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Inter-regional Wage Dispersion in Portugal

José António Cabral Vieira
João Pedro Almeida Couto
Maria Teresa Borges Tiago

University of the Azores – Dep. of Economics and Management
Rua Mãe de Deus
9500 Ponta Delgada Portugal

E-mail: josevieira@notes.uac.pt

Abstract

This paper examines the size o inter-regional wage dispersion in Portugal. For this purpose, we estimate a Mincer-type human capital wage equation, including controls for a large number of districts, and calculate a weighted and adjusted standard deviation (WASD) of inter-regional wage differences. The value is high and quite stable over time. The highest wages are found in the region of Lisbon and the Tagus Valley. Moreover, the results are quite sensitive to inclusion of human capital and industry controls. A decomposition analysis reveals that differences average years of education and in the return to education across regions account for a significant fraction of observed wage differentials.

Keywords: regions, wages, human capital, Portugal

JEL Codes: J31, R10

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1. Introduction

The role of regions for wage differentials has been put forward in the literature by several authors (see e.g. Dumond et al., 1999, Duranton and Monastiriotis, 2002 and Bernard et al. (2003). The main goal of this paper is to provide further evidence on the role of regions to wage determination as well as evaluate the size of regional wage differentials in a small country as Portugal.

This is, however, a country for which a few studies have already addressed the effect of regions on wages. For instance, Cardoso (1991) documents the existence of large wage differentials among the Portuguese regions. Vieira (1999) indicates that after controlling for a large number of individual and job attributes employees working in the area of Lisbon and the Tagus Valley earn higher wages than their counterparts in other regions (the lowest wages were paid in the central region of the country). Teulings and Vieira (2004) compare wages in Lisbon and the Tagus Valley with those paid in the rest of the country and argue that higher wages in Lisbon result from differences in the returns to human capital between those two regions. In particular, they argue that equally skilled workers obtain higher returns on human capital due to differences in technology (complexity of the jobs). More recently, Vieira and Madruga (2005) examined low-pay employment incidence and mobility in Portugal and conclude that those working in the region of Lisbon are less likely to be found in the low pay segment and, once in such a situation, are more likely to escape from it.

A common feature of most of the aforementioned studies is a high level of aggregation of the regions (in some cases only Lisbon and the Tagus Valley versus the rest of the country), which may to some extent lead to misleading results. In this study, we examine the impact of regions on wages considering eighteen districts. Moreover, we make use of a decomposition analysis to disentangle how prices and differences in individual and job attributes contribute to observed wage differentials.

The paper is organised as follows. Next section describes the data. Section 3 presents the size of inter-regional wage differences for apparently equally-skilled workers. Section 4 decomposes observed raw (log) wage differentials among regions and the nationwide average into differences in individual and job attributes and differences in returns to these attributes. Finally, section 5 concludes and summarises.

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2. Data

The data used here were drawn from *Quadros de Pessoal* (Personnel Records) for 1996 and 2000. This is a standardised questionnaire which all firms with wage earners must complete every year for the Department of Labour. The data include information on individual workers such as age, tenure with the current firm, the highest completed level of education, and gender. Information is also available on hours of work, firm size, industry affiliation, and regions. Years of education were calculated by attributing the nominal number of completed years in order to complete the reported level in the data. Potential labour market experience was computed as age minus years of education minus six. Hourly wages were calculated as monthly wages divided by the number of hours worked. Civil servants and others serving in the armed forces are not included in the data source. The final samples contain 1 439 158 and 1 713 488 non-agricultural, and non-fishermen workers between 16 and 65 years of age in 1996 and 2000, respectively. Records with missing values were deleted from the original sample, as were the self-employed, unpaid family workers and apprentices. The data refers only to the mainland.

3. The size of inter-regional wage differentials

This section presents the estimation of regional wage gaps. The estimates are based on a human capital wage-equation of the type presented by Mincer (1974), expanded with a set of other covariates. The equation reads as follows:

$$\ln w_i = \beta' X_i + \theta' Z_i + \varepsilon_i \qquad i=1,2.,\ldots,N \qquad (1)$$

where ln w_i denotes the natural logarithm of wages and X_i is a vector of explanatory variables which include a unit vector and controls for gender and human capital accumulation indicators such as years of education, years of labour marked experience and its square and years of tenure with the firm. It also includes controls for the logarithm of firm size, and eight industry dummies. The inclusion of these variables are justified by the fact that several authors have shown that firm size and industry affiliation play a role in explaining wage differences for apparently equally-skilled workers (see Krueger and Summers, 1988, Edin and Zatterberg, Arai 1994, Lausten,

1995, Idson and Feaster, 1990 and Oosterbeek and van Praag, 1995). In such a case, and to extent that industry location and firm size differ among regions, the effect of regions on wages would be biased in the absence of the inclusion of those variables. Finally, Z_i is a set of regional dummies; each of these dummies takes the value 1 if the individual works in an establishment located in specific region and 0 otherwise. These variables were defined based on two specifications. In the first specification, we used the Portuguese districts (18 districts). In the second specification we considered a higher level of aggregation and used the NUTs II classification (5 regions).

We have also estimated some restricted specifications of the aforementioned equation, namely by excluding the human capital controls, excluding the industry dummies and one equation which only includes controls for regions (i.e. Z_i). In order to evaluate the importance of regions in shaping the wage structure, conventional F-tests were performed. The null hypothesis that regions play no role in explaining the wage structure (i.e. $\theta' = 0$) is rejected in all cases at the 1% level of significance. [1]

Table 1 and Table 2 include the estimated region coefficients in deviations from the employment-weighted mean. A similar procedure has been used in other works that examine the role of industry affiliation to wages (see e.g. Krueger and Summers, 1988 and Lausten, 1995). A negative (positive) sign indicates that the respective region pays below (above) the weighted average. The results included in Table 1 indicate that the range of differentials is significant. In 1996 the wage premium varies between -15.1% in Bragança and 8.9% in Lisbon. In 2000 the differences amount to -13.8% in Castelo Branco and 8.8% in Lisbon. When the regions are defined at a higher level of aggregation (NUTs II) the differences vary between -6.3% in the Center of the country and 6.6% in Lisbon and the Tagus Valley in 1996 (see Table 2). The figures are -5.6% in the North and 6.1% in Lisbon and the Tagus Valley in 2000.[2] The results included in Table 3 for the Pearson as Spearman correlation coefficients reveal that the rankings of pay among regions remained very stable between 1996 and 2000.

--------- insert Table 1 about here ---------

[1] When considering the district level classification the values of the F-statistic amount to 2235 in 1996 and to 2496 in 2000. Considering the regions defined as in NUTs II the values equal 6889 in 1996 and 7141 in 2000.

[2] These values were computed as $d = (\exp(r) - 1) \times 100$, where r denotes the value of the coefficient in difference from the weighted mean , such as presented in Table 1 and Table 2.

--------- insert Table 2 about here ---------

--------- insert Table 3 about here ---------

A summary statistic which can measure the magnitude of inter-regional wage differentials, conditional on worker and job characteristics, is the weighted and adjusted standard deviation presented by Krueger and Summers (1988). The adjusted standard deviation of the regional wage premiums in a given year is given by:

$$\mathrm{ASD}(\theta) = \left[\mathrm{var}(\hat{\theta}) - \sum_{j=1}^{K} \frac{\hat{\sigma}_j^2}{K} + \sum_{j=1}^{K} \sum_{p=1}^{K} \frac{\hat{\sigma}_{jp}}{K^2} \right]^{1/2} \qquad (2)$$

where $\mathrm{var}(\hat{\theta})$ is the variance of the estimated industry coefficients, $\hat{\sigma}_j$ is estimated standard error of $\hat{\theta}_j$, $\hat{\sigma}_{jp}$ is the covariance between $\hat{\theta}_j$ and $\hat{\theta}_p$ ($j \neq p$), and K is the number of regions. By ignoring covariance terms and weighting, the weighted and adjusted standard deviation of the inter-regional wage differentials is calculated as:

$$\mathrm{WASD}(\theta) = \left[\mathrm{w\,var}(\hat{\theta}) - \sum_{j=1}^{k} \alpha_j \hat{\sigma}_j^2 \right]^{1/2} \qquad (3)$$

where α_j is the share of workers in industry j and $\mathrm{w\,var}(\hat{\theta})$ is the employment weighted differences of the industry wage differences.

Calculated WASD(θ) are included at the bottom of Table 1 and Table 2. These tables also compare the values for the main (unrestricted) wage equation with three restricted versions (without industry controls, without human capital controls and only region controls). For the sake of comparison, we also include the unweighted and unadjusted standard deviation, SD(θ).

As can be seen, weighting and adjusting increases the size of the dispersion. This is however mainly due to weighting, since adjustments for sampling error play a minuscule role. If the regression only includes regional dummies the WASD(θ) equals 0.227 in 1996 and 0.211 in 2000. Including controls for education, experience, tenure, gender, firm size and industries the value reduces to 0.073 in 1996 and 0.070 in 2000. This value increases to 0.115 in 1996 and to 0.111 once we remove the human capital controls (education, experience and tenure with the firm). For the sake of comparison, it is interesting to notice that if instead of human capital we had removed the industry controls, the WASD(θ) would have slightly increased to 0.089 in 1996 and to 0.082 in 2002. This suggests that differences in human capital among regions are much more important to the explanation of observed wage differentials among regions than are industry differences.

4. Decomposition of observed wage differentials

In this section we intend to untie the contribution in average attributes (endowments) from differences in rewards to those attributes to the observed average log-wage differential between each region and the whole country. To do this, we apply a wage decomposition analysis that separates out these effects. Oaxaca (1973) and Blinder (1973) were pioneers of this technique, which was designed to analyse labour market discrimination. The decomposition used here is encompassed in the more general formula presented by Cotton (1988).

In order to pursue we have to estimate a separate wage equation for each region of the type:

$$\ln w_{ij} = \beta'_j X_{ij} + \varepsilon_{ij} \qquad (4)$$

where X_{ij} is a set of explanatory variables (including a vector of ones) β_j are vectors of unknown parameters to be estimated and εij is an error term. The subscripts *i* and *j* index individual workers and the corresponding region, respectively. We also estimate and equation for the whole country (reference category) of the type:

$$\ln w_{is} = \beta_s^{'} X_{is} + \varepsilon_{is} \qquad (5)$$

The sample differential in observed average log-wages between region *j* and the country-wide average *s* is decomposed as:

$$\Delta = \overline{\ln w_j} - \overline{\ln w_s} = \sum_c \Delta^{ce} + \sum_c \Delta^{cr} \qquad (6)$$

where $\Delta^{ce} = 0.5(\hat{\beta}_j^c + \hat{\beta}_s^c)'(\overline{X}_j^c - \overline{X}_s^c)$ and $\Delta^{cr} = 0.5(\overline{X}_j^c + \overline{X}_s^c)'(\hat{\beta}_j^c - \hat{\beta}_s^c)$. The subscript c denotes the *cth* characteristic included in the covariates list (e.g. education), β_j^c and β_s^c are estimated parameter vectors estimated by regressing separate wage equations for each region, and $\overline{X}$ denotes the mean values of explanatory variables over the individuals in a particular region.[3]

Equation (6) separates out the observed sample differential of average log-wage between regions that may be attributed to: (i) differences in individual/job characteristics (endowments), captured by $\sum_c \Delta^{ce}$ where Δ^{ce} denotes the contribution of differences in endowments associated with the *cth* characteristics and (ii) differences in the returns to these characteristics, captured by $\sum_c \Delta^{cr}$ where Δ^{cr} stands for the contribution of differences in returns associated to the *cth* characteristic.

As has been noted by Jones (1983), the contribution of the 'return' component in the intercept is flawed in the presence of dummy variables, since the magnitude of the constant term depends on the excluded reference group. But the problem goes beyond identifying the intercept component. In general, it is not possible to identify the separate contributions of the 'return' component associated with the binary variables in the wage decomposition, since they will depend on the reference group. Nevertheless, neither the contribution nor overall decomposition are affected by the choice of the reference

[3] The decomposition based on Oaxaca (1973) suffers from an index number problem. Cotton (1988) dealt with this problem by using weighted averages. The decomposition used here is encompassed in the more general formula presented by Cotton (1988). The application of that formula implies the choice of a weighting number between zero and one. But the choice of the weights is somewhat ad hoc as note by Idson and Feaster (1990, o. 112). We use a weight equal to 0.5.

groups (Oaxaca and Ransom, 1997). Given that limitation, we separate only the contribution of the continuous variables and lump together the intercept and the dummies.

--------- insert Table 4 about here ---------

--------- insert Table 5 about here ---------

--------- insert Table 6 about here ---------

--------- insert Table 7 about here ---------

The decomposition results are included in Table 4 to Table 7. As we can observe, differences log-wages are lower in all regions than the nationwide average, except in Lisbon. This implies that the region of Lisbon, the one with most workers, plays a prominent role to the whole average. As we can see from the results in Table 4, the difference in log-wages between Lisbon and the figure for the whole country amounts to 0.286 in 1996. Of this, 0.181 are due to the effect of education (0.106 to differences in average years of education, i.e. endowments, and 0.075 to differences in the return to education). For 2000, the results in Table 5 indicate the log-wages in Lisbon are 0.274 above the nationwide average. Of this difference, 0.229 is due to the effect of education (0.114 to differences in endowments and 0.116 to differences in returns to education). Indeed, the values plotted in Figure 1 and in Figure 2, clearly indicate that Lisbon stands apart in the national context with the highest return (price) to education but also with the highest average years of education (see also the information in Appendix). Such a situation suggests the demand for education, likely due to differences in technology, is higher in Lisbon.

--------- insert Figure 1 about here ---------

--------- insert Figure 2 about here ---------

The reverse occurs for the other regions: lower average years of education and lower returns to education are responsible for most of the observed log-wage differentials between those regions and the country average. Indeed, the results indicate that if the returns to education and endowments were in those regions equal to those verified for

the whole country, average log-wages would exceed the country average in nine of them in 1996, ceteris paribus. The figure would equal twelve regions in 2000.

4. Conclusions and remarks

In this paper we have examined the size and the determinants of inter-regional wage dispersion in Portugal. For this purpose, we have estimated a Mincer-type human capital wage equation, including controls for a large number of districts, and calculate a weighted and adjusted standard deviation (WASD) of inter-regional wage differences. The value is high and quite stable over time. The highest wages are found in the region of Lisbon and the Tagus Valley. Moreover, the results are quite sensitive to inclusion of human capital and industry controls. A decomposition analysis reveals that differences in the average years of education and the return to education across regions accounts for a significant fraction of observed wage differentials.

In a near future it would be interesting to analyse to what extent differences in the cost of living or other amenities play any role in the explanation of observed wage differentials among regions. It would also be worth to examine the contribution of unobserved individual productive characteristics.

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TABLES TO BE INSERTED IN THE TEXT

Table 1 - Regional wage differentials (deviations from the employment-weighted mean)

	1996				2000			
	Unrestricted Equation	without industry controls	without human capital controls	only region controls	unrestricted equation	without industry controls	without human capital controls	only region controls
Aveiro	-0.061	-0.065	-0.118	-0.188	-0.050	-0.052	-0.095	-0.147
Beja	0.030	0.012	0.024	-0.129	0.006	-0.010	-0.005	-0.137
Braga	-0.085	-0.127	-0.146	-0.308	-0.081	-0.111	-0.134	-0.270
Bragança	-0.164	-0.155	-0.195	-0.387	-0.144	-0.143	-0.181	-0.336
Castelo Branco	-0.156	-0.189	-0.164	-0.310	-0.147	-0.167	-0.164	-0.284
Coimbra	-0.066	-0.067	-0.080	-0.152	-0.068	-0.072	-0.092	-0.170
Évora	0.001	-0.002	-0.015	-0.157	-0.010	-0.016	-0.038	-0.146
Faro	0.054	0.055	0.032	-0.102	0.043	0.041	0.015	-0.096
Guarda	-0.130	-0.152	-0.146	-0.322	-0.130	-0.144	-0.161	-0.299
Leiria	-0.014	0.005	-0.052	-0.123	-0.003	0.008	-0.040	-0.102
Lisboa	0.085	0.103	0.140	0.286	0.084	0.099	0.141	0.274
Portalegre	0.015	0.001	0.009	-0.088	-0.024	-0.032	-0.047	-0.134
Porto	-0.040	-0.049	-0.062	-0.086	-0.045	-0.054	-0.068	-0.101
Santarém	-0.023	-0.025	-0.035	-0.118	-0.030	-0.033	-0.046	-0.117
Setúbal	0.033	0.038	0.052	0.010	0.021	0.020	0.028	-0.011
Viana do Castelo	-0.111	-0.110	-0.157	-0.291	-0.090	-0.097	-0.135	-0.245
Vila Real	-0.147	-0.139	-0.191	-0.313	-0.144	-0.144	-0.185	-0.302
Viseu	-0.109	-0.110	-0.156	-0.279	-0.058	-0.058	-0.121	-0.197
WASD(θ)	0.073	0.089	0.115	0.227	0.070	0.082	0.111	0.211
SD(θ)	0.077	0.083	0.096	0.158	0.067	0.072	0.085	0.140

Observations: see Table 2.

Table 2 - Regional wage differentials (deviations from the employment-weighted mean)

	1996				2000			
	unrestricted equation	without industry controls	without human capital controls	only region controls	unrestricted equation	without industry controls	without human capital controls	only region controls
North	-0.057	-0.077	-0.094	-0.177	-0.058	-0.073	-0.093	-0.169
Center	-0.065	-0.065	-0.094	-0.183	-0.048	-0.050	-0.077	-0.154
Lisbon & Tagus Valley	0.064	0.081	0.106	0.218	0.059	0.073	0.100	0.202
Alentejo	0.026	0.019	0.020	-0.100	0.001	-0.007	-0.019	-0.129
Algarve	0.055	0.059	0.032	-0.102	0.044	0.045	0.016	-0.096
WASD(θ)	0.061	0.076	0.097	0.194	0.056	0.068	0.091	0.180
SD(θ)	0.062	0.071	0.087	0.165	0.053	0.062	0.078	0.154

Observations: The values in the Table are presented as deviations of estimated region parameters from the corresponding employment weighted mean. A negative (positive) sign means that the respective region pays below (above) the mean. Normalisation to deviations from the weighted mean was performed through the formula $\bar{\theta}_j = \hat{\theta}_j - \sum_{s=1}^{K} \alpha_s \hat{\theta}_s$ where $\hat{\theta}_j$ is the estimated coefficient associated to industry j, α_s is the employment share of region s, and K is the number of regions. Thus, for the omitted category in the regression we have that the deviation is given by $\bar{\theta}_j = -\sum_{s=1}^{K} \alpha_s \hat{\theta}_s$.

Table 3 - Pearson and Spearman correlation coefficients for the region wage differentials

		unrestricted equation		without controls industry		without human capital controls		only region controls	
		1996	2000	1996	2000	1996	2000	1996	2000
Unrestricted	1996	**1.000**	0.973	0.983	0.952	0.973	0.959	0.880	0.851
Equation	2000	*0.982*	**1.000**	0.976	0.991	0.937	0.968	0.882	0.890
without industry	1996	*0.983*	*0.988*	**1.000**	0.978	0.959	0.959	0.897	0.851
controls	2000	*0.960*	*0.989*	*0.983*	**1.000**	0.922	0.965	0.893	0.908
without human	1996	*0.983*	*0.955*	*0.950*	*0.920*	**1.000**	0.977	0.929	0.893
capital controls	2000	*0.975*	*0.981*	*0.967*	*0.964*	*0.972*	**1.000**	0.954	0.950
only region	1996	*0.895*	*0.872*	*0.896*	*0.857*	*0.888*	*0.884*	**1.000**	0.985
controls	2000	*0.922*	*0.925*	*0.931*	*0.915*	*0.908*	*0.930*	*0.973*	**1.000**

N=18. Spearman rank-correlation coefficients are in italics below the diagonal. All coefficients are statistically significant at the 1% level.

Table 4 – Decomposition of wage differentials, 1996 (reference: nationwide average)

	Aveiro			Beja			Braga		
	Endowments	Prices	Total	Endowments	Prices	Total	Endowments	Prices	Total
Education	-0.074	-0.134	-0.207	-0.014	-0.196	-0.210	-0.095	-0.143	-0.238
Tenure	-0.003	-0.024	-0.027	-0.019	0.006	-0.013	-0.001	-0.048	-0.049
Experience	-0.008	-0.072	-0.079	-0.006	-0.154	-0.160	-0.019	-0.141	-0.161
Firm size	-0.023	0.037	0.015	-0.160	0.283	0.123	-0.025	0.011	-0.014
Other	-0.030	0.141	0.111	-0.045	0.176	0.131	-0.090	0.244	0.153
Total	-0.137	-0.051	-0.188	-0.243	0.115	-0.129	-0.231	-0.077	-0.308

	Bragança			Castelo Branco			Coimbra		
	Endowments	Prices	Total	Endowments	Prices	Total	Endowments	Prices	Total
Education	-0.027	-0.365	-0.392	-0.070	-0.122	-0.191	-0.043	-0.131	-0.174
Tenure	-0.031	0.016	-0.015	-0.001	-0.015	-0.016	0.000	-0.005	-0.005
Experience	-0.014	-0.233	-0.247	0.017	-0.103	-0.086	0.006	-0.079	-0.072
Firm size	-0.188	0.088	-0.100	-0.042	-0.039	-0.080	-0.052	0.095	0.043
Other	-0.002	0.370	0.368	-0.064	0.127	0.064	-0.009	0.065	0.056
Total	-0.262	-0.125	-0.387	-0.160	-0.151	-0.310	-0.097	-0.055	-0.152

Table 4 – Cont.

	Évora			Faro			Guarda		
	Endowments	Prices	Total	Endowments	Prices	Total	Endowments	Prices	Total
Education	-0.031	-0.240	-0.271	-0.014	-0.244	-0.257	-0.075	-0.168	-0.242
Tenure	-0.010	0.009	-0.001	-0.016	-0.019	-0.035	-0.001	-0.038	-0.039
Experience	-0.008	-0.078	-0.086	-0.001	-0.124	-0.125	0.012	-0.168	-0.155
Firm size	-0.112	0.050	-0.062	-0.117	0.096	-0.021	-0.075	-0.046	-0.121
Other	-0.022	0.285	0.263	-0.010	0.346	0.336	-0.055	0.290	0.236
Total	-0.183	0.026	-0.157	-0.157	0.055	-0.102	-0.194	-0.129	-0.322
	Leiria			Lisbon			Portalegre		
	Endowments	Prices	Total	Endowments	Prices	Total	Endowments	Prices	Total
Education	-0.053	-0.162	-0.214	0.106	0.075	0.181	-0.019	-0.161	-0.180
Tenure	-0.006	-0.004	-0.010	0.009	0.035	0.044	-0.007	-0.018	-0.024
Experience	-0.002	-0.091	-0.093	0.009	0.047	0.056	-0.003	-0.120	-0.123
Firm size	-0.056	0.023	-0.034	0.050	-0.102	-0.052	-0.074	0.169	0.095
Other	-0.011	0.239	0.228	0.034	0.022	0.056	-0.025	0.170	0.145
Total	-0.128	0.005	-0.123	0.208	0.078	0.286	-0.128	0.040	-0.088

Table 4 – Cont.

	Oporto			Santarém			Setúbal		
	Endowments	Prices	Total	Endowments	Prices	Total	Endowments	Prices	Total
Education	-0.038	-0.021	-0.059	-0.035	-0.169	-0.204	0.002	-0.126	-0.123
Tenure	0.001	-0.012	-0.010	-0.005	-0.024	-0.028	-0.008	0.004	-0.004
Experience	-0.001	-0.031	-0.032	0.001	-0.068	-0.067	0.014	-0.070	-0.056
Firm size	0.001	0.010	0.012	-0.060	0.024	-0.036	-0.039	0.018	-0.021
Other	-0.018	0.021	0.004	-0.004	0.222	0.217	0.008	0.206	0.214
Total	-0.055	-0.031	-0.086	-0.103	-0.016	-0.118	-0.023	0.033	0.010
	Viana do Castelo			Vila Real			Viseu		
	Endowments	Prices	Total	Endowments	Prices	Total	Endowments	Prices	Total
Education	-0.040	-0.213	-0.253	-0.048	-0.231	-0.279	-0.054	-0.175	-0.229
Tenure	-0.018	0.035	0.016	-0.013	-0.011	-0.025	-0.014	-0.011	-0.025
Experience	-0.031	-0.158	-0.188	-0.010	-0.197	-0.207	-0.013	-0.136	-0.149
Firm size	-0.098	0.090	-0.007	-0.114	0.053	-0.061	-0.085	0.019	-0.066
Other	-0.014	0.156	0.142	0.006	0.253	0.259	-0.012	0.202	0.189
Total	-0.201	-0.090	-0.291	-0.179	-0.134	-0.313	-0.178	-0.101	-0.279

Table 5 – Decomposition of wage differentials, 2000 (reference: nationwide average)

	Aveiro			Beja			Braga		
	Endowments	Prices	Total	Endowments	Prices	Total	Endowments	Prices	Total
Education	-0.071	-0.125	-0.196	-0.023	-0.227	-0.250	-0.094	-0.159	-0.253
Tenure	0.000	-0.021	-0.021	-0.014	0.005	-0.009	0.000	-0.039	-0.039
Experience	0.005	-0.065	-0.060	0.001	-0.166	-0.165	-0.006	-0.119	-0.125
Firm size	-0.022	0.010	-0.011	-0.117	0.160	0.043	-0.029	0.007	-0.022
Other	-0.016	0.157	0.141	-0.030	0.274	0.245	-0.067	0.235	0.168
Total	-0.104	-0.043	-0.147	-0.183	0.046	-0.137	-0.196	-0.074	-0.270

	Bragança			Castelo Branco			Coimbra		
	Endowments	Prices	Total	Endowments	Prices	Total	Endowments	Prices	Total
Education	-0.042	-0.322	-0.364	-0.082	-0.147	-0.229	-0.039	-0.135	-0.174
Tenure	-0.025	0.002	-0.023	0.002	-0.029	-0.027	-0.004	-0.020	-0.024
Experience	-0.001	-0.241	-0.242	0.026	-0.120	-0.094	0.002	-0.091	-0.089
Firm size	-0.147	0.072	-0.075	-0.037	-0.080	-0.117	-0.046	-0.015	-0.061
Other	-0.005	0.372	0.368	-0.044	0.226	0.182	-0.018	0.196	0.178
Total	-0.220	-0.116	-0.336	-0.134	-0.150	-0.284	-0.105	-0.065	-0.170

Table 5 – Cont.

	Évora			Faro			Guarda		
	Endowments	Prices	Total	Endowments	Prices	Total	Endowments	Prices	Total
Education	-0.033	-0.229	-0.262	-0.016	-0.266	-0.282	-0.081	-0.188	-0.269
Tenure	-0.012	-0.004	-0.016	-0.020	-0.014	-0.034	-0.003	-0.040	-0.043
Experience	-0.006	-0.158	-0.164	0.000	-0.141	-0.141	0.021	-0.180	-0.159
Firm size	-0.093	0.090	-0.002	-0.097	0.117	0.020	-0.081	0.042	-0.039
Other	-0.019	0.318	0.299	-0.009	0.350	0.341	-0.044	0.255	0.211
Total	-0.162	0.017	-0.146	-0.141	0.046	-0.096	-0.188	-0.111	-0.299
	Leiria			Lisbon			Portalegre		
	Endowments	Prices	Total	Endowments	Prices	Total	Endowments	Prices	Total
Education	-0.048	-0.185	-0.233	0.114	0.116	0.229	-0.037	-0.167	-0.203
Tenure	-0.006	-0.014	-0.020	0.010	0.031	0.041	-0.008	0.004	-0.004
Experience	0.002	-0.104	-0.102	-0.002	0.055	0.053	0.002	-0.092	-0.090
Firm size	-0.049	0.030	-0.019	0.051	-0.094	-0.044	-0.066	0.157	0.091
Other	-0.006	0.277	0.272	0.030	-0.035	-0.006	-0.036	0.108	0.073
Total	-0.107	0.005	-0.102	0.202	0.072	0.274	-0.144	0.010	-0.134

Table 5 – Cont.

	Oporto			Santarém			Setúbal		
	Endowments	Prices	Total	Endowments	Prices	Total	Endowments	Prices	Total
Education	-0.042	-0.033	-0.075	-0.034	-0.192	-0.227	-0.004	-0.165	-0.170
Tenure	0.000	-0.013	-0.013	-0.006	-0.020	-0.026	-0.008	0.003	-0.005
Experience	0.001	-0.015	-0.015	0.003	-0.102	-0.099	0.011	-0.105	-0.094
Firm size	-0.007	0.000	-0.007	-0.051	0.030	-0.021	-0.036	0.032	-0.004
Other	-0.016	0.024	0.008	-0.006	0.262	0.256	0.003	0.258	0.261
Total	-0.064	-0.037	-0.101	-0.095	-0.022	-0.117	-0.035	0.023	-0.011
	Viana do Castelo			Vila Real			Viseu		
	Endowments	Prices	Total	Endowments	Prices	Total	Endowments	Prices	Total
Education	-0.039	-0.244	-0.284	-0.044	-0.226	-0.270	-0.056	-0.214	-0.269
Tenure	-0.015	0.009	-0.006	-0.012	-0.029	-0.041	-0.016	-0.013	-0.029
Experience	-0.022	-0.178	-0.199	-0.006	-0.202	-0.208	-0.009	-0.145	-0.154
Firm size	-0.067	0.072	0.005	-0.114	0.107	-0.007	-0.074	0.162	0.088
Other	-0.029	0.267	0.238	0.001	0.223	0.224	-0.004	0.173	0.169
Total	-0.172	-0.074	-0.245	-0.175	-0.126	-0.302	-0.159	-0.038	-0.197

Table 6 – Decomposition of wage differentials, NUTs II, 1996 (reference: nationwide average)

	North			Centre			Lisbon & Tagus Valley		
	Endowments	Prices	Total	Endowments	Prices	Total	Endowments	Prices	Total
Education	-0.063	-0.068	-0.131	-0.052	-0.134	-0.186	0.080	0.052	0.132
Tenure	-0.001	-0.023	-0.024	-0.005	-0.007	-0.012	0.006	0.028	0.034
Experience	-0.008	-0.070	-0.078	-0.002	-0.087	-0.089	0.009	0.039	0.048
Firm size	-0.017	0.038	0.021	-0.049	0.046	-0.003	0.034	-0.069	-0.035
Other	-0.043	0.078	0.035	-0.019	0.127	0.108	0.029	0.011	0.040
Total	-0.132	-0.045	-0.177	-0.127	-0.055	-0.183	0.158	0.061	0.218

	Alentejo			Algarve		
	Endowments	Prices	Total	Endowments	Prices	Total
Education	-0.022	-0.195	-0.217	-0.014	-0.244	-0.257
Tenure	-0.012	-0.004	-0.015	-0.016	-0.019	-0.035
Experience	-0.001	-0.080	-0.081	-0.001	-0.124	-0.125
Firm size	-0.105	0.151	0.046	-0.117	0.096	-0.021
Other	-0.022	0.191	0.169	-0.010	0.346	0.336
Total	-0.163	0.063	-0.100	-0.157	0.055	-0.102

Table 7 – Decomposition of wage differentials, NUTs II, 2000 (reference: nationwide average)

	North			Centre			Lisbon & Tagus Valley		
	Endowments	Prices	Total	Endowments	Prices	Total	Endowments	Prices	Total
Education	-0.064	-0.085	-0.149	-0.050	-0.148	-0.198	0.082	0.078	0.160
Tenure	-0.001	-0.021	-0.022	-0.005	-0.019	-0.024	0.006	0.024	0.030
Experience	-0.002	-0.057	-0.058	0.003	-0.099	-0.096	0.000	0.038	0.039
Firm size	-0.021	0.019	-0.002	-0.045	0.042	-0.003	0.036	-0.061	-0.025
Other	-0.032	0.094	0.062	-0.017	0.183	0.166	0.025	-0.027	-0.002
Total	-0.120	-0.050	-0.169	-0.114	-0.040	-0.154	0.149	0.053	0.202

	Alentejo			Algarve		
	Endowments	Prices	Total	Endowments	Prices	Total
Education	-0.033	-0.191	-0.224	-0.016	-0.266	-0.282
Tenure	-0.012	0.002	-0.009	-0.020	-0.014	-0.034
Experience	0.001	-0.114	-0.113	0.000	-0.141	-0.141
Firm size	-0.090	0.123	0.034	-0.097	0.117	0.020
Other	-0.019	0.203	0.184	-0.009	0.350	0.341
Total	-0.153	0.024	-0.129	-0.141	0.046	-0.096

FIGURES TO BE INSERTED IN THE TEXT

Figure 1 - Average years of education and returns to education, 1996

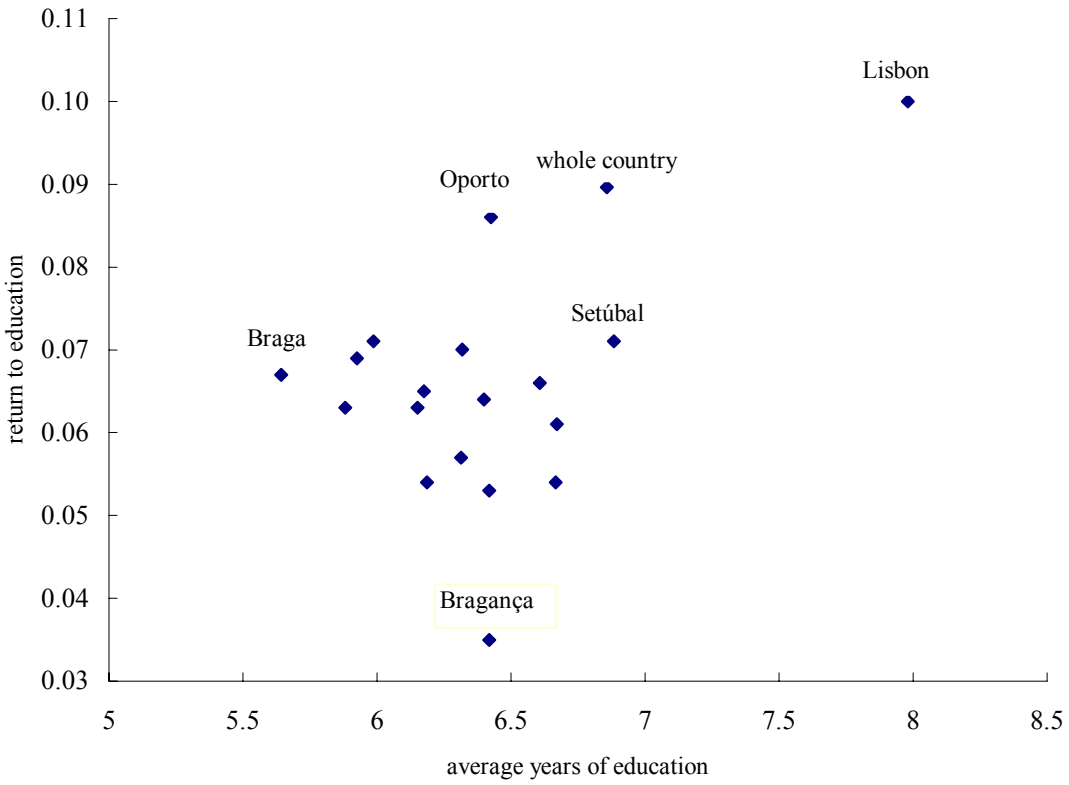
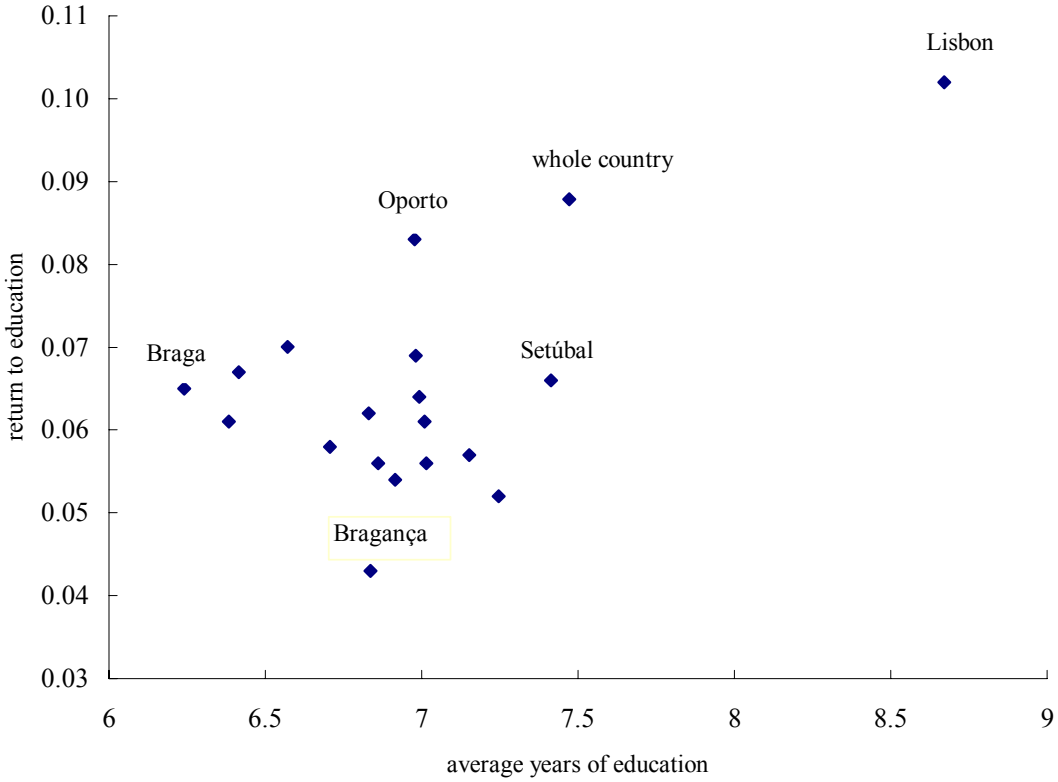


Figure 2 - Average years of education and returns to education, 2000



APPENDIX

Returns to education by region

	1996		2000	
	return	# observ.	return	# observ.
Whole country	0.090	1439158	0.088	1713488
Districts				
Aveiro	0.069	116931	0.070	131844
Beja	0.061	7999	0.057	10925
Braga	0.067	141856	0.065	160593
Bragança	0.035	4979	0.043	7645
Castelo Branco	0.071	22713	0.067	26193
Coimbra	0.070	43512	0.069	50962
Évora	0.053	12790	0.056	19054
Faro	0.054	37835	0.052	52472
Guarda	0.063	12533	0.061	15906
Leiria	0.065	56882	0.062	73873
Lisbon	0.100	511892	0.102	599724
Portalegre	0.066	9385	0.064	10818
Oporto	0.086	293243	0.083	337320
Santarém	0.064	43875	0.061	59115
Setúbal	0.071	652262	0.066	79167
Viana do Castelo	0.057	22470	0.054	27868
Vila Real	0.054	9672	0.056	12972
Viseu	0.063	25248	0.058	37073
NUTs II				
North	0.079	536982	0.076	619111
Centre	0.069	194962	0.067	239126
Lisbon & Tagus Valley	0.097	633225	0.098	755264
Alentejo	0.060	36154	0.062	47515
Algarve	0.054	37835	0.052	52472

The return refers to the coefficient on years of education in the equation. The number of observations refers to the sample size used for each region.