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ABSTRACT

Wage Persistence and Labour Market Institutions: An Analysis of Young European Workers

This paper investigates the effects of labour market institutions on wage persistence among young European workers at the beginning of their careers. We use ECHP data from 1995 to 2001 for 13 EU countries and estimate a three-level random intercept probit model that allows for unobserved heterogeneity both at the individual and country level. Overall, we find that labour market institutions explain wage persistence. In particular, we find that a high level of employment protection legislation and a high level of bargaining centralization increase wage persistence.

JEL Classification: J31, C23, J5

Keywords: wage persistence, labour market institutions, unobserved heterogeneity

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1. Introduction

Wage mobility has constituted a matter of concern in the last years, as it is perceived as an important issue from a welfare perspective, particularly with reference to wage inequality and social mobility. Recently, several authors have studied the relationship between labour market institutions and wage mobility. Theoretical models predict that strict labour market regulations reduce wage mobility. For instance, a high level of employment protection legislation (EPL) leads to a lower job turnover rate, and, thus, to a decline in a major source of wage mobility (Bertola, 1990). In addition, the existence of minimum wage legislation and a high level of bargaining centralization contribute to compress the wage distribution (OECD, 2004).

Quite interestingly, recent empirical studies do not confirm the above mentioned theoretical predictions. In particular, countries with different labour market institutions experience similar wage mobility levels (see, among others, Burkhauser et al. 1997, Aaberge et al. 2002 and Cardoso 2006). We contribute to this literature with a novel microeconomic study that controls for observed individual and job related characteristics, observable labour market institutions and allows for unobservable heterogeneity at both the individual and country level. We use a three-level random intercept probit model as our benchmark model. We focus on young European workers at the beginning of their careers for, at least, two reasons. First, young workers constitute a disadvantaged group in the sense that they are over represented in low paid jobs. In addition, young workers experience more precarious employment and higher job turnover that, in turn, conditions wage persistence and human capital accumulation (Mincer and Ofek, 1982). Hence, uncovering the determinants of wage persistence may be relevant to understand structural differences in labour market experiences of different worker groups, both within and across countries. Second, by focusing on young workers at the beginning of their careers allows a simpler treatment of the so-called initial condition problem. When the beginning of the observation period does not coincide with the beginning of the stochastic process generating wage experiences, potential non-exogeneity of the conditioning starting state may bias parameter estimates (Heckman, 1981). In our sample, we do observe the initial wage values and, hence, the initial conditional problem does not arise.¹

For the sake of international analysis, wage persistence is defined with respect to a deciles transition matrix at the European level and we use the European Community Household Panel (ECHP) dataset as it contains homogeneous variables and a uniform data gathering methodology across countries.

¹ Previous studies on wage mobility tackled the initial condition problem by dealing with the endogeneity of the initial conditions using bivariate probit models (Cappellari, 2000 and Vieira, 2005). However, it should be noted that such bivariate probit models do not take into account unobserved heterogeneity, unlike our benchmark model.

The remainder of the paper is organized as follows. Section 2 presents the statistical model. Section 3 describes the data. Section 4 discusses results. Finally, section 5 concludes.

2. Econometric Specification

Our econometric specification consists in a probit model with unobserved heterogeneity at both the individual and country level. As observations within groups are more likely to be correlated than observations from different groups, failure to control for heterogeneity may lead to inconsistent estimates and misleading inferences. Hence, we implement a Generalized Linear Latent and Mixed Models program (Rabe-Hesketh, Pickles and Skrondal, 2004, Rabe-Hesketh, Skrondal and Pickles, 2005) and estimate a three-level random intercept probit model, taking into account the nesting of individuals in their country of origin. We compute wage persistence in terms of a deciles transition matrix computed at the European level.²

Let $p_{rd} \geq 0$ be the probability that an individual moves from the decile r to the decile d one period later. We define the $m \times m$ transition matrix, $P := [p_{rd}]$, with $\sum_{s=1}^{10} p_{rd} = \sum_{r=1}^{10} p_{rd} = 1$. Let y_{jik} be the binary response variable, j denote a level-1 unit (the unit of observation, i.e. the observed elementary transition between r and d) with $j = 1, 2, \dots, J$; i a level-2 unit with $i = 1, 2, \dots, N$ (i.e. the individuals) and k a level-3 unit, with $k = 1, 2, \dots, K$ (i.e. the countries). The response variable for the individual i living in country k is defined as:

$$y_{jik} = \begin{cases} 1 & \text{if } r_{ik} = d_{ik} \\ 0 & \text{if } r_{ik} \neq d_{ik} \end{cases} \quad (1)$$

Thus, wage persistence is defined as the degree of immobility (year by year) in the transition matrix and is identified by the diagonal elements of the matrix.

Let x_{jik} be a vector of time-varying individual and job-related characteristics, x_{ik} a vector of non time-varying individual and job-related characteristics, x_k a vector of institutional characteristics of the labour markets; $\beta_0, \beta_1, \beta_2$ and β_3 are vectors of unknown parameters and, finally, $\alpha_{ik}^{(2)}$ is the random intercept for individual i in country k and $\alpha_k^{(3)}$ is the random intercept for country k . Denoting the link function by g , the generalized non-linear three level model can be defined as:

$$g[E(y_{jik} | x_{jik}, x_{ik}, x_k, \beta_0, \beta_1, \beta_2, \beta_3, \alpha_{ik}^{(2)}, \alpha_k^{(3)})] = \eta_{jik} = \beta_0 + \beta_1 x_{jik} + \beta_2 x_{ik} + \beta_3 x_k + \alpha_{ik}^{(2)} + \alpha_k^{(3)} \quad (2)$$

² Parker and Gardner (2002) applied a similar approach.

The probability of experimenting wage persistence may be expressed as:

$$\theta_{jik} = \Pr(y_{jik} = 1 | X, \beta, \alpha_{ik}^{(2)}, \alpha_k^{(3)}) = \frac{\exp(\beta_0 + \beta_1 x_{jik} + \beta_2 x_{ik} + \beta_3 x_k + \alpha_{ik}^{(2)} + \alpha_k^{(3)})}{1 + \exp(\beta_0 + \beta_1 x_{jik} + \beta_2 x_{ik} + \beta_3 x_k + \alpha_{ik}^{(2)} + \alpha_k^{(3)})} \quad (3)$$

The likelihood function, integrating out the random terms, reads:

$$L(\beta, \Omega) = \prod_{k=1}^K \int_{-\infty}^{+\infty} \left(\prod_{i=1}^N \int_{-\infty}^{+\infty} \left(\prod_{j=1}^J (\theta_{jik})^{y_{jik}} \right) \varphi^{(2)}(\alpha_{ik}) d\alpha_{ik} \right) \varphi^{(3)}(\alpha_k) d\alpha_k \quad (4)$$

where $\Omega = Var(\alpha)$ and $\varphi^{(2)}$ and $\varphi^{(3)}$ are the density functions of the random effects. As usual, we assume that the random effects are normally distributed with zero mean. The likelihood function is approximated via a Gauss-Hermite quadrature and is maximized by the Newton-Raphson method.

3. Data

We use a sub-sample from seven-waves, 1995-2001, of the ECHP; this is a standardized annual longitudinal survey designed by Eurostat, comprising socio-demographic information on individuals and their families and job related variables (see Peracchi 2002 for additional details on the ECHP). Since the ECHP wages are in nominal terms and at national currency values, we transform them with ECU/EURO exchange rates and comparative price level indices³, and, thus, make them comparable across countries.

We select only individuals who had their first job experience after 1994, in 13 European countries (EU except Sweden and Luxembourg). Only non self-employed workers, aged between 16 and 35, working more than 15 hours per week, with non-missing information were considered. This selection leaves us an unbalanced panel composed by 9837 observations and 4711 individuals.

We control the following personal characteristics: age, gender, education, marital status, presence of children, health status. In addition, we introduce the following job related covariates: type of contract, public or private sector, part-time work, size of firm and industry. Finally, we consider an indicator of job changes, as it may be an important source of wage mobility (Gottschalk and Moffitt, 1994). We also control for the starting decile. In fact, wage persistence is higher at the extreme deciles of the wage distribution, implying that wage persistence takes a U shaped form, as Figure 1 illustrates. As Dickens (2000) argues, this could be an artefact of computing mobility in

³ ECU/EURO exchange rates are provided by European Commission DG II, while comparative price level indices are provided by Eurostat.

terms of deciles transition matrices: modal values are associated with middle deciles, while extreme deciles are characterized by lower wage frequencies but larger wage ranges.

<Insert Figure 1 here>

Finally, we investigate the effects of labour market institutions on wage persistence controlling for the level of employment protection legislation (EPL), the level of bargaining centralization and the existence of minimum wage legislation. The level of EPL is measured by the OECD indicator of the strictness of overall EPL (OECD, 2004), in its second version, as it provides a broad measure of EPL by including specific requirements for collective dismissals.⁴ We use the OECD indicator of bargaining centralization⁵ for the period 1995-2000 and construct three dummies. Low level of centralization includes countries where company/plant level bargaining is predominant and a combination of industry and company/plant level bargaining coexist, but an important share of employees are covered by company level bargaining. Medium level of centralization indicates countries where industry level bargaining is largely predominant. High level of centralization flags countries where industrial level bargaining and recurrent central-level agreements coexist, and countries where central level agreements override. Finally, we include a dummy variable to indicate the existence of minimum wage legislation. Table 1 reports descriptive statistics, in the usual manner.

<Insert Table 1 here>

4. Results

Table 2 presents wage persistence across countries. The incidence of wage persistence is lower among young workers at the beginning of their job careers in comparison with the overall working population, a result in line with previous findings in the literature (Cardoso, 2006). This finding suggests that job turnover, a phenomenon especially acute among young workers, plays a key role in explaining wage persistence (Gottschalk and Moffitt, 1994). Several factors may explain cross country differences in wage persistence. First, the distribution of individuals and job-related workers' observable characteristics varies across countries. Second, different institutions are likely to influence wage persistence. Finally, disparities in purchasing power may influence wage persistence. In fact, workers living in countries with extreme levels of purchasing power are likely to be allocated in the extreme deciles of the wage distribution, with higher immobility. In fact, this

⁴ Using Overall EPL indicator version 1 that allows changes over time but excludes regulations on collective dismissals results remain substantially unchanged.

⁵ OECD does not provide information about level of bargaining centralization in Greece. However, Ioakimoglou, Kouzis and Soumeli, (INE/GSEE-ADEDY, www.eiro.eurofound.ie), highlight that national occupational level and industry level are considered to be the most important levels at which wages are formed.

reasoning may explain why Portugal and Denmark – the poorest and richest countries in the sample, respectively – experience the highest levels of wage persistence.

<Insert Table 2 here>

Table 3 presents the estimation results. We show, for comparison purposes, estimates obtained applying a pooled probit model with robust standard errors, a probit model with random effects at the individual level and, finally, our benchmark probit model allowing for random effects both at the individual and country level. For brevity, we focus on our benchmark model. Individual and job-related observable characteristics explain wage persistence. Age shows a U effect, with wage persistence reaching a minimum for workers aged 22 years old. Being a male reduces wage persistence. Having a high educational level reduces wage persistence. Having a part-time job, working in the public sector and being employed with a temporary contract all decrease wage persistence. As expected, job changes reduce wage persistence. Working in firms of small-medium size reduces wage persistence. Clerks, skilled agricultural, fishery and craft workers, plant and machine operators and assemblers are less likely to experience wage persistence than workers employed in elementary job activities. The dummy variables that flag the starting wage deciles present the expected signs (not shown for brevity).

<Insert Table 3 here>

Our findings support the idea that stricter labour market regulations increase wage persistence⁶. In particular, we find that a higher level of EPL significantly increases wage persistence. The existence of minimum wage legislation, however, has no significant effect on wage persistence. This result may be spurious in the sense that countries where there is no formal minimum wage legislation may have different provisions that, in practice, act as binding arrangements for wage floors (Italy is a remarkable example; see OECD, 2004). High level of bargaining centralization increases wage persistence with respect to countries characterized by medium level of bargaining centralization. Low level of bargaining centralization has a negative but not significant effect on wage persistence in our benchmark model where we control for heterogeneity at the individual and country. However, in both models that do not take into account of heterogeneity at the country level one finds that low level of bargaining centralization has a significant and positive effect on wage persistence. We take this result as suggestive of the importance of controlling for heterogeneity in order to avoid misleading inferences.

5. Conclusions

⁶ We find similar results when we compute wage persistence taking into account deciles transition matrices for each country separately.

This paper investigates the effects of labour market institutions on wage persistence among young European workers at the beginning of their job careers. Applying a three-level random intercept probit model to ECHP data, we find that individual and job-related observable and unobservable characteristics explain wage persistence. In particular, we find that high educational level and job mobility significantly reduce wage persistence, and, concomitantly, enhance social mobility. We find that more regulated labour markets – with high EPL and a high level of bargaining centralization – experience higher wage persistence, in line with theoretical predictions. However, we do note that it is important to control for unobserved heterogeneity at the country level, in order to capture the role of country unobservable characteristics and to avoid misleading inferences and inconsistent estimates.

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Table 1
Descriptive Statistics

Variable	Description of variables	Mean	Std. Dev.
age	age	23.859	3.711
male	gender	0.504	0.500
married	marital status	0.103	0.303
children	presence of children aged 0-15	0.106	0.308
no_children	no children	0.894	0.308
badhealth	health status bad or very bad	0.015	0.123
educ1	low educational level	0.273	0.446
educ2	medium educational level	0.386	0.487
educ3	high educational level	0.340	0.474
pc	employed with permanent contract	0.655	0.475
tc	employed with temporary contract	0.248	0.432
other_relat	employed with other arrangement	0.097	0.235
public	employed in public sector	0.176	0.381
private	employed in private sector	0.824	0.381
part_time	employed with part-time relationship	0.059	0.236
full_time	employed with full-time relationship	0.941	0.236
jobchange	job change	0.185	0.388
ludim0		0.005	0.069
ludim1_4		0.210	0.408
ludim5_19		0.240	0.427
ludim20_49	firm size	0.159	0.366
ludim50_99		0.109	0.311
ludim100_499		0.141	0.348
ludim500		0.136	0.343
legis_manager	legislator, senior officials and managers	0.031	0.173
profess	professionals	0.148	0.355
tech_assprof	technicians and associate professionals	0.153	0.360
clerks	clerks	0.191	0.393
serv_shop	service workers and shop and market sales workers	0.176	0.381
skill_agr	skilled agricultural and fishery workers	0.011	0.104
craft_trades	craft and related trades workers	0.127	0.334
plant_mach	plant and machine operators and assemblers	0.072	0.258
elem_occ	elementary occupations	0.091	0.288
agriculture		0.019	0.136
industry	economic sector	0.301	0.459
services		0.680	0.467
barglow	low level of bargaining centralization	0.324	0.468
bargmed	medium level of bargaining centralization	0.337	0.473
barghigh	high level of bargaining centralization	0.339	0.474
minwage	existence of minimum wage legislation	0.608	0.488
epl2	level of employment protection legislation	2.545	0.943

Figure 1
Wage Persistence across Starting Decile

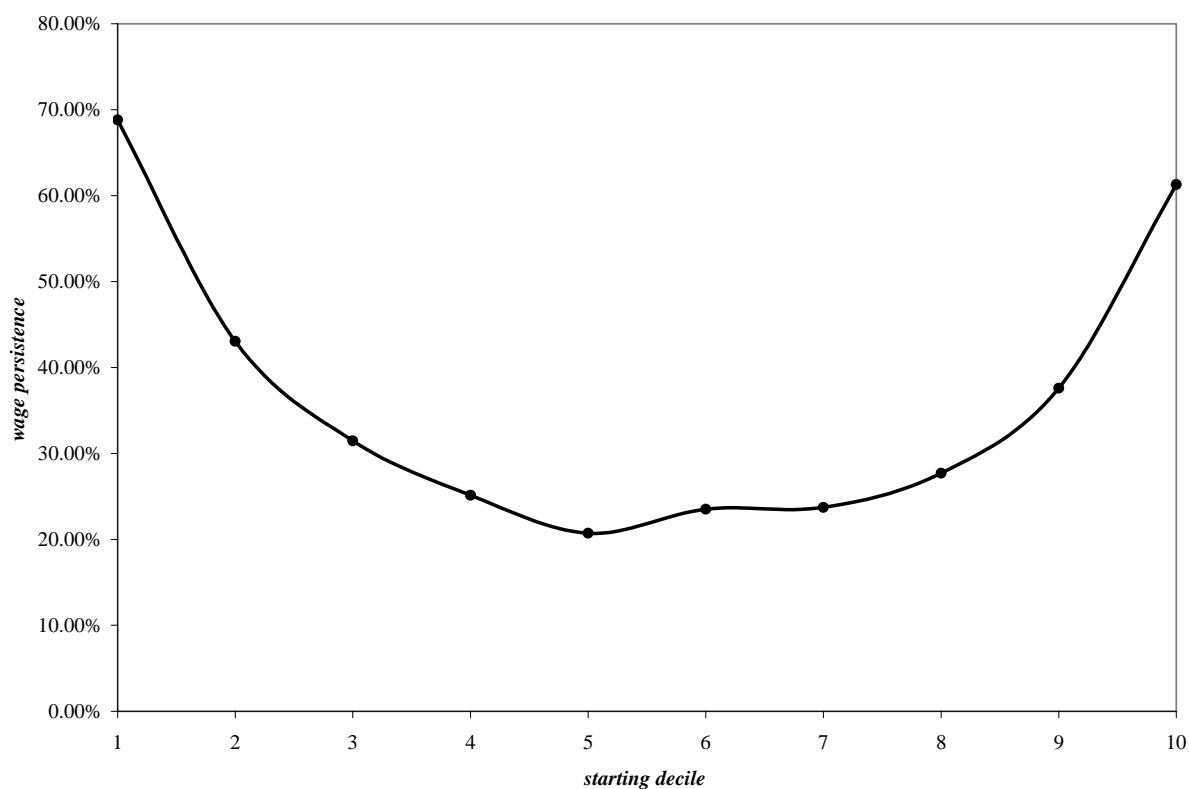


Table 2
Wage Persistence and Labour Market Institutions

Country	EPL	Min. wage	Centralization	Persistence
Denmark	1.8	no	low	50.00%
Netherlands	2.3	yes	medium	31.16%
Belgium	2.5	yes	medium	31.93%
France	2.8	yes	low	28.10%
Ireland	1.2	since 2000	high	32.89%
Italy	3.1	no	low	29.93%
Greece	3.5	yes	high	39.00%
Spain	3.0	yes	medium	27.11%
Portugal	3.7	yes	high	62.14%
Austria	2.4	no	medium	28.57%
Finland	2.2	no	high	26.89%
Germany	2.6	no	medium	29.41%
UK	1.0	since 1999	low	38.35%
UE-13				36.33%

Source: EPL and Level of Bargaining Centralization, OECD (2004)

Existence of Minimum Wage Legislation, OECD Labour Market Statistics, www1.oecd.org

Table 3
Estimation Results

covariates	Pooled Probit			Probit RE i level			Probit RE i and k level		
	b	r.s.e.		b	s.e.		b	s.e.	
age	-0.108	0.039	***	-0.121	0.046	***	-0.086	0.052	*
age2	0.002	0.001	***	0.002	0.001	***	0.002	0.001	**
male	-0.141	0.029	***	-0.150	0.036	***	-0.174	0.043	***
married	0.067	0.045		0.077	0.053		0.038	0.061	
children	-0.078	0.045	*	-0.089	0.053	*	-0.080	0.062	
badhealth	0.132	0.111		0.165	0.119		0.098	0.141	
educ2	-0.125	0.036	***	-0.134	0.042	***	-0.062	0.050	
educ3	-0.096	0.042	**	-0.101	0.049	**	-0.096	0.057	*
pc	0.125	0.030	***	0.141	0.035	***	0.162	0.040	***
public	-0.050	0.040		-0.057	0.046		-0.118	0.056	**
part_time	-0.276	0.061	***	-0.316	0.069	***	-0.310	0.082	***
jobchange	-0.258	0.036	***	-0.270	0.040	***	-0.316	0.048	***
ludim0	-0.263	0.202		-0.314	0.231		-0.191	0.264	
ludim1_4	-0.112	0.050	**	-0.103	0.059	*	-0.086	0.067	
ludim5_19	-0.123	0.049	**	-0.126	0.057	**	-0.107	0.067	
ludim20_49	-0.149	0.050	***	-0.153	0.059	*	-0.155	0.068	**
ludim50_99	-0.118	0.056	**	-0.110	0.064	*	-0.095	0.073	
ludim100_499	-0.117	0.052	**	-0.127	0.059	**	-0.109	0.068	
legis_manager	-0.104	0.092		-0.102	0.108		-0.143	0.124	
profess	-0.016	0.064		0.010	0.076		0.008	0.087	
tech_assprof	-0.086	0.060		-0.084	0.071		-0.118	0.081	
clerks	-0.165	0.057	***	-0.160	0.068	**	-0.208	0.078	***
serv_shop	-0.081	0.057		-0.083	0.068		-0.102	0.078	
skill_agr	-0.370	0.153	**	-0.375	0.183	**	-0.381	0.214	*
craft_trades	-0.144	0.059	**	-0.153	0.070	**	-0.180	0.081	**
plant_mach	-0.161	0.067	**	-0.161	0.079	**	-0.181	0.092	**
industry	-0.129	0.115		-0.133	0.139		-0.127	0.161	
services	-0.197	0.114	*	-0.200	0.138		-0.218	0.160	
barglow	0.266	0.040	***	0.304	0.047	***	-0.026	0.067	
barghigh	0.440	0.034	***	0.490	0.042	***	0.329	0.056	***
minwage	0.190	0.033	***	0.200	0.038	***	0.046	0.048	
epl2	0.059	0.018	***	0.070	0.022	***	0.127	0.026	***
constant	1.172	0.488	**	1.226	0.581	**	0.833	0.671	
J		9837			9837			9837	
N					4711			4711	
K								13	
Log-likelihood		-6072.548			-6018.408			-6170.702	
Var(α) i level				0.496	0.032	***	0.575	0.067	***
Var(α) k level							0.353	0.065	***

All models also include control for starting decile.

*** Significant at 1%

** Significant at 5%

* Significant at 10%