Regions and Low-Wage Mobility in Portugal

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This paper examines the impact of regions on low wage incidence and mobility in Portugal. In particular, we intend to examine to what extent there are significant differences between the region of Lisbon and the rest of the country. The results indicate that, everything else the same, the region is an important determinant of the probability of the individual being found into the low wage class (defined as two-thirds of the median hourly wage), even in a small country like Portugal. It is also affects the probability of leaving low-pay. In particular, equally-skilled workers working in the region of Lisbon are less-likely to be low-paid than the other workers. They are also more likely to escape from the low-pay segment. Other variables of great importance on low pay determination and mobility, and in both regions, are the level of education of the workers, gender and the size of the firm.

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1. Introduction

There is substantial empirical evidence that the region plays and important role for wage determination. This effect is normally attributed to competitive effects arising from compensating differentials due to amenities, although there is still no clear cut on this issue. Furthermore, low-wage employment has become a matter of great concern in many countries and in Portugal as well as a result of increasing inequality. In addition, it is well established that regions matter for wage determination (see, among others, Cardoso, 1994, Vieira 1999 and Teulings and Vieira, 2004).

This paper is intends contribute to a better understanding of low-wage formation and evolution. For this purpose, we use a large panel data for 1986 and 2000 containing information on individual gross monthly wages, gender, education, age, years of tenure with the firm, firm size, industry, and hours worked. Hourly wages were computed as monthly wages divided by total hours worked per month.

Our purpose is twofold. First, we examine the probability of a worker to be found into the low pay class. Secondly, we examine the probability of those workers classified as low paid in a specific time to be out of that situation some years later. In addition, the role of the region for this process is a matter of particular interest in this work.

For this purpose, we split the country into regions: the region of Lisbon and the rest of the country. This simple view results from previous work carried out by Teulings and Vieira (2004) who found remarkable differences between Lisbon and the Tagus Valley and the rest of the country. As is well reported, the region of Lisbon grew rapidly during the last decades. Moreover, it is well established that wages are higher in this region as compared with the rest of the country. According to Teulings and Vieira (2004) these higher wages result from differences in the returns to human capital between those two regions. In particular, they argue that equally skilled workers obtain a higher returns on human capital in Lisbon due differences in technology (complexity of the jobs).

The paper is organised as follows. The econometric model is included in the next section. Section 3 describes the data and presents the estimation results. Finally, section 4 concludes and summarises.

2. Model Specification

Our purpose is to examine the probability of those workers classified as low paid in a specific time to be out of that situation some years later. The main problem with this type of analysis is that conditioning on the lagged state cannot be taken as exogenous (see Heckman, 1981). This problem arises because the beginning of the observation period does not coincide with the beginning of the stochastic process generating individuals' wage experiences and, therefore, the initial values are not observed by the researcher. However, they will be present in the wage levels at each time period due to the presence of serial correlation in such a process making lagged wages to be endogenous with current wages. In order to preclude biased estimates of the transition probabilities the initial conditions problem needs to be explicitly modelled rather than be assumed as exogenously determined.

Stewart and Swaffiled (1998) and Cappellari (1999) notice that this can be thought as a sample selection problem and tackled with a bivariate probit model. We follow a similar reasoning here using the bivariate probit model with censoring presented by van de Ven and van Praag (1981).

Let y_{1i}^{*} denote a latent variable that measures the propensity of the individual *i* to be a low or a high-wage earner in the first period and let y_{2i}^{*} be a latent variable that measures the propensity to leave low-pay in second period for those who were in this state in the previous period.

These propensities are not observed but are affected by a vector of explanatory variables x_{1i} and x_{2i} and by the disturbance terms ε_{1i} and ε_{2i}. However, we observe the realizations y_{1i} and y_{2i}. Consider the following structure:

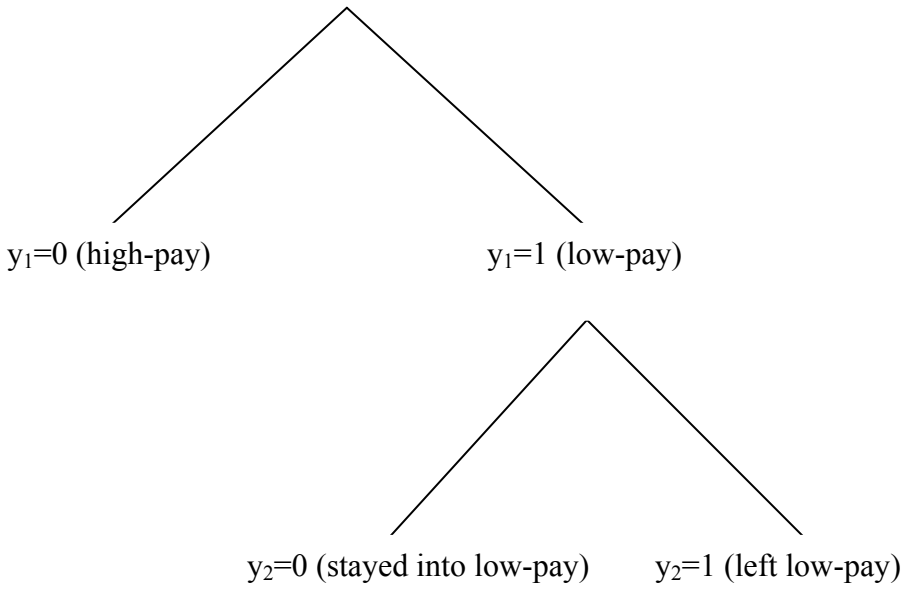
$y_{1i}^{*} = \beta_1' x_{1i} + \varepsilon_{1i}$

with $y_{1i} = 1$ (low-pay) if $y_{1i}^{*} > 0$, 0 (high-pay) otherwise

and

$y_{2i}^{*} = \beta_2' x_{2i} + \varepsilon_{2i}$

with $y_{2i} = 1$ (left low-pay) if $y_{2i}^{*} > 0$, 0 (stayed into low-pay) otherwise



The basic idea is depicted above where (y_{2i}, x_{2i}) is observed only when $y_{1i} = 1$. Assuming that the stochastic components ε_{1i} and ε_{2i} are from a bivariate normal distribution with correlation ρ, that is ε_{1i}, $\varepsilon_{2i} \sim N(0, 0, 1, 1, \rho)$, the following probabilities can be calculated:

$$P(y_{1i} = 1) = P(y_{1i}^{*} > 0) = 1 - \Phi(\beta_1' x_{1i})$$

$$P(y_{1i} = 1, y_{2i} = 1) = P(y_{1i}^{*} > 0, y_{2i}^{*} > 0) = \Phi_2(\beta_1' x_{1i}, \beta_2' x_{2i}, \rho)$$

$$P(y_{1i} = 1, y_{2i} = 0) = P(y_{1i}^{*} > 0, y_{2i}^{*} \le 0) = \Phi_2(\beta_1' x_{1i}, -\beta_2' x_{2i}, -\rho)$$

where Φ_2 and Φ are the bivariate and the univariate normal cumulative distribution functions, respectively.

Therefore, the log-likelihood function of this model is written as:

$$\text{Log}-\text{L} = \sum_{y_{1i}=1}(1-\ln\Phi(\beta_1' x_{1i})) + \sum_{y_{1i}=1,\, y_{2i}=1}\ln\Phi_2(\beta_1' x_{1i}, \beta_2' x_{2i}, \rho) + \\ + \sum_{y_{1i}=1, y_{2i}=0}\ln\Phi_2(\beta_1' x_{1i}, -\beta_2' x_{2i}, -\rho)$$

3. Data and estimation results

We use a panel of full-time non-agricultural workers drawn from *Quadros de Pessoal* for 1996 and 2000. This is a standardised questionnaire that all firms with wage earners have to fill and send to the Portuguese Department of Labour. The data includes information on a set of individual characteristics such as age, tenure with the firm, the highest completed level of education, and gender. Information is also available on monthly wages, firm size, industry, regions and hours worked per month. It is also possible to calculate firm age. Hourly wages were computed as the wages divided by worked hours. Moreover, we define the low pay threshold as two-thirds of the median hourly wage.

The whole sample includes 615 506 workers. Of these, 507 846 (82.5%) were in the high pay track in 1996 and 107 660 (17.5%) were low-paid workers. The data for 2000 indicate that 73 553 (68.3%) of the low-paid in 1996 remained in this position four years later, thus revealing a high persistence (see Table 1). As we can also observe through the figures included in Table 1, the incidence of low wage employment in 1996 was lower in Lisbon (5.9%) than in the rest of the country (22.9%). Of those who were in the low pay segment in 1996, 42.3% of those working in Lisbon had left such a situation in 2000. The figure amounts to 30.4% for those working in the other regions. (See Appendix, Table1)

The estimation results for the whole sample are in Table 2. The explanatory variables include, apart from a dummy variable indicating the region, controls for gender, education, firm size, firm age, years of tenure with the firm an industries, all evaluated at the first period of observation. All explanatory variables are included in both equations since the bivariate model with censoring requires no exclusion restrictions.

As we can see, the correlation coefficient $\rho(1,2)$ is statistically significant at the 1% level and, therefore, the exogeneity of the initial conditions is rejected. The 'selection equation' indicates that the after controlling for a large set of covariates the region matters for the incidence of low pay: those working in Lisbon have a lower probability of falling in the low pay segment, ceteris paribus. The results also indicate that the lower the level of education of the individual the higher the probability of falling into the low-pay sector. The same is valid for youngsters, females and those working in older and smaller firms and in the textiles, food and beverages industries. (See Appendix, Table2)

In addition, the probability of leaving low-pay is higher in Lisbon than in the other regions. This probability is also higher for males, better-educated workers and follows a slightly concave pattern with the age of the individual. With respect to firm size and age, that probability is higher for workers in larger plants and lower for those working in older firms. Finally, the highest probability of leaving low-pay is found for those working initially in banking and insurance and the lowest for those in firms operating in industries such as textiles (export-orientated) and food and beverages. (See Appendix, Table3)

In order to observe to what extent variables such as age, gender, tenure, firm size, firm age, and industries impact low wage incidence and mobility in both regions we split the sample by regions run a separate model for each one. The figures included in Table 3 reveal that the results are very similar to the ones reported above for the whole country. In particular, the probability of falling into low pay decreases as the level of education increases. It also decreases with the number of years of tenure with the firm and with firm size. Moreover, it is lower for males in both regions. As we can also observe, the probability of escaping from low pay depends positively, in both

regions, on the level of education and firm size. In addition it is higher for males than for females.

4. Conclusions

This paper has examined low-pay mobility in Portugal, over a four-year period. In particular, we were concerned with differences by regions. The results reveal that those working in the region of Lisbon are less-likely to fall into the low pay segment and, once in that situation, are more likely to leave it, ceteris paribus.

The results indicate that the determinants of low-pay incidence and mobility are, however, very similar in both regions. For instance, the higher the level of education of the worker the lower the probability of falling into low-pay. Moreover, better-educated workers are more likely to escape from low pay. We also find that there are significant differences by gender, since males are less likely to fall into low-pay. Furthermore, low-paid males are more likely to leave such a situation than females.

Despite these findings, we are aware that further research on the issue is needed. In particular in a near future we should examine to what extent those who moved up are more likely to move down again. The analysis of the width of the move could also bring further evidence on the issue.

Appendix- Tables

Table 1 – Low wage employment and mobility by region

A. Low wage earners by region in 1996 (%)

	High wage	Low wage	Total
Lisbon	94.1	5.9	100
Other regions	77.1	22.9	100
Total	82.5	17.5	100

B. Situation in 2000 of those who were in the low-pay segment in 1996 (%)

	Lisbon	Other regions
Left low pay	42.3	30.4
Stayed into pay	57.7	69.6
Total	100.0	100.0

Table 2 - Low-Pay Mobility: bivariate probit estimates

	(1) selection into low-pay		(2) leaving low-pay	
	coeff.	std. error	coeff.	std. error
Intercept	1.662	(0.010)*	-1.230	(0.018)*
Education = primary - 2nd cycle	-0.273	(0.006)*	0.145	(0.019)*
Education = primary - 3rd cycle	-0.797	(0.008)*	0.557	(0.047)*
Education = secondary	-1.139	(0.009)*	0.921	(0.064)*
Education = university	-1.886	(0.027)*	1.616	(0.140)*
Age = 30-39 years	-0.345	(0.006)*	0.002	(0.027)
Age = 40-49 years	-0.492	(0.007)*	0.064	(0.037)***
Age ≥ 50 years	-0.489	(0.010)*	-0.013	(0.041)
Male	-0.809	(0.005)*	0.777	(0.040)*
years of tenure	-0.026	(0.001)*	0.005	(0.002)*
Lisbon	**-0.339**	**(0.007)***	**0.211**	**(0.024)***
Firm age = 5-9 years	0.017	(0.008)**	-0.053	(0.013)*
Firm age = 10-19 years	0.035	(0.008)*	-0.129	(0.013)*
Firm age ≥ 20 years	0.085	(0.008)*	-0.198	(0.014)*
Firm size = 10-19 employees	-0.472	(0.008)*	0.319	(0.030)*
Firm size = 20-49 employees	-0.715	(0.008)*	0.472	(0.042)*
Firm size = 50-99 employees	-0.875	(0.009)*	0.644	(0.050)*
Firm size ≥ 100 employees	-1.242	(0.008)*	0.823	(0.071)*
Wood, paper, rubber and leather	-0.982	(0.008)*	0.718	(0.057)*
Electronics and transp. Equipment	-0.606	(0.011)*	0.320	(0.041)*
Electricity and construction	-0.975	(0.010)*	0.859	(0.053)*
Wholesale and retail	-0.678	(0.007)*	0.564	(0.036)*
Transport and communications	-1.565	(0.021)*	0.894	(0.111)*
Banking and insurance	-1.192	(0.015)*	0.985	(0.070)*
Real state and serv. provided to firms	-0.836	(0.012)*	0.806	(0.044)*
Education, health and other services	-0.692	(0.022)*	0.296	(0.057)*
ρ(1,2)	-0.365	(0.093)*		
Log-likelihood		-253495		
Number of observations	615506		107660	

* significant at the 1% level ** significant at the 5% level
*** significant at the 10% level

Table 3 - Low-Pay Mobility by Regions: bivariate probit estimates

A. Lisbon	Selection into low-pay			Leaving low-pay		
	Coeff.	Std. Error		Coeff.	Std.Error	
Intercept	0.970	0.023	*	-0.550	0.033	*
Education = primary - 2nd cycle	-0.361	0.014	*	0.332	0.017	*
Education = primary - 3rd cycle	-0.754	0.015	*	0.757	0.020	*
Education = secondary	-1.148	0.017	*	1.164	0.023	*
Education = university	-1.779	0.039	*	1.913	0.076	*
Age = 30-39 years	-0.301	0.012	*	0.169	0.021	*
Age = 40-49 years	-0.436	0.015	*	0.249	0.031	*
Age ≥ 50 years	-0.381	0.019	*	0.169	0.037	*
Male	-0.680	0.011	*	0.728	0.014	*
Tenure = 5 - 9 years	-0.351	0.012	*	0.217	0.025	*
Tenure = 10 – 14 years	-0.568	0.022	*	0.422	0.038	*
Tenure ≥ 15 years	-0.795	0.020	*	0.614	0.048	*
Firm age = 5-9 years	-0.012	0.017		-0.017	0.021	
Firm age = 10-19 years	0.079	0.016	*	-0.088	0.020	*
Firm age ≥ 20 years	0.188	0.016	*	-0.238	0.021	*
Firm size = 10-19 employees	-0.520	0.016	*	0.513	0.019	*
Firm size = 20-49 employees	-0.780	0.015	*	0.802	0.019	*
Firm size = 50-99 employees	-0.932	0.018	*	0.968	0.024	*
Firm size ≥ 100 employees	-1.284	0.014	*	1.289	0.018	*
Wood, paper, rubber and leather	-0.584	0.020	*	0.671	0.028	*
Electronics and transp. Equipment	-0.502	0.030	*	0.630	0.043	*
Electricity and construction	-0.584	0.022	*	0.769	0.037	*
Wholesale and retail	-0.243	0.017	*	0.351	0.026	*
Transport and communications	-1.189	0.034	*	1.196	0.048	*
Banking and insurance	-0.758	0.025	*	0.889	0.038	*
Real state and serv. provided to firms	-0.493	0.023	*	0.621	0.034	*
Education, health and other services	-0.419	0.037	*	0.434	0.044	*
ρ(1,2)	-0.967	0.029	*			
Log-L	-52807					
Number of observations	241104					

* Significant at the 1% level

Table 3 (cont.)

A. Other regions	Selection into low-pay			Leaving low-pay		
	Coeff.	Std. Error		Coeff.	Std. Error	
Intercept	1.687	0.012	*	-1.230	0.018	*
Education = primary – 2nd cycle	-0.248	0.007	*	0.162	0.019	*
Education = primary - 3rd cycle	-0.803	0.010	*	0.623	0.050	*
Education = secondary	-1.124	0.012	*	1.031	0.061	*
Education = university	-2.009	0.038	*	1.913	0.155	*
Age = 30-39 years	-0.334	0.007	*	0.050	0.032	
Age = 40-49 years	-0.509	0.008	*	0.140	0.045	*
Age ≥ 50 years	-0.523	0.011	*	0.088	0.052	**
Male	-0.835	0.006	*	0.890	0.037	*
Tenure = 5 - 9 years	-0.219	0.007	*	0.009	0.023	
Tenure = 10 – 14 years	-0.356	0.010	*	0.057	0.037	
Tenure ≥ 15 years	-0.436	0.010	*	0.176	0.039	*
Firm age = 5-9 years	0.061	0.009	*	-0.041	0.015	*
Firm age = 10-19 years	0.081	0.009	*	-0.120	0.014	*
Firm age ≥ 20 years	0.090	0.010	*	-0.179	0.015	*
Firm size = 10-19 employees	-0.463	0.009	*	0.352	0.031	*
Firm size = 20-49 employees	-0.705	0.009	*	0.514	0.045	*
Firm size = 50-99 employees	-0.887	0.010	*	0.714	0.052	*
Firm size ≥ 100 employees	-1.277	0.009	*	0.938	0.077	*
Wood, paper, rubber and leather	-1.018	0.009	*	0.804	0.062	*
Electronics and transp. equipment	-0.574	0.011	*	0.309	0.045	*
Electricity and construction	-1.024	0.011	*	0.921	0.056	*
Wholesale and retail	-0.751	0.008	*	0.630	0.042	*
Transport and communications	-1.630	0.027	*	1.077	0.126	*
Banking and insurance	-1.303	0.020	*	1.123	0.079	*
Real state and serv. provided to firms	-0.819	0.014	*	0.864	0.041	*
Education, health and other services	-0.661	0.028	*	0.288	0.066	*
ρ(1,2)	-0.543	0.106	*			
Log-L	-198669					
Number of observations	374402					

* Significant at the 1% level ** Significant at the 10% level

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