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NET MIGRATION AND CONVERGENCE IN PORTUGAL. AN ALTERNATIVE ANALYSIS

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ABSTRACT

In this work we pretend to present a project of research about the identification of the determinants that affect the mobility of labor. The empirical part of the work will be performed for the NUTS II of Portugal, from 1996 to 2002. As main conclusion it can be said which is confirmed the existence of some labor mobility in Portugal and that regional mobility is mainly influenced positively by the output growth and negatively by the unemployment rates and by the weight of the agricultural sector. This study analyses, also, through cross-section estimation methods, the influence of spatial effects and human capital in the conditional productivity convergence in the economic sectors of NUTs III of mainland Portugal between 1995 and 2002.

Keyword: net migration; convergence; panel and cross-section estimations; Portuguese regions.

1. INTRODUCTION

There are many authors who have dedicated themselves to issues of labor mobility, with very different theoretical assumptions, trying to investigate how these issues or do not explain the regional differences. For example, the authors associated with the Neoclassical theory, as (1)Solow (1956), consider that the tendency is, for the labor mobility, to alleviate, in the medium and long term, the regional disparities. This, because these authors consider the mobility of factors as a function of wages and the supply of resources as exogenous. Thus, what determines the mobility factor is their compensation.

In another context, it appears that the current trend of several economic theories is to consider that the labor mobility accentuates regional disparities. Even writers in the line of neoclassical theory, as Barro and (5)Sala-i-Martin (1991), associated with endogenous growth theory, now admit that the mobility of labor reacts to processes of convergence and reduce regional disparities, but only if some conditions are met. That is, left to disappear the idea of absolute convergence for the same "steady state" of neoclassical influence, to a perspective of conditional convergence for differents "steady states" (2-4)(Martinho, 2011a, 2011b and 2011c).

2. THE THEORETICAL MODEL FOR NET MIGRATION WITH PANEL DATA

We consider here, the models related to the migratory balance of (5)Salvatore (1977), (6)Katseli et al. (1989) and (7)Soukiazis (1995) and the models of the New Economic Geography of (8)Epifani et al. (2005). The choice of these models has to do with the fact that seem to be more closely aligned with the objectives set for this work initially just in the abstract. That is, models Salvatore (1977), Katseli et al. (1989) and Soukiazis (1995) are models simpler and can identify the determinants of labor mobility and the Epifani et al. (2005) is a more complete model that allows us to analyze the dynamics associated with the spatial evolution with implications for labor migration and unemployment.

The model estimated in this study is what is presented below in equation 1. Are represented in the model presented below some new factors, mentioned in the economic theory, such as the effects of congestion, through the availability of housing.

$$(SM/PA)_t = c_0 + c_1(r_I - r_E)_t + c_2(D_I - D_E)_t + c_3(A_I)_t + c_4(s_I - s_E)_t + c_5(f_I - f_E)_t \qquad (1)$$

SM/PA = net migration from one country or region with the outside, as a percentage of total active population of the country or region;
r_I-r_E = difference between the growth rates of real output, with r_I to be the annual growth rate of real output of the originating country or region and r_E being the average growth rates of real GDP in all countries or regions destination;
D_I-D_E = difference between the internal unemployment rate and the external average;
AI = number of employees in agriculture of the country or region of origin;
s_I-s_E = difference between the internal growth rate of wage and external average;

f_I-f_E = difference between the internal growth rate of housing and external average.

3. THE THEORETICAL MODEL FOR CONDITIONAL CONVERGENCE WITH SPATIAL EFFECTS AND CROSS-SECTION DATA

Bearing in mind the theoretical considerations, what is presented next is the model used to analyse conditional productivity convergence with spatial effects, at a sector and regional level (NUTs III) in mainland Portugal:

$$(1/T)\log(P_{it}/P_{i0}) = \alpha + \rho W_{ij} p_{it} + b\log P_{i0} + X'\gamma + \varepsilon_{it}, \text{ with } \alpha > 0 \text{ e } \beta < 0 \qquad (2)$$

In this equation (2) P is sector productivity, p is the rate of growth of sector productivity in various regions, W is the matrix of distances, X is the vector of variables which represent human capital (levels of schooling – primary, secondary and higher) b is the convergence coefficient, ρ is the autoregressive spatial coefficient (of the spatial lag component) and ε is the error term (of the spatial error component, with, $\varepsilon = \lambda W\varepsilon + \xi$). The indices i, j and t, represent the regions under study, the neighbouring regions and the period of time respectively.

4. EMPIRICAL EVIDENCES

Then we present empirical evidence for the different NUTS II, from 1996 to 2002, and for the NUTS III in 1995 and 2002.

4.1. EMPIRICAL EVIDENCES ON THE LEVEL OF NUTS II

Analyzing the results presented below in Table 1 for the estimation of equation (1), we verify which the estimation method which we must to take in count is that of random effects, given the value of the Hausman test (no significant statistics). On the other hand, only the coefficients associated with the relative growth rates of real output, unemployment rates and the relative share of agricultural employment are that have statistical significance. The first coefficient referred has positive effect (only significant for 10%) and the last two negative effects (as it was expected, given the theory). It should be noted, however, that the coefficient associated with the share of employment has the highest marginal effect (-1.913).

For these reasons, we conclude that the regional mobility of labor in mainland Portugal is positively affected by growth rates of real output, in other words, greater is the difference between the rate of growth of real output of a region and the average growth rates of other regions most is the migration of workers into the region. On the other hand, it appears that mobility is negatively related to unemployment rates and the relative share of agricultural employment. That is, higher the unemployment rate of a region and greater the weight of the agricultural sector, lower is the labor migration to this region.

The growth rates for wages and growth rates on the housing stock does not have statistical significance and because this they have no influence on national labor mobility. What is not a surprising, given the Portuguese regional context.

Table 1: Results of panel estimations, with the equation of net migration for the NUTS II in the period 1996-2002

$$(SM/PA)_t = c_0 + c_1(r_I - r_E)_t + c_2(D_I - D_E)_t + c_3(A_I)_t + c_4(s_I - s_E)_t + c_5(f_I - f_E)_t$$

	c_0	c_1	c_2	c_3	c_4	c_5	G.L.	R^2	SEE	T.H.
LSDV	(#)	0.235 (1.062)	-0.008** (-1.890)	-0.746* (-2.228)	-0.027 (-0.086)	0.150 (0.618)	20	0.693	0.013	6.157 (0.188)
GLS	0.148* (2.627)	0.310** (1.802)	-0.020* (-3.234)	-1.913* (-3.153)	-0.078 (-0.333)	0.247 (1.395)	18	0.708	0.013	

Note: LSDV, method of estimation with fixed effects; GLS estimation method with random effects; * Coefficient statistically significant at 5%; ** Coefficient statistically significant at 10%; GL, Degrees of freedom; SEE, standard deviation estimation; TH, Hausman Test; (#), all "dummies" statistical significance and values are very close. Figures in brackets are the t-statistics.

4.2. EMPIRICAL EVIDENCES ON THE LEVEL OF NUTS III

The results concerning OLS estimates of conditional convergence with tests of spatial specification are present in Table 2, which follows.

Table 2: OLS estimation results for the equation of absolute convergence with spatial specification tests

$$(1/T)\log(P_{it}/P_{i0}) = \alpha + b\log P_{i0} + \varepsilon_{it}$$

	Con.	Coef. b	JB	BP	KB	M'I	LM_l	LMR_l	LM_e	LMR_e	$\bar{R}^2$	N.O.
Agriculture	-0.399* (-3.974)	0.046* (4.082)	0.234	1.248	0.926	-0.078	0.343	3.679**	0.492	3.827**	0.367	28
Industry	0.490* (5.431)	-0.047* (-5.090)	0.971	17.573*	13.065*	0.120**	0.003	0.863	1.149	2.009	0.480	28
Services	0.181** (1.928)	-0.014 (-1.479)	0.031	4.627*	4.094*	0.092	1.499	4.924*	0.673	4.098*	0.042	28
Total of sectors	0.138* (2.212)	-0.010 (-1.559)	0.437	0.296	0.271	-0.141	2.043	0.629	1.593	0.180	0.050	28

Note: JB, Jarque-Bera test; BP, Breusch-Pagan test; KB, Koenker-Bassett test: M'I, Moran's I; LM_l, LM test for spatial lag component; LMR_l, robust LM test for spatial lag component; LM_e, LM test for spatial error component; LMR_e, robust LM test for spatial error component;R^2, coefficient of adjusted determination; N.O., number of observations; *, statistically significant to 5%; **, statistically significant to 10%.

Productivity convergence is only seen in industry, although the values of the convergence coefficient present indications of heteroskedasticity, according to the BP and KB tests. Agriculture presents clear signs of divergence, since the convergence coefficient is positive and statistically significant. Convergence in the productivity sector will be conditioned by spillover effects spatial error in agriculture, eventually, and spillover effects spatial lag in services, according to the LM tests.

Table 3 presents the results of the estimates of spillover effects spatial error for agriculture and spillover effects spatial lag for services.

Table 3: ML estimation results for the equation of conditional convergence to spatial effects

$$(1/T)\log(P_{it}/P_{i0}) = \alpha + \rho W_{ij}\, p_{it} + b\log P_{i0} + \varepsilon_{it}$$

	Constant	Coefficient	Spatial coefficient	Breusch-Pagan	$\bar{R}^2$	N.Observations
Agriculture	-0.460* (-6.419)	0.053* (6.558)	-0.496 (-1.405)	0.915	0.436	28
Services	0.122 (1.365)	-0.010 (-1.065)	0.327 (1.268)	4.884*	0.138	28

Note: *, statistically significant to 5%; **, statistically significant to 10%; *, spatial coefficient of the spatial error model for agriculture and spatial lag model for services.**

The convergence coefficient for agriculture is similar to what is presented in Table 2, although it has improved slightly statistically. In services the convergence coefficient is slightly different in terms of values obtained and statistical significance. On the other hand, the coefficients of spatial variables have no statistical significance. As a result, convergence in agriculture and services is not conditioned by spatial effects.

Table 4 presents a series of estimates for conditional sector productivity convergence, with the level of schooling as a proxy for human capital (NUTs III). Three levels of schooling were considered (primary, secondary and higher education) represented by different variables. These variables were obtained through the percentage of the population with each level of schooling in relation to the total number of people, taking into account the data from the Census 2001. Different estimates for each sector were carried out for level of schooling so as to avoid problems of multicollinearity.

Table 4: Empirical evidence of the importance of the level of schooling in the convergence of productivity in the various economic sectors

$$(1/T)\log(P_{it}/P_{i0}) = \alpha + b\log P_{i0} + X'\gamma + \varepsilon_{it}$$

	Con.	Coef.1	Coef.2	JB	BP	KB	M'I	LM_l	LMR_l	LM_e	LMR_e	R^2	N.O.
Agriculture													
Prim.	-0.200 (-1.552)	0.037* (3.302)	-0.220* (-2.249)	8.486*	5.007**	2.054	-0.089	0.243	3.284**	0.632	3.672**	0.453	28
Sec.	-0.440* (-4.401)	0.040* (3.508)	0.253 (1.684)	8.890*	7.908*	3.232	-0.112	0.129	3.723**	0.996	4.591*	0.409	28
High..	-0.370* (-3.882)	0.039* (3.477)	0.414* (2.098)	1.085	2.466	1.526	-0.053	0.672	3.914*	0.223	3.466**	0.440	28
Industry													
Prim.	0.578* (6.197)	-0.050* (-5.700)	-0.116* (-2.198)	0.565	18.144*	12.359*	0.076	0.010	0.180	0.461	0.630	0.547	28
Sec.	0.448* (4.809)	-0.048* (-5.212)	0.118 (1.426)	0.746	13.761*	10.875*	0.109**	0.049	0.339	0.943	1.234	0.500	28
High..	0.521* (6.285)	-0.053* (-6.062)	0.271* (2.544)	3.450	33.593*	16.957*	0.016	0.054	0.161	0.021	0.128	0.570	28

Services													
Prim.	0.371* (2.059)	-0.032** (-1.853)	-0.034 (-1.231)	0.323	6.990*	5.055**	0.101	1.890	6.694*	0.819	5.623*	0.061	28
Sec.	0.234** (1.801)	-0.021 (-1.435)	0.021 (0.596)	0.033	5.873**	5.031**	0.093	1.607	7.047*	0.685	6.125*	0.018	28
High.	0.284* (2.203)	-0.025** (-1.872)	0.051 (1.157)	0.553	10.749*	7.736*	0.105	1.791	3.734**	0.875	2.818**	0.054	28
Total of sectors													
Prim.	0.307* (3.405)	-0.024* (-2.900)	-0.070* (-2.427)	0.662	0.302	0.402	-0.078	2.239	2.672	0.482	0.914	0.201	28
Sec.	0.188* (2.816)	-0.018* (-2.326)	0.072** (1.727)	0.775	0.223	0.290	-0.075	1.572	1.952	0.448	0.828	0.118	28
High..	0.213* (3.001)	-0.019* (-2.461)	0.106** (1.929)	0.130	1.134	1.072	-0.165	3.354**	1.331	2.178	0.156	0.140	28

Note: Prim., estimate with primary education; Sec., estimate with secondary education; High., estimate with higher education; Con., constant; Coef.1, coefficient of convergence; Coef. 2 coefficient of level of schooling; JB, Jarque-Bera test; BP, Breusch-Pagan test; KB, Koenker-Bassett test: M'I, Moran's I; LM_l, LM test for spatial lag component"; LMR_l, robust LM test for spatial lag component; LM_e, LM test for spatial error component; LMR_e, robust LM test for spatial error component; R^2, r squared adjusted; N.O., number of observations *, statistically significant to 5%; **, statistically significant to 10%.

In agriculture, for the three levels of schooling, the indications of divergence are maintained, since the coefficients for convergence present a positive sign with statistical significance, although the values are slightly lower, which is a sign that the level of schooling productivity convergence in this sector, albeit slightly. On the other hand, as could be expected, primary education has a negative effect on the growth of productivity in agriculture for the period 1995 to 2002, while higher education has a positive effect. Therefore, the progress in the level of schooling in this sector improves productivity performances. As far as the LM test of specification are concerned, with the exception of the results obtained from the estimations of higher education, all figures confirm the previous results for this sector, or, in other words, the better specification of the model is with the spatial error component.

Industry confirms in these estimations the signs of productivity convergence across the NUTs III of mainland Portugal from 1995 to 2002, a fact which is only favoured by higher education (since the effect of higher education is positive and increases convergence). The non-existence of indications of spatial autocorrelation was also confirmed, given the values of the LM tests.

Contrary to what was seen in the results for absolute convergence, in these estimations of conditional productivity convergence in services, has the level of schooling as a conditioning variable. Some indications of convergence can be seen in the equations of primary education and higher education, which is sign that eventually convergence will be conditioned to human capital in this sector (since none of the coefficients associated to the variables of the level of schooling has statistical significance). On the other hand, taking into account the LM tests, it is confirmed that the better specification of the model is with the spatial lag component.

In the total of sectors, something similar to what was verified in services can see, or, in other words, the convergence coefficient has no statistical significance in the estimations for absolute convergence, but is present in the estimations for conditional productivity convergence with human capital. The difference is that here the coefficients of conditioning variables demonstrate statistical significance, an indicator that convergence in the total of sector sis conditioned by level of schooling.

Finally, it should be noted that the greatest marginal effect is through higher education schooling, which indicates that the higher the level of schooling, the greater the growth in productivity.

5. CONCLUSIONS

It is noted also that in the period 1996 to 2002, the Algarve was the region with higher percentages for net migration. Different trend showed the Alentejo region which has even negative migration balance at the beginning of the period, which is understandable, since it is the region with the highest rates of unemployment and highest percentage of employment in agriculture.

At NUTs III level and with cross-section data, it can be seen that sector by sector the tendency for productivity convergence is greatest in industry. With reference to spatial autocorrelation it is also confirmed that this possibly exists in agriculture and services, when taking into account the LM tests. Following the procedures of Florax et al. (2003) the equation is estimated with the spatial error component for agriculture and the spatial lag component for services, and it can be seen that the consideration of these spatial effects does not significantly alter the results obtained previously with the OLS estimation. The level of schooling as proxy for human capital conditioning productivity convergence, improves the value and the statistical significance of convergence coefficients. On the other hand, above all the variable which represents higher education shows indications which directly favour the growth of productivity, since the coefficient associated to it presents in all economic sectors the greatest marginal positive effect.

Beside, the different regional level used, the conclusions are more or less consistent and we can say which the tendency in this period is for the regional divergence.

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