forces of attraction to this theory, are the differences that arise in real wages, since locations with higher real wages, have better conditions to begin the process of agglomeration. Therefore, it pretends to analyze the factors that originate convergence or divergence in real wages between Portuguese regions. Thus, given the characteristics of these regions will be used as the dependent variable, the ratio of real wages in each region and the region's leading real wages in this case (Lisboa e Vale do Tejo), following procedures of Armstrong (1995) and Dewhurst and Mutis-Gaitan (1995). So, which contribute to the increase in this ratio is a force that works against clutter (centrifugal force) and vice versa.

Thus:

$$\ln\left(\frac{\omega_{rt}}{\omega_{lt}}\right) = a_0 + a_1 \ln Y_{nt} + a_2 \ln T_{rl} + a_3 \ln L_{nt} + a_4 \ln P_{rt} + a_5 \ln RL_{rmt} + a_6 \ln RL_{rgt} + a_7 RL_{rkt} + a_8 \ln RL_{rnt} \text{, (8)}$$

where:

- Ynt is the national gross value added of each of the manufacturing industries considered in the database used;
- Trl is the flow of goods from each region to Lisboa e Vale do Tejo, representing the transportation costs;
- Lnt is the number of employees in manufacturing at the national level;
- Prt is the regional productivity (ratio of regional gross value added in manufacturing and the regional number of employees employed in this activity);
- RLrmt is the ratio between the total number of employees in regional manufacturing and the regional number of employees, in each manufacturing (agglomeration forces represent inter-industry, at regional level);
- RLrgt is the ratio between the number of regional employees in each manufacturing and regional total in all activities (represent agglomeration forces intra-industry, at regional level);
- RLrkt is the ratio between the number of regional employees in each manufacturing, and regional area (representing forces of agglomeration related to the size of the region);
- RLrnt is the ratio between the number of regional employees, in each of the manufacturing industries, and the national total in each industry (agglomeration forces represent inter-regions in each of the manufacturing industries considered).

The index r (1,..., 5) represents the respective region, t is the time period (8 years), n the entire national territory, k the area (km2), l the region Lisboa e Vale do Tejo, g all sectors and m manufacturing activity (9 industries).

4. THE DATA USED

Considering the variables of the model presented previously, and the availability of statistical information, we used the following data at regional level: temporal data from 1987 to 1994 for the five regions (NUTS II) in mainland Portugal and for the various manufacturing industries existing in these regions, from the regional database of Eurostat statistics (Eurostat Regio of Statistics 2000).

5. ESTIMATIONS MADE WITH THE NON LINEAR MODEL

Analysis of the results presented in Table 1, obtained in the estimations for the period 1987 to 1994, it appears that these are slightly different for the reduced equations of the three models considered, with the estimates made with the equation of the Thomas model present statistically better results. Possibly because it is an equation to work harder and thus beyond the centripetal forces of agglomeration processes favorable to consider also the centrifugal forces of anti-agglomeration by immobile factors. Anyway, the point that it confirms the results obtained with the estimates of three equations of some importance, but small, transport costs, given the low values of the parameter τ. Looking at the increasing returns to scale, calculating, as noted, the value $\sigma/(\sigma-1)$, it appears that this is always greater than one, reflecting the fact that there were increasing returns in the Portuguese regions in this period. It should be noted also that the parameter values μ are unreasonably high in all three estimations, however, as stated (7)Head et al. (2003) there is a tendency for these values fall around the unit in most empirical work.

Table 1: Results of estimations of the models of Krugman, Thomas and Fujita et al., in temporal differences, for the period 1987-1994, with panel data (at NUTS II level)

Krugman Model in differences

$$\Delta\log(w_{it}) = \sigma^{-1}\begin{bmatrix}\log(\sum_j Y_{jt} w_{jt}^{\frac{\sigma-1}{\mu}} e^{-\tau(\sigma-1)d_{ij}}) - \\ \log(\sum_j Y_{jt-1} w_{jt-1}^{\frac{\sigma-1}{\mu}} e^{-\tau(\sigma-1)d_{ij}})\end{bmatrix} + \Delta v_{it}$$

Parameters and R^2	**Values obtained**
σ	5.110* (3.611)
μ	1.262* (6.583)
τ	0.862** (1.622)
R^2	0.111
DW	1.943
SEE	0.196
Nº observations	284
$\sigma/(\sigma-1)$	1.243

Thomas Model in differences

$$\Delta\log(w_{it}) = \sigma^{-1}\begin{bmatrix}\log(\sum_j Y_{jt}^{\frac{\sigma(\mu-1)+1}{\mu}} H_{jt}^{\frac{(1-\mu)(\sigma-1)}{\mu}} w_{jt}^{\frac{\sigma-1}{\mu}} e^{-\tau(\sigma-1)d_{ij}}) - \\ \log(\sum_j Y_{jt-1}^{\frac{\sigma(\mu-1)+1}{\mu}} H_{jt-1}^{\frac{(1-\mu)(\sigma-1)}{\mu}} w_{jt-1}^{\frac{\sigma-1}{\mu}} e^{-\tau(\sigma-1)d_{ij}})\end{bmatrix} + \Delta\eta_{it}$$

Parameters and R^2	**Values obtained**
σ	9.076* (2.552)
μ	1.272* (21.181)
τ	0.713* (2.053)
R^2	0.145
DW	1.932
SEE	0.192
Nº Observações	284
$\sigma/(\sigma-1)$	1.124

Fujita et al. Model in differences	
$$\Delta \log(w_{it}) = \sigma^{-1}\left[\begin{array}{l}\log(\sum_j Y_{jt} w_{jt}^{\frac{\sigma-1}{\mu}} T_{ijt}^{-(\sigma-1)}) - \\ \log(\sum_j Y_{jt-1} w_{jt-1}^{\frac{\sigma-1}{\mu}} T_{ijt-1}^{-(\sigma-1)})\end{array}\right] + \Delta\psi_{it}$$	
Parameters and R^2	**Values obtained**
σ	2.410* (31.706)
μ	1.612* (3.178)
R^2	0.111
DW	1.990
SEE	0.215
Nº Observações	302
$\sigma/(\sigma-1)$	1.709

Note: Figures in brackets represent the t-statistic. * Coefficients statistically significant to 5%. ** Coefficient statistically significant 10%.

6. ESTIMATIONS MADE WITH THE LINEAR MODEL

The equation 6 of the real wages, estimated, presents satisfactory results in terms of statistical significance of coefficients, the degree of adjustment and autocorrelation of errors. For the signs of the estimated coefficients that represent the respective elasticities, taking into account the expected by the economic theory, we confirm that, apart the gross value added, the price index and the nominal wages per employee, all coefficients have the expected signs.

Table 2: Estimation of the equation of real wages with the independent variables aggregated at national level (without productivity), 1987-1994

$$\ln \omega_{rt} = f_0 + f_1 \ln Y_{pt} + f_2 \ln T_{rpt} + f_3 \ln G_{pt} + f_4 \ln \lambda_{pt} + f_5 \ln w_{pt} + f_6 \ln T_{prt}$$

Variable	**$\ln Y_{pt}$**	**$\ln T_{rpt}$**	**$\ln G_{pt}$**	**$\ln \lambda_{pt}$**	**$\ln w_{pt}$**	**$\ln T_{prt}$**		
Coefficient	**f_1**	**f_2***	**f_3***	**f_4**	**f_5***	**f_6***	**R^2**	**DW**
LSDV Coefficients T-stat. L. signif.	-0.038 (-0.970) (0.333)	0.674 (4.227) (0.000)	-0.967 (-7.509) (0.000)	0.025 (0.511) (0.610)	0.937 (15.239) (0.000)	-0.594 (-3.787) (0.000)	0.810	1.516
Degrees of freedom	290							
Number of obervations	302							
Standard deviation	0.146 **T.HAUSMAN - 416.930**							

(*) Coefficient statistically significant at 5%.

Table 3: Estimation of the equation of real wages with the independent variables aggregated at national level (with productivity), 1987-1994

$$\ln \omega_{rt} = f_0 + f_1 \ln Y_{pt} + f_2 \ln T_{rpt} + f_3 \ln G_{pt} + f_4 \ln \lambda_{pt} + f_5 \ln w_{pt} + f_6 \ln T_{prt} + f_7 \ln P_{rt}$$

Variable	**$\ln Y_{pt}$**	**$\ln T_{rpt}$**	**$\ln G_{pt}$**	**$\ln \lambda_{pt}$**	**$\ln w_{pt}$**	**$\ln T_{prt}$**	**$\ln P_{rt}$**		
Coefficient	**f_1***	**f_2***	**f_3***	**f_4***	**f_5***	**f_6***	**f_7***	**R^2**	**DW**
LSDV Coefficients T-stat. L. signif.	-0.259 (-7.064) (0.000)	0.557 (4.422) (0.000)	-0.884 (-9.671) (0.000)	0.256 (5.919) (0.000)	0.883 (19.180) (0.000)	-0.493 (-3.996) (0.000)	0.258 (10.443) (0.000)	0.858	1.560
Degrees of freedom	289								
Number of obervations	302								
Standard deviation	0.126 **T.HAUSMAN - 7086.989***								

(*) Coefficient statistically significant at 5%.

Table 4 presents the results of estimating equation 7 where the independent variables are disaggregated at regional level. About the signs of the coefficients, it appears that these are the expected, given the theory, the same can not be said of the variable λ_{rt} (number of employees). However, it is not surprising given the economic characteristics of regions like the Norte (many employees and low wages) and Alentejo (few employees and high salaries), two atypical cases precisely for opposite reasons. Analyzing the results in Tables 2, 3 and 4 we confirm the greater explanatory power of the variables when considered in aggregate at the national level.

Table 4: Estimation of the equation of real wages with the independent variables disaggregated at the regional level

$$\ln \omega_{rt} = f_0 + f_1 \ln Y_{rt} + f_2 \ln T_{rpt} + f_3 \ln G_{rt} + f_4 \ln \lambda_{rt} + f_5 \ln w_{rt} + f_6 \ln T_{prt},$$

Variables	**Const.**	**$\ln Y_{rt}$**	**$\ln T_{rpt}$**	**$\ln G_{rt}$**	**$\ln \lambda_{rt}$**	**$\ln w_{rt}$**	**$\ln T_{prt}$**		
Coefficients	**f_0***	**f_1***	**f_2***	**f_3***	**f_4***	**f_5***	**f_6***	**R^2**	**DW**
Random effects Coefficients T-stat. L. signif.	1.530 (3.355) (0.001)	0.101 (4.147) (0.000)	0.629 (4.625) (0.000)	-0.571 (-10.218) (0.000)	-0.151 (-5.364) (0.000)	0.516 (13.357) (0.000)	-0.506 (-3.985) (0.000)	0.670	1.858
LSDV		0.098* (4.129)	0.559* (4.449)	-0.624* (-11.380)	-0.155* (-6.130)	0.619* (16.784)	-0.411* (-3.511)	0.756	1.934
Degrees of freedom	295 - 289								
Number of obervations	302 - 302								
Standard deviation	0.155 - 0.165 **T.HAUSMAN - 72.843***								

(*) Coefficient statistically significant at 5%.

The results of the estimations made regarding equation 8 are shown in Tables 5 and 6. Two different estimates were made, one without the variable productivity (whose results are presented in Table 5) and one with this variable (Table 6).

Table 5: Estimation of the agglomeration equation without the productivity

$$\ln\left(\frac{\omega_{rt}}{\omega_{lt}}\right) = a_0 + a_1 \ln Y_{nt} + a_2 \ln T_{rl} + a_3 \ln L_{nt} + a_4 \ln RL_{rmt} + a_5 \ln RL_{rgt} + a_6 RL_{rkt} + a_7 \ln RL_{rnt}$$

Variab.	Constant	$\ln Y_{nt}$	$\ln T_{rl}$	$\ln L_{nt}$	$\ln RL_{rmt}$	$\ln RL_{rgt}$	$\ln RL_{rkt}$	$\ln RL_{rnt}$		
Coef.	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	R^2	DW
Random ef. V.Coef. T-stat. L. sign.	-3.991 (-3.317) (0.001)	-0.040 (-1.353) (0.177)	0.012 (1.469) (0.143)	0.390 (4.046) (0.000)	-0.413 (-4.799) (0.000)	-0.507 (-4.122) (0.000)	-0.228 (-4.333) (0.000)	0.368 (4.249) (0.000)	0.253	1.474
Degrees of freedom	293									
Number of obervations	302									
Standard deviation	0.126 **T.HAUSMAN - 1.870**									

(*) Coefficient statistically significant at 5%.
(**) Coefficient statistically significant at 10%.

Table 6: Estimation of the agglomeration equation with the productivity

$$\ln\left(\frac{\omega_{rt}}{\omega_{lt}}\right) = a_0 + a_1 \ln Y_{nt} + a_2 \ln T_{rl} + a_3 \ln L_{nt} + a_4 \ln P_{rt} + a_5 \ln RL_{rmt} + a_6 \ln RL_{rgt} + a_7 RL_{rkt} + a_8 \ln RL_{rnt}$$

Variab.	Constant	$\ln Y_{nt}$	$\ln T_{rl}$	$\ln L_{nt}$	$\ln P_{rt}$	$\ln RL_{rmt}$	$\ln RL_{rgt}$	$\ln RL_{rkt}$	$\ln RL_{rnt}$		
Coef.	a_0*	a_1*	a_2*	a_3*	a_4*	a_5*	a_6*	a_7*	a_8*	R^2	DW
Random eff. V.Coef. T-stat. L. sign.	-3.053 (-2.991) (0.003)	-0.240 (-7.182) (0.000)	0.015 (2.026) (0.044)	0.486 (5.934) (0.000)	0.218 (8.850) (0.000)	-0.266 (-3.494) (0.001)	-0.333 (-3.102) (0.002)	-0.141 (-3.067) (0.002)	0.230 (3.026) (0.003)	0.455	1.516
LSDV	-0.307* (-9.259)	-0.033* (-4.821)	0.330* (5.701)	0.256* (8.874)	-0.049 (-0.972)	0.011 (0.169)	-0.027 (-0.968)	0.006 (0.137)		0.649	1.504
Degrees of freedom	292 - 285										
Number of obervations	302 - 302										
Standard deviation	0.116 - 0.136 **T.HAUSMAN - 33.578***										

(*) Coefficient statistically significant at 5%.

Comparing the values of two tables is confirmed again the importance of productivity (Prt) in explaining the wage differences. On the other hand improves the statistical significance of coefficients and the degree of explanation.

7. CONCLUSIONS

In light of what has been said above, we can conclude, with the non linear models, the existence of agglomeration processes in Portugal (around Lisboa e Vale do Tejo) in the period 1987 to 1994, given the low transport costs, what was shown by the $\sigma/(\sigma-1)$ and the $\sigma(1-\mu)$ values obtained in the estimations made with the reduced forms of the models presented above. On other hand, there are increasing returns to scale in manufacturing in the Portuguese regions.

With the linear models, it appears that the explanatory power of the independent variables considered in models of the New Economic Geography, is more reasonable, even when these variables are considered in their original form, in other words, in the aggregate form for all locations with strong business with that we are considering (in the case studied, aggregated at national level to mainland Portugal). However, the agglomeration process of the Portuguese regions, analyzing the set of coefficients of the estimations, in Lisboa e Vale do Tejo is not impressive, but when we look at the data this region has a greater potential of attractiveness of the population and economic activity. This is because that's where real wages are more uniform across different industries and higher than in other regions. However, the estimation results reflect some strange situations, in the face of the theory, namely the fact the Norte has the highest value of employees in manufacturing, the highest gross value added in this industry, but has the lowest real wages, explained possibly by the great weight of the textile industry in this region. The same we verify, but precisely in the contrary to the Alentejo. Perhaps, a finer spatial unit could help to explain these strange situations, but the lack of data for the NUTS III prevents this analysis. Anyway, the direct effect of considering large spatial units is reduced (as can be seen in Table 6 with the value obtained for the variable RLrkt, or -0141). Despite some inconsistencies found in the face of the theory, it was possible to identify a set of centripetal forces (forces that favor the agglomeration) and a set of centrifugal forces (forces that work against agglomeration).

On the other hand, given the existence of "backward and forward" linkages and agglomeration economies, represented in the variables RIrmt and RLrgt, we can affirm the existence of growing scale economies in the Portuguese manufacturing industry during the period considered. This taking into account the mentioned by (8)Marshall (1920) which in modern terminology argued that increasing returns to scale occur in industry, in the face of "spillover" effects, advantages of market expertise and "backward" and "forward" linkages associated with large local markets. Therefore, the trend during this period was for the regional divergence in Portugal, considering what referred by Hanson (1998), in other words, "The interaction of scale economies and transport costs creates a centripetal force, to use Krugman's language, that causes firms to agglomerate in industry centers".

It should be noted also that different estimates were made without the productivity variable and with this variable in order to be analyzed the importance of this variable in explaining the phenomenon of agglomeration. It seems important to carry out this analysis, because despite the economic theory consider the wages that can be explained by productivity, the new economic geography ignores it, at least explicitly, in their models, for reasons already mentioned widely, particular those related to the need to make the models tractable.

Finally, is important to refer the importance of the transportation costs in explaining the spatial issues, reinforced by the fact that the estimates made with the seven NUTS II Portugal (including Madeira and Açores) present values much worse than when considering only the five NUTS II. What makes sense, since the real wage developments do not follow the increase in transport costs from the continent for these two Portuguese islands.

So, we can conclude which the new economic geography said that in Portugal we have spatial divergence between the continental regions and the transport costs play here a important role.

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