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Labour Economics 12 (2005) 531–555

LABOUR
ECONOMICS

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Wage changes through job mobility in Europe: A multinomial endogenous switching approach

José Ignacio García Pérez^a, Yolanda Rebollo Sanz^{b,*}

^a*Centro de Estudios Andaluces and Universidad Pablo de Olavide, Spain*

^b*Departamento de Economía, Met. Cuantitativos e Hist. Economica, Universidad Pablo de Olavide, Spain*

Abstract

This paper presents evidence on the relationship between job mobility and wage mobility for various European countries using the European Community Household Panel (1994–2001). While much of the earlier research uses least-squares regression to predict wages for individuals with different labour market experience, we have found that it is important to take into account the possible non-random selection between job movers and stayers and between voluntary and involuntary movers. In this paper we focus on the effects of an unemployment spell on subsequent wages by estimating a multinomial endogenous switching model composed of two selection equations and three wage equations. Our results indicate that job mobility through unemployment has negative returns in all the analysed economies. As regards stayers, these losses range from 8% in Portugal to 21% in Germany while losses with respect to voluntary movers vary from 14% in Spain to 31% in Portugal. © 2005 Elsevier B.V. All rights reserved.

JEL classification: J31; J63; J65

Keywords: Wage mobility; Job mobility; Unemployment; Endogenous switching; Multinomial probit; Wage penalties

1. Introduction

A great deal of attention has been paid to the relationship between job mobility and wage mobility, as it is unclear what the effect is of different work experiences on

* Corresponding author. Tel.: +34 954 348915.

E-mail address: yfrebsan@upo.es (Yolanda Rebollo Sanz).

individual wages. Firstly, it is important to distinguish between job movers and stayers because both groups may experience very different earning dynamics. However, a second issue arises, as job change can take place for different reasons and not all workers experience job changes as a result of a voluntary decision. Broadly speaking, we relate voluntary separations with job-to-job transitions and involuntary transitions with the situation where the worker experiences an unemployment spell. Obviously, one would expect to observe different wage patterns depending on the type of job separation. In fact, previous literature shown that there can be important differences in wage profiles depending on the type of separation from the previous job. For instance, some studies show that in the USA involuntary separations lead to wage losses of between 10% and 20% (Kletzer, 1996; Jacobson et al., 1993; Stevens, 1997; Seninger, 1997). Furthermore, in some cases these real wage losses may become permanent future income losses. On the contrary, other studies found that in the USA voluntary transitions lead to wage gains of between 10% and 20% (Mincer, 1993).

Existing research focused on the case of the USA, so evidence for European countries is still relatively sparse. Recently, some papers have investigated whether comparable costs to involuntary separations exist in the European labour markets (Rosolia and Saint-Paul, 1998; Burda and Mertens, 2001; Carneiro and Portugal, 2003; Bender et al., 2002; Lefranc, 2003). However, the available evidence is not comparable among European countries due to differences in the econometric specification and the type of data used. Moreover, it is worth noting that many empirical papers do not explicitly consider the unobservable differences between movers and stayers, and only a few earlier studies refer to the analysis of wage gains and their relation to job mobility considering this self-selection problem (Antel, 1986; Topel, 1991; Mincer, 1993; Bartel and Borjas, 1981; Holmlund, 1991).

This paper attempts to offer new empirical evidence on the relationship between job mobility and wage mobility, trying to overcome some shortcomings found in previous literature. The fundamental econometric problem arising in this study is that the earnings of each individual are only observed in one state. In this framework, it is possible that each group is a non-random sample of workers because the process that explains the type of transition can be correlated with the observed and unobserved characteristics of the individual. This inconsistency problem is overcome by estimating separate earnings equations for stayers, voluntary movers and involuntary movers with the appropriate corrections. These estimates are then used to predict worker's earnings in each potential labour state and to measure the returns from job mobility and the costs of having an unemployment spell compared to staying at the job or having a voluntary transition. Using the European Community Household Panel (ECHP, 1994-2001) we study the cases of Spain, Germany, Portugal and France. These countries stand out for having relatively strict employment protection legislation (OECD, 1999).

In this paper we address the following questions: i) what are the wage variations caused by changing jobs?; ii) are there wage losses when job mobility implies an unemployment spell?; iii) are these wage losses homogeneous across countries and individuals? Moreover, while looking at the effects of involuntary separations on wages, we investigate the need to control by non-random selection or endogeneity in order to measure correctly wage changes from job mobility.

Overall, our results point to important differences in wage behaviour among different types of job movers and show that without considering the endogeneity problem we underestimate the wage penalties caused by an unemployment spell with respect to both voluntary job mobility and job stability. Another important conclusion of this paper is that job mobility may generate important returns but can also create costs for the worker. When it is voluntary, job change can be the fastest way for workers to advance in their careers and move up in the wage structure. However, involuntary separations imply relative costs for workers and these costs may have permanent effects on their future income.

The remainder of the paper is organised as follows. Section 2 presents a brief overview of the theoretical models that relate job mobility and wage mobility. Section 3 discusses the data and Section 4 outlines the methodology employed. Empirical results and diagnoses are set out in Section 5, while in Section 6 we present our main conclusions.

2. Theoretical background

The basic search approach combined with the on-the-job search assumption predicts that job mobility has a positive effect on lifetime earnings (Burdett, 1978). The idea is that the worker enters the labour market with a stock of human capital, which remains constant over time, and firms differ in the level of productivity they can extract from the worker. Once employed, the individual is able to continue searching and each firm the worker approaches offers the wage that is related to his productivity within the firm. The more intensely the worker searches, the higher is the arrival rate of job offers. The worker switches jobs if the present value of the earnings stream in the alternative job exceeds that of the current job, after allowing for any costs incurred when switching jobs.

However, when we add to the search model the assumption of on-the-job training, job mobility may imply wage cuts for the worker (Mortensen, 1988). One of the main elements of the theory of human capital is that productivity increases with tenure in the job as a result of the accumulation of specific human capital. In this framework worker's productivity will not be constant while employed in a particular job and wages may increase since the firm and the worker share the return generated by specific human capital investments. In this framework, the individual may be willing to accept a pay cut when switching jobs in order to receive a higher rate of wage growth in the new job. The idea is that when a worker switches jobs, the specific human capital accumulated in the previous one is lost because such firm specific skills are non-transferable and their contribution to the worker's productivity is permanently lost when employment with the firm is finished. Thus, the worker remains with only his stock of general human capital to carry into the new job.

Search models often argue that the depreciation of general transferable work skills may accelerate as the unemployment spell lengthens¹ and therefore observed wage cuts may be larger for unemployed workers. Following a different argument, García-Pérez and Rebollo (2005) present a stationary job search model with on-the-job search and on-the-job wage

¹ For instance, García-Pérez (2005) considers a non-stationary job search model where lower reservation wages are the main determinant of the change in the hazard rate during the first 6 months of the unemployment spell. In this context, wage losses are closely related to the length of the unemployment spell and to the lack of job offers.

growth to account for wage losses after an unemployment spell. They conclude that workers adjust their reservation wages and may incur in wage losses when their labour expectations while employed are favourable enough.²

In the matching approach (Jovanovic, 1979) the most important assumption is that there may initially be uncertainty regarding a worker's current productivity within a particular job. This assumption implies that mismatches may occur in the labour market where workers are initially not employed in the jobs in which they are most productive. Job mobility provides the mechanism for the market to move towards an efficient allocation of resources where workers locate themselves in the jobs that maximise their productivity. To the extent that job mobility allows for an improved sorting of workers among jobs, higher earnings may be expected.

Job match quality partly depends on career decisions made by the individual up to the time of observation. At the same time, the individual's career history indicates to the employer the quality of previous and current matches. As match quality partly determines wages, the dependence of the match on past career decisions causes a potential endogeneity problem relevant for empirical analysis. Bad matches favour the probability of job mobility and simultaneously determine low tenure and low wages. If the workers who stay in the same jobs are the good matches and the ones who move are the bad matches, estimating the wage return from moving, using as a comparison group the stayers, will tend to underestimate the returns from job mobility.

In line with the approach of imperfect information, some models (Lockwood, 1991; Gibbons and Kazi, 1991; Blanchard and Diamond, 1994) point out that the existence of an unemployment spell could have a negative effect on subsequent wages. In this case, depending on observables, we could underestimate the negative effect of job change on wages. Moreover, unemployment experiences may have a significant effect on individual's future earnings if unemployment occurs frequently.

3. The data

Our empirical analysis is based on data from the European Community Household Panel (hereafter 'ECHP'). We used eight waves from 1994 to 2001 for Spain, Germany, Portugal and France. The ECHP is based on a survey that is annually carried out on a sample of households. Since it has a panel dimension we can follow the history of individuals over the duration of the survey. Most of the variables refer to the moment of the interview but some variables relating to annual earnings and labour status refer to the year prior to the interview.

We take the retrospective report of the monthly labour status to build up the length of the job and unemployment spells. We use the reported date the individual began the current job to identify the job tenure and the existence of two consecutive jobs. In most of the empirical literature, job separation variables are broadly defined when an individual is

² For instance, if an unemployed worker faces a high probability of getting high wage offers while employed he will be willing to accept low wage offers from unemployment.

observed to have different employers at two consecutive or non-consecutive interviews. We choose an alternative approach and use this monthly information for two main reasons. Firstly, we are able to identify different employment and unemployment spells within a year. Secondly, when using the annual information it is not possible to identify wages at the moment of moving to another job. However, the point at which wages are computed is relevant to correctly measure the costs produced by an unemployment spell, especially because there may be on-the-job wage growth.

We combine the monthly labour situation and the data on annual earnings to calculate monthly wages.³ If the individual has only one job during the year, the monthly wage is the ratio between annual labour earnings and the number of months in employment. If the worker has two different employment spells we combine the information on annual earnings with the wage reported at the time of the interview to obtain the monthly wage.⁴ However, we can not identify the wage for each employment spell when the worker has more than two different job spells within the same year since the worker is interviewed only once a year.

Our sample consists of three types of workers: stayers, voluntary movers and involuntary movers. The stayers are workers that remain in the same job between two consecutive interviews.⁵ We consider as voluntary movers all job changes characterised by the absence of an unemployment spell between two consecutive jobs.⁶ Conversely, involuntary movers are workers that experience an unemployment spell between two jobs. This definition of voluntary and involuntary separations follows the argument offered by matching models as they assume that unemployment may offer a negative signal to the firm, which negatively affects the offered wage and subsequently generates a cost for the worker. Nevertheless, from an empirical perspective we may face some mis-specification problems and consider as voluntary some cases where the job change is induced by the employer or vice versa. One type of mis-specification arises from considering what is in reality a case of a voluntary entry into unemployment, as being a layoff. The ECHP provides self-reported data on the reasons for being unemployed and distinguishes voluntary terminations from layoffs. To avoid this mis-specification we will also consider as voluntary movers those unemployed workers who indicate they voluntarily left their job and were unemployed no more than three months.⁷ Another type of misspecification could occur because the employer may announce in advance to the worker that he will be laid off forcing him to search on-the-job, and he ends up in

³ Information on hours worked is also available but it significantly restricts the sample so we use the monthly wage as the endogenous variable. Previous works show that wage losses based on monthly wage are greater than those based on hourly wage. This could be due to changes in monthly hours.

⁴ This method can introduce measurement errors in wages but, given the aim of this paper, we consider it is important to include in the sample those individuals with more than one employment spell during a year.

⁵ In this paper, job mobility is defined as a change of employer. Therefore, job stability may be related to a change of job within the same firm. We follow this approach since job changes within the employer are likely to be associated to wage mobility.

⁶ The same hypothesis is assumed in [Abowd et al. \(1999\)](#).

⁷ The reported information is not always consistent with the idea of “voluntary” separations since there were workers with unemployment spells lengthier than 3 months and who reported a voluntary separation from their job.

Table 1

Variables used in the analysis

Gender: 1=Woman, 0=Men.Civil Status: 1=Single; 0=Otherwise.Education Attainments: Superior Studies, Medium Studies, Primary Studies.Age: Age (18–30), Age (30–45), Age (>45)Children (<15): 1=there are children younger than 15 in the household; 0=otherwise.Household Income: Monthly earnings of the household excluded the labour earnings of the individualTenure (measured in months): tenure (<12); tenure (12–24); tenure (24–48); tenure (>48).Full time job: 1=Full time job; 0=Otherwise.On the job search: 1=the individual reported to be searching for another job and is employed, 0=Otherwise.^aOccupation: three categories: High skill, medium and low.Type of Contract: 1=Permanent Contract ; 0=Otherwise.Unemployment Duration: measured in months.Previous Unempl. Spells: 1=the worker had an unemployment spell previous to the current state, 0=Otherwise.Previous Wage: Real Monthly wage of the previous job.^bEmployment Growth Rate: Rate of growth of total employment. National Labour Force Surveys

^a This variable is not available for Germany.^b We use the CPI of each country to obtain real monthly wages, which are all them expressed in Euros (in real terms of 1993). All tables use real wages.

another job before being fired. This type of misspecification is less relevant in the context of our study since on-the-job search is strongly related to having a temporary contract.⁸ Moreover, on general grounds in all countries advance notification before a layoff is required (OECD, 1999).

Our sample contains all non-self-employed workers aged between 18 and 60 with jobs in the non-farming sector who are observed for at least two consecutive interviews and with available information on previous wages. This last sample restriction may impose certain non-random sample selection problems since we reduce the share of very short-term jobs and long-term unemployment spells.⁹ The selection of covariates is limited by sample size requirements. Therefore we select model variables considering both their economic relevance and the minimum presence of missing observations.

A brief description of each of the variables used in the analysis is offered in Table 1, while Table 2 shows their sample characteristics. This table shows that there are important differences between the three groups of observations. Firstly, women, young, lowly skilled workers and those with primary studies have higher probabilities of being involuntary movers. Job movers tend to have low tenure, particularly involuntary movers, for whom more than 50% come from jobs with tenure of less than 12 months. In Spain and France more than 60% of unemployed workers were employed for less than 12 months. Related to this last result, we observe that more than 50% of the workers had a previous unemployment spell. This is strongly related to the fact that a high percentage of these

⁸ Among workers who reported on-the-job search 94% have a temporary contract in Spain, 77% in France and 67% in Portugal. Therefore, in our sample on-the-job search is related to temporary contracts more than an advance notification of a layoff.

⁹ The share of job spells shorter than a year decreases from 23.7% to 19.4% in Spain, from 6.38% to 5.48% in Germany, from 5.7% to 4.2% in France and from 9.5% to 9.2% in Portugal. The mean unemployment duration – measured in months-, decreases slightly from 9.51 to 9.37 in Spain, from 8.62 to 8.44 in Germany, from 8.59 to 8.59 in France, and from 9.53 to 9.22 in Portugal.

Table 2
Sample characteristics

	Spain	Germany	Portugal	France
Employment Growth Rate (Average, 1994–2001)	3.71%	0.33%	1.75%	1.82%
<i>Involuntary job movers</i>				
Woman	46%	44%	44%	52%
Single	41%	24%	24%	44%
Superior Studies	18%	16%	16%	20%
Medium Studies	19%	60%	60%	30%
Age (18–30)	36%	24%	41%	36%
Age (30–45)	37%	38%	33%	40%
Children (<15)	41%	36%	41%	48%
Household Income	1151	1559	672	1274
Tenure (<12)	78%	47%	50%	60%
Tenure (12–24)	7%	15%	9%	8%
Tenure (24–48)	4%	11%	8%	9%
Tenure (48–60)	2%	7%	6%	5%
Full time job	79%	78%	83%	70%
On the job search	34%	–	19%	41%
High Skill (Occupation)	10%	12%	6%	9%
Medium Skill (Occupation)	14%	20%	10%	20%
Permanent Contract	37%	77%	60%	52%
Unempl. Dur. (<3)	29%	36%	35%	41%
Unempl. Dur. (3–6)	35%	35%	37%	28%
Previous Unempl. Spells	73%	51%	55%	61%
N	6175	2975	3389	1457
<i>Voluntary job movers</i>				
Woman	30%	39%	34%	40%
Single	40%	32%	39%	35%
Superior Studies	24%	29%	7%	35%
Medium Studies	19%	56%	12%	28%
Age (18–30)	41%	29%	55%	36%
Age (30–45)	45%	55%	31%	48%
Children (<15)	43%	41%	46%	40%
Household Income	1125	1625	776	1125
Tenure (<12)	61%	42%	49%	39%
Tenure (12–24)	13%	14%	13%	11%
Tenure (24–48)	10%	15%	13%	15%
Tenure (48–60)	4%	10%	7%	9%
Full time job	89%	88%	94%	87%
On the job search	20%	–	10%	25%
High Skill (Occupation)	10%	13%	7%	19%
Medium Skill (Occupation)	31%	43%	31%	45%
Permanent Contract	29%	90%	62%	84%
Previous Unempl. Spells	50%	21%	30%	16%
N	1115	745	922	575
<i>Stayers</i>				
Woman	45%	40%	43%	45%
Single	21%	16%	20%	21%

(continued on next page)

Table 2 (continued)

	Spain	Germany	Portugal	France
<i>Stayers</i>				
Superior Studies	34%	25%	10%	28%
Medium Studies	20%	58%	13%	35%
Age (18–30)	15%	12%	23%	12%
Age (30–45)	48%	47%	43%	48%
Children (<15)	48%	41%	48%	51%
Household Income	1032	1593	751	1526
Tenure (12–24)	6%	8%	6%	5%
Tenure (24–48)	12%	16%	13%	11%
Tenure (48–60)	10%	14%	12%	11%
Previous Unempl. Spells	8%	2%	4%	4%
Full time job	96%	90%	96%	90%
On the job search	5%	–	2%	4%
High Skill (Occupation)	19%	17%	8%	15%
Medium Skill (Occupation)	39%	42%	38%	49%
Permanent Contract	86%	97%	91%	97%
N	15,932	23,055	19,516	24,337

workers enter into temporary jobs after the unemployment spell. On the contrary, stayers are basically older workers with higher level of studies and with longer tenures. The majority of workers had a full-time job and those with a part-time job were more common in the group of involuntary movers. The sample data shows that the ratio of on-the-job search is higher for job entrants, though one could think that it should be higher for voluntary movers. This is again related to the fact that a larger share of involuntary movers had temporary contracts. Finally, more than 50% of the unemployed workers exit this state during the first six months. German workers tend to exit earlier from unemployment while Spanish workers have longer unemployment spells.

In Table 3 we present the sample mean of current wages for each type of worker. The second column computes the wage gap of involuntary movers with regard to voluntary movers and stayers and the third column the wage gap of voluntary movers with regard to

Table 3
Wages by type of worker

		Current wage	Wage gap of involuntary job movers	Wage gap of voluntary job movers
Spain	Involuntary movers	1103		
	Voluntary movers	1426	–22%	
	Stayers	1781	–38%	–19%
Germany	Involuntary movers	1628		
	Voluntary movers	2025	–19%	
	Stayers	2137	–23%	–5%
Portugal	Involuntary movers	581		
	Voluntary movers	661	–12%	
	Stayers	823	–29%	–19%
France	Involuntary movers	1458		
	Voluntary movers	2068	–29%	
	Stayers	2204	–33%	–6%

stayers. The findings shown are consistent with the view that there could be a non-random selection process. The wage gap between voluntary and involuntary movers is negative and ranges from 12% in Portugal to 29% in France. The wage gap between involuntary movers and stayers is also negative and clearly larger. It ranges from 23% in Germany to 38% in Spain. From this data we may conclude that involuntary separations generate large costs and these costs are larger relative to stayers. However, this measure of the wage gap does not reflect the net cost that an unemployment spell has on wages. Firstly, this cost can be higher or lower than the one computed from observed wage differentials because wage dynamics may be different between individuals due to differences in observed characteristics. Secondly, the sample of job movers could be a non-random sample of the pull of workers, and thus their mean wage may not represent that of a random worker who experiences a job change, but rather the expected wage depending on the voluntary or involuntary nature of the job change.

4. Model specification

Before proceeding, careful attention needs to be paid to developing an appropriate definition of the effect of unemployment on wages. This paper defines the effect of unemployment on wages as the difference between what workers with a given unemployment experience earn and what they would have earned had they not experienced unemployment. This definition allows for the wage growth that would have occurred while the person was unemployed and has been extensively used in the job displacement literature.

We consider a situation where for each sample observation only one among the J dependent variables W_j -wages-is observed. In our case we classify the observations into three regimes, involuntary movers ($j=0$), voluntary movers ($j=1$) and stayers ($j=2$) respectively, which are governed by different probability laws:

$$W_j = X_j \beta_j + u_j, j = 0, 1, 2. \quad (1)$$

Where W_j represents potential wages for a worker in state j . The selection mechanism is described through a latent variable model that describes the propensity towards being in one of the possible J states. The process for I_j is:

$$I_j = Z_j \gamma_j + \varepsilon_j \quad (2)$$

where Z_j represents a vector of explanatory variables of the selection process, γ_j is the corresponding vector of unknown parameters to be estimated and ε_j is the random component of the selection equation. As known, it is not possible to observe the latent process, I_j , but only its realisation and therefore the switching model can be described as follows:¹⁰

$$W = W_k, \text{ if } I_k = \max \{I_j\}, j = 0, 1, 2. \quad (3)$$

¹⁰ The latent variable model may be interpreted as a reduced form approach, where supply and demand side effects mix and cannot be disentangled. This implies that the behaviour of the worker and the functioning of the labour market jointly generate what we observe, I_k . The estimated coefficients of the explanatory variables therefore capture the joint effect of genuine preferences of the worker and the employer's preferences as regards the worker's characteristics.

Where the indexes k and j represent the observed and the potential state respectively.

To avoid the restrictions imposed by the Multinomial Logit Model¹¹ we estimate the selection process using the Multinomial Probit Model (MNP, hereafter). Nevertheless, MNP faces some identification problems, making it necessary to introduce several identification restrictions. First, we have to take one alternative as a reference and reduce the selection process to two equations.¹² In our three-choice model, we chose as a reference alternative $j=2$, which corresponds with the group of *stayers*:

$$I_j^* = I_j - I_2 = Z_j\gamma_j^* + \varepsilon_j^*, \gamma_j^* = \gamma_j^* - \gamma_2 \text{ and } \varepsilon_j^* = \varepsilon_j - \varepsilon_2 \tag{4}$$

where we use the superindex “*” to differentiate the transformed model from the original three equation selection model. The relevant distribution of the disturbances is bivariate, which is normal with zero mean and covariance matrix Σ^* :

$$\Sigma^* = \begin{pmatrix} \sigma_{11}^* & \sigma_{12}^* \\ \sigma_{12}^* & \sigma_{22}^* \end{pmatrix}. \tag{5}$$

Given the lack of information on the scale of the variances it is necessary to make the first variance, σ_{11}^* , equal to one.

We estimate our model by full maximum likelihood¹³ because this method is more efficient¹⁴ than the two step estimation method proposed by Heckman (1979). The likelihood function to be estimated has the following form:

$$\begin{aligned} L(\beta_j, \gamma_j^*, \sigma_{\varepsilon_j^*}^2, \sigma_{\varepsilon_0^* \varepsilon_1^*} \sigma_{\varepsilon_1^* \varepsilon_2^*} W, X, Z, I^*) \\ = \prod_{\substack{I_0^* - I_1^* > 0 \\ I_0^* > 0}} \left[(\varphi(W_0)\Phi_{W_0}(I_0^* > 0, I_0^* - I_1^* > 0))^{c_0} (\Phi_{W_0}(I_0^* > 0, I_0^* - I_1^* > 0))^{1-c_0} \right] \\ \times \prod_{\substack{I_1^* > 0 \\ I_0^* - I_1^* \leq 0}} \left[(\varphi(W_1)\Phi_{W_1}(I_1^* > 0, I_0^* - I_1^* \leq 0))^{c_1} (\Phi_{W_1}(I_1^* > 0, I_0^* - I_1^* \leq 0))^{1-c_1} \right] \\ \times \prod_{\substack{I_0^* \leq 0 \\ I_1^* \leq 0}} [(\varphi(W_2)\Phi_{W_2}(I_0^* \leq 0, I_1^* \leq 0))] \end{aligned} \tag{6}$$

Where $\varphi(\cdot)$ describes the wage density function and $\Phi_w(\cdot)$ the conditional cumulative distribution function of the bivariate selection process. The vector of parameters to be estimated are the coefficients in the wage, β_j , and the selection equations, γ_j^* ; the

¹¹ This model implies the assumption of Independence of Irrelevant Alternatives (IIA). This means that the utilities derived from the three choices are mutually uncorrelated for the same individual. This is unlikely to be true if certain characteristics of the labour market states make two of them closer.

¹² The identification problem arises since observed choices are only informative with regard to the differences of the latent variables Dansie (1985).

¹³ An alternative is to estimate the model by simulated maximum likelihood (SML). There is a study (Weeks, 1997), which shows that SML, when applied to a MNP with only individual characteristics, exhibits considerable bias. Difficulty was encountered in the estimation of both the mean equation and covariance parameters.

¹⁴ Moreover, the maximum likelihood estimation offers more reliable results even when instruments are weak.

corresponding variances, $\sigma_{u_j}^2, \sigma_{\varepsilon_{j^*}}^2$; the covariances between the error term of the wage and selection equations $\sigma_{u_j \varepsilon_{j^*}}^2$ and the covariances between the selection equations $\sigma_{\varepsilon_{j^*} \varepsilon_{j^*}}^2$.

We consider also the contribution of the censored and missing observations to the likelihood function and the index c_j takes value 1 if the observation is not censored or missing. Some missing observations emerge where the worker changed job but we cannot measure his new wage. Censored observations also arise where the individual is still unemployed at the time of the interview.¹⁵

Given valid instruments, in order to test for the endogeneity of the switching model the parameters of interest are the covariances of the error term of each wage equation with the error terms of the selection equations. If these covariances are different from zero, then the selection process is not exogenous, and the estimation of the wage equations by OLS would produce inconsistent estimators of the parameters of the model. The covariance between the error terms of the selection equations informs us about the adequacy of using the MNP to describe the selection process.

5. Estimation results

The variables considered in the selection equation control the observed heterogeneity that influences the type of transition and are based on the theoretical models presented in Section 2. They give some insight into the effects of factors such as tenure, wages, labour market experience, search intensity and productivity on the probability of being a job mover. We also include in the selection equation other unemployment experiences since empirical research suggests that the best predictor of an individual's future risk of unemployment is his past history of unemployment (Arulampalam, 2001). The wage equations contain the usual set of control variables that explain current wages.¹⁶ For involuntary movers we add the duration of the unemployment spell to investigate whether current wages are negatively related to unemployment duration as non-stationary search models predict.

To identify the model in a way other than through the normality assumption we need various exclusion restrictions. We excluded the variables on-the-job search, Marital status, the presence of Children younger than 15 years old and household income from the wage equation. Matching and searching models point to a positive correlation between on-the-job search and job mobility. The variables marital status, children younger than 15 years old and household income may explain the type of transition since they affect the probability of being laid off, the value of leisure, the intensity of the search and the arrival rate of job offers while employed and unemployed, and given the covariates already

¹⁵ We consider as censored all unemployment spells longer than 36 months. We include censored observations to improve the estimation of the selection process but we do not control for their effects on wage predictions.

¹⁶ Since this database offers only worker level data we do not have available information from the demand side of the labour market. Our specification of the wage equation can be related to other empirical papers based on worker-level data to estimate the effects of seniority and experience on wages, such as the standard wage model described in Altonji and Shakotko (1987) and Topel (1991) in which wages depend on a time trend, years of experience and seniority.

Table 4

Selection equation: correlation term

	Spain	Germany	Portugal	France
$\rho_{\varepsilon_1\varepsilon_2}$	0.89 (0.00)	0.18 (0.15)	0.95 (0.00)	0.49 (0.00)

* The first row represents the estimated parameter and the second row its p-value.

present in the wage equation, it is plausible to assume that they will not be correlated with current wages.¹⁷ Another variable that is excluded from wage equations is previous unemployment experience. The use of this variable as an instrument is not clear-cut since this variable is highly correlated with the type of job mobility but it could also be argue that is correlated with current wages¹⁸ (scarring hypothesis).

The validity of the results relies most importantly on the exclusion restrictions. As there is no obvious identifying restriction that could be used to perform over-identification tests, we use the non-linearity of the trivariate probit as the minimum identifying restriction and test the validity of the instruments.¹⁹ Overall, the data supported the proposed identification strategy since the instruments are all statistically significant.

5.1. Selection and wage equations

Tables 4–6 present the estimation results for the two selection equations. The first equation describes the probability of being an involuntary mover instead of a stayer, and the second equation describes the probability of being a voluntary mover instead of a stayer. Table 4 reports the correlation coefficients and Tables 5 and 6 display the results for the coefficients of the selection equations. In order to compare the results obtained from the exogenous and the endogenous model we also provide both estimations.

An inspection of the correlation coefficient of the selection equations set out in Table 4 shows the relevance of this approach in correctly estimating the probability of job mobility. For all the countries analysed, this correlation is positive and, except for Germany, statistically significant. This indicates that the unobserved factors that make job stability and involuntary job mobility different alternatives also result in voluntary mobility being practically unrelated to job stability. Therefore we should expect that observed wage gaps between movers and stayers will be strongly bias.

Most of signs of the estimated coefficients are widely established in the literature. Hence, we will briefly point out some of them. We obtain a non-linear relationship between age and the probability of involuntary separations. The level of studies also helps to explain job mobility behaviour. When we focus on unemployed workers versus stayers, all countries show the same result: the higher the level of studies, the lower the probability

¹⁷ We tested other variables available in the database as instruments such as house ownership and size of the city where the worker lives on. None of them were statistically significant.

¹⁸ We estimated the model using this variable in the wage equation and we found that it was statistically significant only in Spain and Portugal for the wage equation of stayers and, as expected, it shows a negative effect.

¹⁹ We computed the likelihood ratio test on the model without instruments versus the basic model. The results supported the model with instruments.

Table 5

Selection equation: involuntary job movers-job stayers

	Exogenous switching				Endogenous switching			
	Spain	Germany	Portugal	France	Spain	Germany	Portugal	France
Constant	3.10 (0.00)	-0.43 (0.13)	1.06 (0.00)	1.30 (0.00)	3.11 (0.00)	0.99 (0.03)	0.64 (0.00)	1.28 (0.00)
Sex	-0.07 (0.04)	-0.11 (0.00)	0.02 (0.29)	-0.08 (0.04)	-0.08 (0.03)	-0.14 (0.00)	-0.03 (0.20)	-0.05 (0.13)
Age	-8.98 (0.00)	-6.80 (0.00)	-3.82 (0.00)	-6.37 (0.00)	-5.12 (0.00)	-6.95 (0.00)	-1.27 (0.00)	-7.85 (0.00)
Age squared	11.70 (0.00)	9.99 (0.00)	5.07 (0.00)	7.62 (0.00)	7.27 (0.00)	9.86 (0.00)	2.29 (0.00)	10.29 (0.00)
On-the-job search	0.63 (0.00)	- (0.00)	0.71 (0.00)	0.88 (0.00)	0.63 (0.00)	- (0.00)	0.55 (0.00)	0.85 (0.00)
Tenure (>48)	-1.56 (0.00)	-1.13 (0.00)	-1.83 (0.00)	-2.15 (0.00)	-1.57 (0.00)	-1.04 (0.00)	-1.91 (0.00)	-1.19 (0.00)
Tenure (24–48)	-1.45 (0.00)	-0.46 (0.00)	-1.25 (0.00)	-1.61 (0.00)	-1.46 (0.00)	-0.87 (0.00)	-1.17 (0.00)	-1.05 (0.00)
Children (<15)	0.14 (0.00)	0.03 (0.26)	0.02 (0.29)	0.11 (0.01)	0.14 (0.03)	0.03 (0.39)	0.03 (0.15)	0.04 (0.06)
Household Income	0.03 (0.00)	0.05 (0.00)	-0.05 (0.00)	0.05 (0.00)	0.03 (0.00)	0.04 (0.00)	-0.01 (0.00)	0.08 (0.00)
Full time job	-0.17 (0.09)	-0.20 (0.00)	-0.10 (0.08)	0.06 (0.18)	-0.19 (0.32)	-0.07 (0.00)	-0.25 (0.01)	-0.06 (0.18)
Civil status	0.02 (0.41)	0.13 (0.01)	0.01 (0.42)	0.17 (0.00)	0.02 (0.03)	0.13 (0.00)	-0.01 (0.17)	0.14 (0.04)
Superior Studies	-0.24 (0.00)	-0.38 (0.00)	-0.18 (0.02)	-0.05 (0.18)	-0.25 (0.00)	-0.29 (0.00)	-0.35 (0.00)	-0.09 (0.01)
Secondary Studies	-0.10 (0.01)	-0.18 (0.00)	-0.09 (0.07)	0.05 (0.17)	-0.11 (0.01)	-0.17 (0.00)	-0.16 (0.01)	0.04 (0.37)
Previous Wage	-0.38 (0.00)	0.03 (0.21)	-0.09 (0.01)	-0.13 (0.00)	-0.38 (0.00)	-0.11 (0.10)	-0.11 (0.01)	-0.22 (0.00)
Previous Unemp. Experience	0.61 (0.00)	1.49 (0.00)	0.86 (0.00)	0.74 (0.00)	1.07 (0.00)	1.51 (0.00)	0.73 (0.00)	0.97 (0.00)

*Time dummies are included in the estimation.

*The first row represents the estimated parameter and the second row its p-value.

of experiencing an unemployment spell. However the relationship between the level of studies and voluntary separations differs among countries. In Spain and Portugal, the level of studies is negatively correlated with voluntary separations. On the contrary, in Germany those workers with superior studies have the highest probability of changing job voluntarily. When we look at previous wages we find a similar result. Low-wage workers face larger probabilities of being job movers, either voluntary or involuntary, in Portugal and Spain. In Germany these workers have larger probabilities of being involuntary movers while voluntary separations and wages are positively related. In France this variable is negative and statistically significant for involuntary movers and positive but not statistically significant for voluntary movers.

Our results confirm the scarring effect of unemployment as the estimated parameter of other unemployment experience is positive and statistically significant in both

Table 6
Selection equation: voluntary job movers-job stayers

	Exogenous switching				Endogenous switching			
	Spain	Germany	Portugal	France	Spain	Germany	Portugal	France
Constant	2.04 (0.00)	-1.32 (0.01)	0.11 (0.41)	0.33 (0.31)	2.01 (0.00)	-1.83 (0.01)	0.49 (0.09)	-1.01 (0.06)
Sex	-0.18 (0.00)	-0.08 (0.05)	-0.29 (0.00)	-0.11 (0.01)	-0.18 (0.00)	-0.06 (0.06)	-0.13 (0.01)	-0.12 (0.02)
Age	-1.88 (0.02)	4.21 (0.02)	-1.01 (0.19)	-2.03 (0.22)	-1.69 (0.11)	3.52 (0.02)	-0.96 (0.01)	-0.01 (0.47)
Age squared	1.85 (0.12)	-7.78 (0.00)	-1.55 (0.29)	1.26 (0.36)	1.63 (0.20)	-6.70 (0.00)	0.94 (0.33)	-1.74 (0.16)
On-the-job search	0.47 (0.00)	- (0.00)	0.32 (0.00)	0.81 (0.00)	0.47 (0.00)	- (0.00)	0.45 (0.00)	0.65 (0.00)
Tenure (>48)	-1.75 (0.00)	-0.95 (0.00)	-1.74 (0.00)	-2.04 (0.00)	-1.73 (0.00)	-0.99 (0.00)	-1.29 (0.00)	-1.15 (0.00)
Tenure (24–48)	-1.43 (0.00)	-0.58 (0.00)	-1.21 (0.00)	-1.52 (0.00)	-1.42 (0.00)	-0.79 (0.00)	-1.16 (0.00)	-0.92 (0.00)
Children (<15)	0.10 (0.01)	-0.07 (0.09)	0.00 (0.48)	0.05 (0.18)	0.10 (0.01)	-0.09 (0.08)	0.01 (0.46)	-0.02 (0.32)
Household Income	0.01 (0.08)	-0.03 (0.01)	0.04 (0.03)	0.03 (0.00)	0.02 (0.15)	-0.02 (0.01)	0.00 (0.14)	0.02 (0.22)
Full Time Job	-0.11 (0.06)	-0.13 (0.06)	0.06 (0.29)	0.05 (0.24)	0.04 (0.25)	-0.03 (0.11)	-0.17 (0.31)	0.09 (0.20)
Single	-0.00 (0.20)	-0.02 (0.38)	-0.05 (0.21)	0.12 (0.02)	-0.09 (0.04)	-0.00 (0.30)	-0.05 (0.09)	0.02 (0.42)
Superior Studies	-0.21 (0.00)	0.15 (0.02)	-0.10 (0.18)	0.02 (0.40)	-0.20 (0.00)	0.15 (0.05)	-0.26 (0.00)	0.02 (0.49)
Secondary Studies	-0.12 (0.00)	0.00 (0.47)	-0.12 (0.05)	0.06 (0.15)	-0.11 (0.00)	0.01 (0.47)	-0.14 (0.01)	0.06 (0.34)
Previous Wage	-0.29 (0.00)	-0.01 (0.40)	-0.06 (0.13)	-0.07 (0.07)	-0.29 (0.00)	0.06 (0.07)	-0.10 (0.01)	-0.03 (0.48)
Previous Unemp. Experience	0.71 (0.03)	0.00 (0.49)	-0.07 (0.22)	0.13 (0.45)	0.67 (0.00)	0.49 (0.01)	0.50 (0.05)	0.14 (0.24)

*Time dummies are included in the estimation.

*The first row represents the estimated parameter and the second row its p-value.

selection equations. Interestingly, a comparison between the exogenous and the endogenous model shows that the effect of this variable is strongly biased in the exogenous model.

As expected, on-the-job search is positively correlated with the probability of both voluntarily and involuntarily changing jobs, but the effect is stronger for unemployed workers. From search models we know that search activity is positively related to job transitions while from job matching models the relation could be the opposite, because a worker searches when there is some kind of mismatch in their current job. This second approach seems to be more suitable in our case. Tenure in the previous job is also relevant to explain the propensity of being a job mover and, as human capital and matching models predict, the probability of changing jobs is higher the lower the tenure. This is also the case for voluntary and involuntary movers, though if we compare these two types of workers

we observe that, except for Spain, workers with tenure lower than 24 months have the highest probability of having an unemployment spell.

Therefore, the characteristics that explain the probability of experiencing an involuntary separation seem to be quite similar among the countries analyzed. Some differences arise when we study voluntary movers. In fact we found that in Spain and Portugal voluntary and involuntary movers face closer observed characteristics than in France and Germany. Besides, in Spain and Portugal there are unobserved factors that make voluntary and involuntary job movements more similar alternatives than in Germany and France. Finally, the positive sign of the correlation coefficient between alternatives can be interpreted as indicating the existence of an adverse selection process common for job movers across countries. Overall, these results point out that voluntary transitions might be partially related to unstable jobs, especially in Spain.

We estimate three wage equations, one for each labour state. The results are set out in Tables 7–9. The comparison of the estimated coefficients for the different covariates among

Table 7
Wage equation for involuntary job movers

	Exogenous model				Endogenous model			
	Spain	Germany	Portugal	France	Spain	Germany	Portugal	France
Constant	3.20 (0.00)	5.52 (0.00)	1.90 (0.00)	4.37 (0.00)	3.27 (0.00)	5.03 (0.00)	1.74 (0.00)	4.66 (0.00)
Sex	-0.10 (0.00)	-0.22 (0.00)	-0.10 (0.00)	-0.21 (0.00)	-0.10 (0.00)	-0.19 (0.00)	-0.08 (0.02)	-0.23 (0.00)
Age	1.51 (0.00)	-1.41 (0.21)	1.40 (0.07)	2.31 (0.11)	1.15 (0.00)	-1.61 (0.05)	1.49 (0.07)	1.15 (0.25)
Age ²	-1.81 (0.00)	-0.32 (0.43)	-1.85 (0.07)	-2.68 (0.16)	-1.30 (0.00)	3.13 (0.07)	-1.80 (0.08)	-1.38 (0.27)
Superior Studies	0.16 (0.00)	0.00 (0.49)	0.32 (0.00)	0.17 (0.01)	0.15 (0.00)	0.05 (0.39)	0.28 (0.00)	0.10 (0.02)
Secondary Studies	0.05 (0.45)	0.06 (0.21)	0.05 (0.18)	0.02 (0.34)	0.05 (0.04)	0.05 (0.06)	0.04 (0.20)	-0.02 (0.34)
Full Time Job	0.34 (0.00)	0.18 (0.03)	0.29 (0.00)	0.37 (0.00)	0.34 (0.00)	0.24 (0.02)	0.19 (0.00)	0.30 (0.00)
Unemp. Duration	-0.12 (0.00)	-0.07 (0.30)	0.03 (0.32)	-0.18 (0.04)	-0.11 (0.00)	-0.01 (0.33)	-0.10 (0.29)	-0.10 (0.03)
Unemp. Duration ²	0.03 (0.00)	0.06 (0.11)	-0.03 (0.11)	0.08 (0.02)	0.03 (0.00)	0.01 (0.13)	0.02 (0.09)	0.04 (0.02)
Previous Wage	0.45 (0.00)	0.26 (0.00)	0.61 (0.00)	0.28 (0.00)	0.43 (0.00)	0.32 (0.00)	0.65 (0.00)	0.26 (0.00)
Medium skill	0.09 (0.00)	0.09 (0.01)	-0.01 (0.43)	0.05 (0.15)	0.07 (0.00)	0.02 (0.01)	0.01 (0.00)	0.12 (0.00)
High skill	0.36 (0.00)	0.19 (0.00)	0.13 (0.03)	0.45 (0.00)	0.36 (0.00)	0.20 (0.00)	0.20 (0.03)	0.50 (0.00)
Tenure (>48)	0.08 (0.02)	0.12 (0.00)	0.04 (0.23)	0.22 (0.01)	0.02 (0.41)	-0.04 (0.11)	-0.10 (0.12)	-0.02 (0.15)
Tenure (24–48)	-0.00 (0.24)	0.05 (0.14)	0.00 (0.46)	0.16 (0.16)	-0.05 (0.44)	-0.21 (0.06)	-0.08 (0.16)	-0.10 (0.13)

*Time dummies are included in the estimation.

*The first row represents the estimated parameter and the second row its p-value.

Table 8
Wage equation for voluntary job movers

	Exogenous model				Endogenous model			
	Spain	Germany	Portugal	France	Spain	Germany	Portugal	France
Constant	3.77 (0.00)	2.94 (0.00)	2.78 (0.00)	4.18 (0.00)	4.06 (0.00)	3.21 (0.00)	3.04 (0.00)	3.58 (0.00)
Sex	-0.19 (0.00)	-0.09 (0.01)	-0.19 (0.00)	-0.11 (0.00)	-0.19 (0.00)	-0.12 (0.01)	-0.13 (0.00)	-0.12 (0.00)
Age	2.46 (0.00)	-0.08 (0.48)	2.75 (0.00)	-1.75 (0.18)	1.98 (0.00)	-0.38 (0.39)	3.20 (0.00)	2.83 (0.08)
Age ²	-3.09 (0.01)	-0.32 (0.43)	-3.34 (0.00)	3.01 (0.12)	-2.42 (0.00)	0.29 (0.46)	-3.79 (0.00)	-3.46 (0.05)
Superior Studies	0.15 (0.00)	0.01 (0.45)	0.42 (0.00)	0.27 (0.00)	0.14 (0.00)	0.06 (0.12)	0.39 (0.00)	0.20 (0.00)
Secondary Studies	0.06 (0.01)	-0.04 (0.20)	0.08 (0.02)	0.09 (0.03)	0.05 (0.00)	-0.02 (0.20)	0.10 (0.02)	0.04 (0.04)
Full Time Job	0.36 (0.00)	0.12 (0.01)	0.29 (0.00)	0.29 (0.00)	0.32 (0.00)	0.13 (0.02)	0.31 (0.01)	0.24 (0.00)
Previous Wage	0.35 (0.00)	0.60 (0.00)	0.44 (0.00)	0.42 (0.00)	0.33 (0.00)	0.58 (0.00)	0.42 (0.00)	0.41 (0.00)
Medium skill	0.04 (0.09)	0.09 (0.01)	0.10 (0.00)	-0.04 (0.22)	0.04 (0.10)	0.07 (0.02)	0.08 (0.00)	0.02 (0.25)
High skill	0.27 (0.00)	0.19 (0.00)	0.22 (0.00)	0.17 (0.01)	0.30 (0.00)	0.13 (0.00)	0.22 (0.00)	0.22 (0.00)
Tenure (>48)	0.17 (0.00)	0.12 (0.00)	0.03 (0.14)	0.18 (0.00)	0.11 (0.20)	0.06 (0.26)	0.10 (0.29)	0.07 (0.15)
Tenure (24–48)	0.05 (0.29)	0.05 (0.14)	0.04 (0.08)	0.04 (0.22)	-0.01 (0.48)	0.02 (0.36)	0.02 (0.34)	0.01 (0.49)

*Time dummies are included in the estimation.

*The first row represents the estimated parameter and the second row its p-value.

the wage equations shows that it is relevant to specify different wage equations because the marginal effects of the observables on current wages depend on the type of transition.²⁰

The current wage of job movers depends positively on previous wages, but it is also clearly related to the personal and labour characteristics of the worker. We highlight the most relevant results. Interesting results are obtained for the variable tenure in previous job when we compare the exogenous with the endogenous model.²¹ In the exogenous model, the effect of tenure on current wages is positive and statistically significant. As we are conditioning on age, this result would imply that, among workers with similar labour market experience, those who spent more time with their previous employer have higher earnings. However, in the endogenous model tenure is only statistically significant for stayers, indicating that longer tenure workers have higher current wages. This difference

²⁰ This approach is especially relevant for previous wage since we consider that the this variable approximates the worker's reservation wage. For voluntary movers and stayers, this assumption does not cause any problems but for unemployed people the reservation wage tends to be lower than the previous wage.

²¹ It is important to recall the different nature of this variable in the case of movers and stayers. For stayers, previous tenure describes the tenure in the current job at the time the wage change is measured, while for the group of movers this variable describes the tenure of the worker at the time of that job change.

Table 9
Wage equation for stayers

	Exogenous model				Endogenous model			
	Spain	Germany	Portugal	France	Spain	Germany	Portugal	France
Constant	0.87 (0.00)	0.05 (0.00)	0.34 (0.00)	0.47 (0.00)	0.88 (0.00)	0.56 (0.00)	0.16 (0.00)	0.44 (0.00)
Sex	-0.05 (0.00)	-0.02 (0.00)	-0.02 (0.00)	-0.01 (0.00)	-0.04 (0.00)	-0.02 (0.00)	-0.02 (0.00)	-0.01 (0.00)
Age	0.32 (0.01)	-0.16 (0.01)	0.04 (0.27)	0.10 (0.08)	0.32 (0.00)	-0.15 (0.02)	-0.02 (0.05)	0.09 (0.05)
Age ²	-0.22 (0.04)	0.16 (0.03)	-0.06 (0.19)	-0.12 (0.08)	-0.32 (0.00)	0.16 (0.03)	-0.05 (0.04)	-0.10 (0.06)
Superior Studies	0.03 (0.00)	0.01 (0.01)	0.04 (0.00)	0.03 (0.00)	0.03 (0.00)	0.01 (0.03)	0.04 (0.00)	0.02 (0.00)
Secondary Studies	0.02 (0.00)	0.00 (0.11)	0.02 (0.00)	0.01 (0.00)	0.02 (0.00)	0.00 (0.15)	0.02 (0.00)	0.01 (0.00)
Full Time Job	0.04 (0.00)	0.03 (0.00)	0.01 (0.00)	0.02 (0.00)	0.04 (0.00)	0.03 (0.00)	0.04 (0.00)	0.02 (0.00)
Previous Wage	0.87 (0.00)	0.92 (0.00)	0.95 (0.00)	0.94 (0.00)	0.87 (0.00)	0.92 (0.00)	0.96 (0.00)	0.94 (0.00)
Medium skill	0.03 (0.00)	0.01 (0.00)	0.01 (0.00)	0.01 (0.00)	0.02 (0.00)	0.01 (0.00)	0.01 (0.00)	0.01 (0.00)
High skill	0.06 (0.00)	0.04 (0.00)	0.03 (0.00)	0.04 (0.00)	0.06 (0.00)	0.03 (0.00)	0.04 (0.00)	0.04 (0.00)
Tenure (>48)	0.01 (0.11)	0.00 (0.16)	-0.01 (0.00)	-0.02 (0.00)	0.00 (0.46)	0.02 (0.00)	0.08 (0.00)	0.00 (0.01)
Tenure (24–48)	-0.01 (0.47)	0.00 (0.15)	-0.01 (0.02)	-0.01 (0.06)	-0.01 (0.30)	0.01 (0.03)	0.07 (0.00)	0.00 (0.00)

*Time dummies are included in the estimation.

*The first row represents the estimated parameter and the second row its p-value.

proves that the exogenous model is biased due to the existence of unobserved heterogeneity that makes the positive relation thereby obtained partially spurious. This evidences that match heterogeneity maybe relevant.

We estimate the wage equation controlling for the previous wage and we treat this variable as an approximation of the worker's reservation wage. As expected, in all cases the previous wage is positively correlated to the current wage, although this relation is stronger for stayers. This result is consistent with the idea that stayers have higher reservation wages than job entrants.

The length of the unemployment spell also explains the behaviour of current wages, though this relation is not lineal since wages start decreasing with unemployment duration until a certain point in time. This proves that reservation wages decrease during the unemployment spell.

5.2. Wage losses from unemployment

Once we estimate the switching model, taking into account the endogeneity problem, we can determine conditional wages for involuntary movers and their predicted

Table 10
Likelihood ratio test and correlation coefficients

	Spain	Germany	Portugal	France
Likelihood ratio test ^a	19.38	44.96	149.36	83.59
$\rho_{u_i \varepsilon_i^*}$	0.16 (0.06)	0.17 (0.42)	0.17 (0.19)	0.23 (0.32)
$\rho_{u_i \varepsilon_i^\dagger}$	0.12 (0.22)	0.20 (0.01)	0.26 (0.29)	0.29 (0.01)
$\rho_{u_i \varepsilon_i^0}$	0.09 (0.04)	0.32 (0.34)	0.63 (0.00)	0.37 (0.00)
$\rho_{u_i \varepsilon_i^\dagger}$	0.21 (0.39)	-0.08 (0.44)	-0.27 (0.35)	0.11 (0.30)
$\rho_{u_i \varepsilon_i^0}$	0.05 (0.31)	0.06 (0.16)	-0.87 (0.00)	0.00 (0.14)
$\rho_{u_i \varepsilon_i^\dagger}$	-0.03 (0.44)	-0.75 (0.00)	-0.89 (0.00)	-0.75 (0.00)

^a The value of the chi-squared is 12.59 with a confidence level of 95% and 10.64 with a confidence level of 90% with 6 degrees of freedom.

counterfactuals, which are the wages that they would have earned having stayed at the job or having experienced a voluntary transition.

Before this, in Table 10 we present the results for the correlation structure of the error terms and the likelihood ratio test (LR test, hereafter), for the endogenous switching model with respect to the exogenous one. These figures tell us that there is evidence of non-random selection and hence, if we omit the effect of unobservables, predicted wages for movers and stayers would be inconsistently estimated, as well as the wage penalty associated with involuntary separations.

In Table 11 we present the predicted wage gap for involuntary movers considering the whole sample and for full time workers.²² In order to evaluate the importance of the non-random selection problem we show wage gaps derived from the exogenous and the endogenous model. Firstly, the results confirm that the observed wage differentials previously shown are related to observed characteristics and that there is an adverse selection process which implies that low productivity workers tend to be over-represented in the group of movers. Therefore, observed wage gaps overestimate the costs from job mobility. Secondly, if we estimate wage differentials following the traditional regression approach without considering the endogeneity bias problem, we will underestimate the wage penalty derived from unemployment. Interestingly, this bias seems to be larger when voluntary movers are the control group. Given the sign of the correlation coefficient for the selection equations, the direction of the bias, and the fact that it is larger when voluntary movers are the comparison group, we consider that our results support the approach offered by the matching models. That is, in a context of imperfect information and match

²² The predictions in this table are based in the mean for all variables used in the model and are computed using its complete structure. Hence, the standard errors of these predictions are quite involved to obtain. This is because their computation requires using the standard errors for all the estimated parameters and dealing with the non-linearity of each expression for the predicted wage in any case (see García Pérez and Rebollo, 2004 for these expressions).

Table 11
Wage penalties for involuntary job movers

	Counterfactual	Spain	Germany	Portugal	France
Exogenous Switching (Whole sample)	Voluntary job movers	–7%	–13%	–1%	–6%
	Stayers	–9%	–19%	–8%	–9%
Exogenous Switching (Full time workers)	Voluntary job movers	–9%	–13%	–2%	–7%
	Stayers	0%	–6%	–8%	–7%
Endogenous Switching (whole sample)	Voluntary job movers	–14%	–27%	–31%	–22%
	Stayers	–11%	–21%	–9%	–14%
Endogenous Switching (Full time workers)	Voluntary job movers	–10%	–26%	–26%	–20%
	Stayers	–9%	–20%	–8%	–10%

*The results are calculated at sample means.

heterogeneity, being unemployed sends a negative signal to the employer about the worker which is not completely supported by his lower skills and/or lower potential productivity, and as a consequence the wage loss is greater than would have existed had this perverse signalling effect not arisen.²³

The results reported do not allow us to define a range of countries according to relative wage losses, though on average terms German workers tend to experience larger wage losses compared to the rest of countries. When compared to stayers, German workers have much larger wage penalties, around 22%, followed by French, Spanish and Portuguese workers, who suffer wage losses of 14%, 10% and 9% respectively. Secondly, regarding voluntary movers these wage losses are the lowest for Spain, around 14% followed by France, Germany and Portugal, where wage losses are 23%, 27% and 31% respectively. Interestingly in all countries the estimated wage differentials are larger when compared with voluntary movers. This fact implies that on general grounds voluntary separations give rise to positive returns to workers.²⁴

To understand these cross-national differences we find useful to consider job search models with on-the-job wage growth and on-the-job search mentioned in the theoretical section. A version of this model has been structurally estimated for the same countries using the same database (García-Pérez and Rebollo, 2005). Interestingly, this paper finds that wage cuts are larger in Germany because wage growth expectations while employed are higher in this country than in the others. This result means that relative wage losses in Germany are larger because German workers find more profitable to adjust down their reservation wages to exit from unemployment since they have better chances of wage growth while employed. In line with this argument, in the statistical analysis we shown that Germany faces the lowest mean unemployment duration followed by France, Portugal and Spain.

²³ A similar argument is used in Gibbons and Katz's (1991) where a worker would prefer to be identified as being separated as a result of a mass layoff than as a result of an individual layoff, because of the negative signal embodied in the individual layoff category.

²⁴ Spanish voluntary movers have wages that are around 10% higher than involuntary movers but 3% lower than stayers. In the rest of countries voluntary movers get positive returns. In Germany these quantities are 48% and 3%, in Portugal 44% and 4% and in France 31% and 1% respectively.

Now we look at macroeconomic performance and national labour institutions that may influence workers' reservation wage strategies and/or wage expectations while employed such as employment protection legislation (hereafter, EPL), wage-setting mechanism such as wage bargaining and minimum wages and unemployment benefits.²⁵ Firstly, from the demand side of the market, during the analysed period Germany faced the lowest employment growth rate that should affect the probability of exiting to employment and therefore lower the reservation wage of the unemployed. Secondly, labour institutions also play an important role. Differences between Germany, in one side, and Portugal and Spain in the other side, might be related with national EPL²⁶ since EPL is less stringent in Germany than in Portugal and Spain²⁷ and it is well established that stronger EPL increase the bargained wage. France and Germany have similar levels of EPL and wage bargaining coverage²⁸ but there are differences on minimum wages regulations and unemployment benefits. Lower minimum wages and lower unemployment benefits may reduce the accepted wage to exit from unemployment and therefore they may explain larger wage losses after an unemployment spell. In Germany the ratio of the minimum wage²⁹ is lower than in France (around 58% and 62% respectively). Finally the replacement ratio and the generosity of unemployment benefits are also lower in Germany than in the rest of countries.³⁰ Hence these institutional differences might generally explain the larger wage cuts after unemployment encountered in Germany.

When we compute the wage loss with respect to voluntary movers, Spain stands out as having a relative wage loss approximately 10 percentage points lower than in the rest of countries. National labour market institutions also help to explain these divergences though we think that the evolution and nature of temporary employment plays the most relevant role. These countries are all characterised by having a more restrictive EPL for regular workers as opposed to temporary ones. In this situation the outsiders tend to isolate permanent workers from adjustment and therefore, an important share of job-to-job transitions arise from workers with unstable positions on the labour market. The larger the divergence between EPL for permanent and temporary workers, the stronger is the dualism

²⁵ In cross country comparisons concerns always arise regarding the ability to separate the impact of labour market policies on labour market performance from the consequences of other economic shocks or policies, as well as the concern that policy differences across countries interact in ways that complicate any inference regarding the effect of any particular policy.

²⁶ The index of EPL may vary depending on the way it is constructed and the time is referred since during the 1990s these countries have experience changes in different aspects of the labour institutions towards a larger flexibility. We took as a basic reference the figures in the *Employment Outlook* (OECD, 1999).

²⁷ This argument also helps to explain voluntary job mobility differences since it is well established that countries with strong EPL tend to have a larger share of temporary contracts and therefore job turnover is also larger.

²⁸ The general index of EPL is 2.6 for Germany, 2.8 for France, 3.1 for Spain and 3.7 for Portugal (OECD, 1999). The wage bargaining coverage is 71% and 78% for Spain and Portugal and 92% and 95% for Germany and France (OECD, 1999).

²⁹ Although there are no state-mandated minimum wages in Germany one can say that something similar exists determined by collective bargaining. The ratio represented describes the ratio of the minimum wage relative to the median wage.

³⁰ The replacement ratio is 71% for Germany, 75% for Spain, 79% for France and 87% for Portugal (OECD, 1999).

of the labour market. To ascertain the validity of this argument and to check for cross-national differences we firstly compute the return/cost from voluntary separations relative to job stability. As expected in France, Germany and Portugal voluntary movers experience a small but positive return when changing jobs of around, 1% in France, 2% in Germany and 4% in Portugal. On the contrary, this return is negative in Spain, around 3%. These results ratify the fact that the nature of voluntary mobility in Spain is more strongly related with the existence of a large share of unstable or short-term jobs and therefore wage gains from job-to-job mobility are lower than in the rest of countries (the share of job movers with temporary contracts is much higher in Spain than in the rest of countries).³¹ This evidence is also ratified by the fact that divergences between EPL for permanent workers in contrast to the EPL for temporary contracts are larger in Spain.³²

Finally, in [Table 12](#) we display wage penalties in relation to different personal and labour characteristics that ratify some of the ideas put forward previously. For example, if tenure contributes to the accumulation of specific human capital or seniority rights, wage losses should be positively associated with tenure. This is the case in all countries, especially Germany and Portugal, when we move from short spells to tenures between 2 and 3 years. When we compare involuntary and voluntary movers, workers with short job spells have lower wage losses in all countries. This proves that the loss of specific human capital is relevant to explain wage losses after an unemployment spell and that voluntary movers are able to carry over part of their specific skills or seniority rights into their new job. Most importantly, this result support the view that part of the wage losses may become permanent if workers repeatedly enter into unstable jobs where they are unable to accumulate specific human capital skills.

Concerning worker age we find very little variation in wage losses, which implies that the accumulation of general human capital skills is not relevant to explain divergences in wage losses. The size of wage penalties differs among workers with different levels of studies and also depends on the type of transition. When we compare involuntary movers with stayers, workers with secondary and primary studies suffer the highest wage penalties. This finding is consistent with the argument that more educated workers have more transferable human capital. This is also the case in Spain when we compare voluntary and involuntary movers. However, in Germany, Portugal and France wage losses are greater for unemployed workers with high educational attainments when a voluntary transition occurs. This last result is related to the way lowly educated workers tend to move on the wage distribution. Interestingly -and in accordance with the different nature of voluntary transitions in Spain mentioned above-, we obtain that Spanish workers tend to experience wage losses even regarding voluntary transitions.

We next examine how wage losses vary according to the worker's position on the wage distribution (quartiles). The largest wage penalty for involuntary movers compared to stayers is found for workers with high wages in the previous job, ranging from 30% in

³¹ One important source of job instability is the type of contract. To ascertain the role played by fixed-term contracts in explaining job mobility and wage losses we have also estimated a model adding as a covariate the type of contract in the previous and current job. The results, available upon request, show that, wage losses are larger when the workers enter into a temporary job.

³² The difference between the Index of EPL for permanent and temporary workers is 0.49 for Spain, 0.3 for France and 0.27 for Portugal (OCDE, 1999). There was non available information for Germany.

Table 12
Wage penalty for involuntary job movers by observed characteristics

Tenure in previous job	Counterfactual	Spain	Germany	Portugal	France
Tenure <24 months	Voluntary job movers	–13%	–23%	–26%	–22%
Tenure 24–48 months		–16%	–38%	–34%	–28%
Tenure >48 months		–20%	–29%	–39%	–24%
Tenure <24 months	Stayers	–12%	–19%	–2%	–15%
Tenure 24–48 months		–14%	–32%	–12%	–17%
Tenure >48 months		–10%	–21%	–15%	–9%
Age	Counterfactual				
25 years	Voluntary job movers	–14%	–25%	–31%	–21%
35 years		–15%	–27%	–34%	–24%
45 years		–15%	–28%	–35%	–25%
55 years		–12%	–28%	–34%	–23%
25 years	Stayers	–13%	–17%	–11%	–15%
35 years		–10%	–21%	–7%	–12%
45 years		–10%	–24%	–6%	–12%
55 years		–12%	–24%	–10%	–16%
Unemployment Duration	Counterfactual				
3 Months	Voluntary job movers	–10%	–28%	–31%	–22%
6 Months		–14%	27%	–34%	–25%
12 months		–17%	–26%	–36%	–25%
18 months		–17%	–22%	–38%	–24%
3 Months	Stayers	–7%	–22%	–6%	–12%
6 Months		–12%	–22%	–10%	–15%
12 months		–15%	–20%	–13%	–16%
18 months		–16%	–17%	–15%	–14%
Studies	Counterfactual				
Superior Studies	Voluntary job movers	–13%	–30%	–39%	–29%
Secondary Studies		–14%	–25%	–36%	–24%
Primary Studies		–15%	–30%	–32%	–19%
Superior Studies	Stayers	–3%	–21%	–0%	–7%
Secondary Studies		–12%	–20%	–9%	–17%
Primary Studies		–14%	–25%	–12%	–14%
Previous Wage (quartiles)	Counterfactual				
Q ₂₅	Voluntary job movers	–14%	–23%	–37%	–24%
Q ₅₀		–12%	–28%	–33%	–26%
Q ₇₅		–9%	–32%	–27%	–29%
Q ₂₅	Stayers	–10%	–10%	–1%	–14%
Q ₅₀		–20%	–22%	–9%	–28%
Q ₇₅		–30%	–33%	–18%	–41%
Gender	Counterfactual				
Men	Voluntary job movers	–17%	–25%	–34%	–20%
Woman		–8%	–30%	–32%	–27%
Men	Stayers	–9%	–16%	–6%	–6%
Woman		–14%	–29%	–13%	–24%

Spain to 41% in France. It is also striking that the difference between the wage loss of the upper quartile and that of the lower quartile is around 20 percentage points in Germany, Portugal and Spain and around 30 percentage points in France. Since we did not find a similar variation of wage losses regarding other observed categories we consider that this result ratifies the fact that these countries are generally characterised by having more stringent labour market policies and wage setting mechanisms that favour wage compression and affect positively to workers located in the low tail of the wage distribution.

Finally, as signalling and non-stationary job search models state, unemployment duration also affects the size of the wage penalty. We found that in Spain, Portugal and France wage penalties increase with the length of the unemployment spell during the first year of the spell, and afterwards they tend to decline. On the contrary, in Germany wage penalties remain constant during the first year and afterwards slightly decrease. This evidence supports the argument that, compared to the rest of countries, German wage losses are more related to future employment expectations than to non-stationary reservation wage strategies.

6. Conclusion

In this paper we analyse the relationship between job mobility and wage mobility and try to measure how harmful unemployment is in terms of relative wage costs for the worker in Spain, Germany, Portugal and France. For this purpose we estimate a multinomial endogenous switching regression model from which we derived wages for each labour market state and the subsequent wage losses when workers pass through unemployment in relation to experiencing a voluntary transition or to staying at the job.

We found that it is important to take into account observed and unobserved heterogeneity since without control for selectivity, we may underestimate wage losses after a period of unemployment. We obtain that wage losses after unemployment are present in the four countries analysed and these wage losses are larger when compared to voluntary movers. These results are interesting because, as theoretical models predict, it shows that the returns from voluntary transitions are positive in relation to involuntary movers and, more importantly, in relation to stayers. Spain is an exception since voluntary movers have negative returns with respect to stayers and, compared to involuntary movers, the positive returns are much lower than in the rest of countries. We also found that German unemployed workers tend to experience the largest wage penalties, especially when stayers is the reference group. These larger wage losses may be related to larger on-the-job wage growth and larger wage cuts after an unemployment spell. Macroeconomic performance and national labour market institutions may also explain this divergence. Furthermore, the analysed period is characterised by a lower and even negative employment growth rate in Germany. Besides, less stringent EPL than in Spain and Portugal and less minimum wages and unemployment benefits than in France may also be the sources of these larger wage penalties.

These wage losses may be seen as the natural mechanism through which the labour market moves to a new equilibrium. However, we also found that unemployed workers enter into jobs with a high destruction propensity, especially in Spain, since they tend to

have repeated spells of unemployment and therefore each wage loss adds up to the previous one. Hence, we can conclude that these losses have permanent effects on the worker's future income, especially in those labour markets strongly characterised by scarring effects as is the case in Spain.

Some questions remain open for future research. Firstly, our results suggest that wage losses after an unemployment spell exist but we did not measure how long these wage losses persist, as the worker remains employed. Secondly, what are the policy implications of these results and its relation to the source of the wage losses? As stated above, these wage losses are part of the adjustment mechanism of the labour market. However, we also found that there are significant differences in the amount of wage losses depending on different observed characteristics, which may suggest the need for political intervention. The stigmatisation or deterioration of human capital implies that wage losses increase during the spell of unemployment. These arguments highlight the need for a policy that may reduce the time the unemployed need to find a job. On the other hand, our research shows that an unemployed worker has a high chance of experiencing repeated spells of unemployment, turning initially small wage losses into large and permanent ones. In this case, a better policy option would be one that focuses on finding high quality matches rather than quickly finding a new job.

Acknowledgement

We wish to thank J.F. Jimeno and Silvio Rendón for their helpful comments. We also wish to thank all the participants in the seminars at centra, U. Carlos III, Bank of Portugal, XXVIII Simposio de Análisis Económico, EPUNET'2004 and EALE'2004 for their suggestions. The financial support of the Ministry of Science and Technology (SEC2003-04028/ECO) is also gratefully acknowledged. Of course, any remaining errors are our responsibility.

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