Wage Mobility in Europe. A Comparative Analysis Using Restricted Multinomial Logit Regression *

Dimitris Pavlopoulos, Ruud Muffels and Jeroen K. Vermunt

Abstract.

The paper investigates cross-country differences in wage mobility in Europe, using the European Community Household Panel. We examine the impact of specific wage-setting institutions, such as the collective bargaining and the trade union density, the employment protection regulation and the welfare state regime on wage mobility. We apply a log-linear approach that is very much similar to a restricted multinomial logit model and much more flexible than the standard probit approach that is typically applied in the research on wage mobility. It is shown that the macro-economic context and the aforementioned specific institutions explain a substantial part of the cross-country variation that is larger than the part that regime type explains. The findings also confirm the existence of an inverse U-shape pattern of wage mobility, showing a great deal of low-wage and high-wage persistence in all countries.

Keywords: wage mobility, welfare states, multinomial logit regression, log-linear models.

* Corresponding author: Dimitris Pavlopoulos, CEPS/INSTEAD, 44 rue Emile Mark, BP48, L-4501 Differdange, Luxembourg, tel. +352 585855 556, email: dimitris.pavlopoulos@ceps.lu.

1. Introduction

The aim of this paper is twofold. Firstly, it provides a contribution to the comparative study of wage mobility in Europe. More specifically, we investigate the effect of labour market institutions on the cross-country differences in wage mobility in Europe. Standard economic theory suggests that the less important these institutions are in a country the higher the volatility of wages. The effect of labour market institutions can be measured in two ways. The first way is by studying the effect of specific wage setting institutions (trade union density, collective bargaining coverage and Employment Protection Legislation - EPL). The second one is by using a classification of countries according to the features of the labour market institutions. The classification we use is an amended version of the classification of Esping-Andersen (1990).

The second aim of the paper is to account for the effect of the origin state - the initial position in the wage distribution - on wage mobility. For this purpose, we apply a novel approach in modelling wage mobility. Economists typically use individual level data to investigate the determinants of absolute changes in wages. Other approaches rooted mainly in sociology - but not only - use mobility measures though their main interest is in aggregate changes in earnings. For these approaches, relative income changes matter more (Runciman, 1966; Duesenberry,

1967; Easterlin, 1974; Brickman et al., 1978; Fritzell, 1990). Regardless of the approach, most studies do not account for the fact that wage mobility can be different in different parts of the wage distribution. Workers from the various parts of the wage distribution may differ in the type of jobs they perform and in their investments in human capital. In this paper, we apply an approach that uses individual level data to derive a macro-level measure for wage mobility accounting for the initial position in the wage distribution. Our mobility measure is the year-to-year transition matrix between deciles of the wage distribution. We model this measure of positional mobility with a variant of the multinomial logit model using restrictions that are typical for the log-linear approach. These restrictions allow us to estimate the parameters of a model that would otherwise involve the estimation of a huge number of transition tables.

The paper is organized as follows. Section 2 reviews the comparative research on wage mobility. Section 3 elaborates on the measure of mobility and the measures of institutions that are used in this paper. Section 4 deals with the data and sampling from the European Community Household Panel. Section 5 presents the restricted multinomial logit model and section 6 discusses the parameter estimates of the analysis. The main conclusions of the study as well as the issues for further research are discussed in the final section (section 7) of the paper.

2. Theory and research on wage mobility patterns

The idea that labour market institutions such as union power, employment protection and minimum wages tend to decrease wage mobility is well established in economics. Standard economic suggests that these labour market institutions reduce job mobility as well as inflows into the labour market (Lindbeck and Snower, 1989; Bertola, 1990; Lazear, 1990). These institutions safeguard primarily the employment and the wages of the individuals that are already in the labour market - the 'insiders' - at the cost of the unemployed and the inactive. In the US and the UK, where labour market institutions were weak, wages were allowed to adjust downwards during recession and unemployment did not rise, while in continental Europe, where institutions were strong, wages remained rigid and unemployment increased.

However, recent empirical research provides evidence against the predictions of standard economic theory. Dickens (2000) finds evidence of high and increasing (since the 1970s) levels of immobility, especially among the low paid, in the UK. Burkhauser et al. (1997) find 'a great deal of persistence' and a similar pattern of mobility in the US and in Germany, despite the fact that the welfare systems and the labour markets of the two countries differ significantly. Aaberge et al. (2002) reach the same conclusion comparing the US with Scandinavian countries. A

common finding for many countries is that wage mobility is low at the lower parts of the distribution. Using panel data from the Survey on Households Income and Wealth of the Bank of Italy, Cappellari (2002) finds high levels of immobility among the low paid Italian workers. Buchinsky et al. (1998) corroborate these results for the French workers. However, no study has ever investigated analytically wage mobility at the different parts of the wage distribution.

3. Measuring mobility and institutions

The measure of positional mobility

The aim of this paper is to investigate differences in wage mobility between countries as well as between the various parts of the wage distribution. The latter can only be achieved with the use of a measure of mobility that is based on micro-level data. For this purpose, our aggregate positional mobility measure is based on the year-to-year transitions of working individuals across deciles of the wage distribution within each country[1]. This measure has been extensively used in the literature (Burkhauser et al., 1997; Buchinsky and Hunt, 1999; Dickens, 2000). As far as theory is concerned, this measure bridges the economic with the sociological/psychological approach on income mobility (Pavlopoulos,

2007). Hirsch (1995) suggests that even if an individual cared only for the purchasing power of his own income - as economists suggest -, his rank in the distribution still matters, as it determines his ability to acquire 'positional' (goods whose assigned value depends on how many other possess them) or status goods.

Table I. 10 by 10 transition matrix for wage mobility

	Destination decile				
Origin decile	$x_{1,1}$	$x_{1,2}$	$x_{1,3}$	...	$x_{1,10}$
	$x_{2,1}$	$x_{2,2}$	$x_{2,3}$	...	$x_{2,10}$
	$x_{3,1}$	$x_{3,2}$	$x_{3,3}$	...	$x_{3,10}$
	:	:	:		:
	$x_{10,1}$	$x_{10,2}$	$x_{10,3}$	...	$x_{10,10}$

Our aim is particularly to explain the 10×10 table (Table I), where cells represent frequencies. The index for the rows denotes the decile position in year 1, while the index for the columns represents the decile position in year 2. In a society with perfect mobility (PM) all cells per row have the same value ($x_{i,k} = \frac{\sum_{j=1}^{10} x_{i,j}}{10}$, for each $k = 1, ..., 10$), while in a perfectly immobile society (PI) all off-diagonal elements of the table are zero ($x_{ij} = 0$, if $i \neq j$). In our analysis, individuals whose destination state differs up to one decile from the origin state are considered immobile, because a transition of one decile could be the result of a light level of churning in the wage distribution.

The measure of institutional constraints

The most straightforward way to measure the effect of labour market institutions is to examine to what extent these institutions and regulations have a bearing on cross-country variation in wage mobility. OECD (2004) suggests that the main wage-setting institutions are minimum wages, trade union density, as well as collective bargaining coverage, centralization and co-ordination.[2] The problem that we face is that there are no reliable measures for the majority of these institutions that can allow us to make cross-country comparisons. Union density and collective bargaining coverage are measured by the OECD, but the relevant levels seem more an approximation than a 'hard figure' for many countries. Minimum wage regulations are determined at various levels (industry, region, national) in different countries. This makes cross-country comparison of minimum wage levels practically unfeasible. As for bargaining centralization and coordination, no generally accepted measure exists. Therefore, we only include in our analysis measures for union density and collective bargaining.

Our expectations are that extensive collective bargaining coverage prevents wages from being too volatile in the low and the middle parts of the wage distribution. We expect union density to have a similar but weaker effect since in some countries, such as Denmark and Fin-

land, being a member of a union provides entitlement to unemployment benefit.

A second way is to use the Employment Protection Legislation (EPL) (OECD, 1999). This index is based on hiring and firing regulations and on criteria concerning the employment protection legislation for regular employment, temporary employment and collective dismissal. A low value of this index in a country indicates that there is a low level of employment protection, and therefore there are few barriers for job changes. Since workers change jobs easier in such a country, their wage will also change more often. In such a country, wage mobility will 'ceteris paribus' be also higher than in countries with a higher EPL index.

Finally, a third way of testing the effect of labour market institutions is by using country clustering. Even when the institutions do not seem to differ considerably across countries, the dissimilarities emerge more outspokenly across particular groups of countries. Classifying countries in clusters or regime types is a quite common approach in comparative studies on income and welfare policies. Probably the most commonly used classification is the Esping-Andersen's regime type classification (Esping-Andersen, 1990). This classification is based on his socio-political account of welfare state policies during the 1960s and 1970s and the degree of de-commodification and stratification of labour

caused by these policies. This degree of de-commodification is interrelated with regulations that control the volatility of wages (minimum wage, employment protection regulations, collective wage bargaining, union density etc.) and public interventions that prevent the labour market from operating as a fully competitive market. Our classification that resembles the classification of Esping-Andersen (1990), clusters 12 European countries in four regime types. Countries with a more flexible labour market due to relatively low levels of employment regulation, such as the UK and Ireland that are believed to exhibit a high level of wage mobility. Southern European countries; namely Greece, Italy, Portugal and Spain that are believed to exhibit low levels of wage mobility due to the strictness of their employment protection legislation. The continental European countries - Austria, Belgium, France, Germany - for which we expect to find low levels of wage mobility due to their strongly regulated labour market. Finally, in Scandinavian countries and in the Netherlands, notwithstanding the high union density and the high level of compliance to collective wage bargaining, wages are more flexible than in the strongly regulated continental countries, but less flexible than the lowly-regulated labour markets of the liberal countries (Muffels and Fouarge, 2002; Muffels and Luijkx, 2006).

4. Data, main concepts and some descriptives

We use the European Community Household Panel (ECHP), which is designed by EUROSTAT for income study purposes. This is a longitudinal database that contains comparable socio-economic data for individuals and households from 15 European countries and for eight years, namely from 1994 to 2001. It includes information for approximately 60,000 households and 130,000 individuals per wave (EUROSTAT, 2001). However, some countries (Austria and Finland) lack data for the first or for the first two waves, as they stepped in later. Due to artifacts in the income data we exclude Belgium, Luxembourg and Sweden. The first wave of ECHP (1994) is excluded from our analysis as, in the view of EUROSTAT, the income data for the first wave (1994) are much less robust than the data for the consecutive waves. Hence, our sample consists of 7 waves and 12 countries.

The sample is restricted to male wage earners between 25 and 55 years old, appearing in the dataset for at least two subsequent years and declaring paid employment as their main economic activity for the year prior to the survey. We exclude female workers as they tend to have more career breaks and more intermittent periods of temporary or permanent lay-off for very different reasons than males (e.g. caring obligations). Controlling for these different career paths goes beyond

the scope of this paper. Finally, in order to reduce measurement error, we trim the wage distribution by excluding individuals that have less than 10% or more than 3,000% of the median wage income.

Our main economic variable is the total income from paid employment. This is the total personal net labour income after deduction of taxes and social security contributions, with the reference year being the year prior to the survey. In order to construct our sample, we rank the wage income of individuals according to their decile position within a country, and we examine the transitions between the decile positions across year t and t+1. Our sample population consists of 12,709 individuals for the first pair of years (1995-1996), 13,746 for the second (1996-1997), 13,193 for the third (1997-1998), 15,379 for the fourth (1998-1999), 14,533 for the fifth (1999-2000) and 14,173 for the last (2000-2001). From now on, the time points of our analysis will correspond to the year from which the data come from. For example when we refer to time point 1998-1999 data come from wave 7 (1999-2000) of the ECHP.

Some descriptives

A basic overview of the decile transitions is given in Table II. This table presents the origin-destination transitions pooled across countries and

Table II. Overall year-to-year transitions in percentages

		Destination decile										
		1	2	3	4	5	6	7	8	9	10	**SUM**
	1	53.0	23.7	8.7	5.0	3.4	2.2	1.4	1.3	0.9	0.4	**100**
	2	10.2	51.1	21.4	7.4	4.0	2.7	1.5	0.9	0.5	0.2	**100**
	3	3.3	18.1	58.3	0.3	9.9	4.8	2.8	1.5	0.7	0.3	**100**
	4	1.3	4.1	15.4	42.1	22.1	8.2	3.8	1.8	0.8	0.3	**100**
Origin	5	1.0	2.1	4.9	17.0	40.6	21.6	7.9	3.1	1.3	0.5	**100**
decile	6	0.6	1.2	2.2	5.3	17.4	40.7	21.8	7.3	2.8	0.8	**100**
	7	0.6	0.7	1.1	2.3	5.5	16.9	43.4	21.8	6.3	1.4	**100**
	8	0.3	0.4	0.7	1.1	2.2	5.8	16.8	47.9	20.8	3.8	**100**
	9	0.2	0.3	0.4	0.6	1.0	2.1	4.3	16.8	58.0	16.2	**100**
	10	0.2	0.2	0.2	0.4	0.5	0.7	1.3	2.5	13.6	80.4	**100**

Transitions are pooled over the countries and the years.

time periods. The main finding of this table is a significant amount of persistence, especially at the low-wage- and high-wage strata. Low-wage- and high-wage earners experience hardly any wage change in a one-year period. The relevant tables by regime type[3] show that wage earners in the Nordic countries (including the Netherlands) are apparently more mobile than average, while in the lowly-regulated (liberal) countries, workers are seemingly less mobile than average. In the Southern European countries mobility rates emerge higher than average,

at least in the higher income strata. The lowest mobility levels are observed in the Continental European countries.

The data that we use in our analysis consist of a separate observed transition table per country (12 countries), time (6 time points: 1994-1995 up to and including 1999-2000), sector (2 sectors: private and public), and education (3 groups: completed education lower than high school, high school, and higher education) combination. As information on two countries is missing for the first time point and on one country for the second time point, we have in total 414 (instead of 432) transition tables. It should be noted that for the construction of these transition matrices, deciles were defined per country and time combination. This means that the same definition applies across education and sector groups (within country-time combinations).

5. A restricted multinomial logit analysis

The standard practice in much of the (economic) research on wage mobility involves the estimation of a probit model. However, a model to analyse positional mobility should take into account the origin state from which a transition takes place, the size and the direction of a transition (i.e. whether it is an upward or downward transition). This

could be done, for example, by means of an ordered probit model. In this case, however, such an approach would require a large number of separate regressions.[4] For this reason, we have opted for a method that can account for all these aspects in a single analysis and therefore is much more flexible than the probit approach. This method includes the application of a variant of the multinomial logit model that applies log-bilinear restrictions that are typically used in the log-linear analysis field. We specify a multinomial logit model for the probability that an individual is in a particular destination (D) state (decile) given his origin (O) state (his state in the previous year) and the subgroup (G) to which he belongs. This probability will be denoted by $P\left(D=d|O=o,G=g\right)$. With 'subgroup' we mean one of the aforementioned 414 time, country, education, and sector combinations. The basic structure of the multinomial logit model we use is:

$$P\left(D=d|O=o,G=g\right)=\frac{\exp\left(\beta_{d|g}^{D|G}+\beta_{od|g}^{OD|G}\right)}{\sum_{i=1}^{10}\exp\left(\beta_{i|g}^{D|G}+\beta_{oi|g}^{OD|G}\right)}\ . \qquad (1)$$

This model contains two types of regression parameters: $\beta_{d|g}^{D|G}$ and $\beta_{od|g}^{OD|G}$. The term $\beta_{d|g}^{D|G}$ is an intercept term for the destination state $D{=}d$ that may differ across subgroups. The other parameter - $\beta_{od|g}^{OD|G}$ - captures the strength of the origin-destination association that may also differ across subgroups. In our application, the term of main interest is

this origin-destination association term. The size of this term indicates the degree of mobility (the smaller the association between the origin and destination state, the greater the mobility). What we are especially interested in is how much the size of this term varies across subgroups defined by country, time, sector, and education. However, by not further restricting the $\beta_{od|g}^{OD|G}$ term, we would have to estimate and interpret 81 (=9*9) association parameters for each of the 414 tables, which is, of course, not meaningful. For such situations, where there is a large number of association parameters (81 in this case) that vary across large numbers of subgroups (414 in this case), in the log-linear modeling field, restrictions have been proposed for specifying parsimonious higher-order interaction terms. These methods that involve the use of bilinear decompositions, have been applied among others in the analysis of mobility tables (Hout, 1983; Luijkx, 1994; Vermunt, 1997b; Goodman and Hout, 1998; Goodman and Hout, 2001). In our case, the following bilinear decomposition is used: $\beta_{od|g}^{OD|G} = a_{od}^{OD} + b_{od}^{OD} \cdot \phi_g^G$. This decomposition implies that the various tables have a common component a_{od}^{OD} , which serves as a kind of intercept or overall mean association term. The other component $b_{od}^{OD} \cdot \phi_g^G$ captures the differences in the origin-destination associations across tables, where the parameters b_{od}^{OD} can be regarded as 'slopes' of the explanatory variables' effects; they indicate in which parts of the mobility table the largest differences across

subgroups occur. The term ϕ_g^G is a scaling factor indicating whether mobility is higher or lower than average in a particular subgroup. In other words, differences in mobility across tables are described by a single coefficient per table. For reasons of normalization, we have to impose a location and a scaling restriction on the ϕ_g^G parameters. Here, we will use $\sum_g \phi_g^G = 0$ and $\sum_g \left(\phi_g^G\right)^2 = 1$, which implies that the ϕ_g^G parameters are centered and restricted to have a sum of squares of 1. For our analysis, we made use of the program lEM (Vermunt, 1997a).

Table III illustrates the values of the log-likelihood function and the BIC obtained by the various models that were estimated. The first two models serve as baseline models. In Model 0, both the a_{od}^{OD} and b_{od}^{OD} terms are restricted to be equal to zero, which yields a model in which the destination state is assumed to be independent of the origin state. Model 1 assumes that b_{od}^{OD} is equal to zero for each o-d combination, yielding a homogeneous association model. Comparison of the log-likelihood and BIC values of Models 0 and 1 shows that the origin and destination states of individuals in the wage distribution are strongly correlated. Model 2, in which we use the bilinear decomposition described above, fits much better than Model 1 in terms of the log-likelihood, indicating that the origin-destination association is not equal across tables. In Models 3 to 6, we use several simplifying assumptions for the term b_{od}^{OD}. Among these models, the model that fits

Table III.: Comparison of the models

	Model	Restrictions on a and b	**Parameters**	**Log-likelihood**	**BIC**
0	Independence	$a_{od}^{OD} = b_{od}^{OD} = 0$	7,776	-368,598	825,482
1	Homogeneous association	$b_{od}^{OD} = 0$	7,938	-310,472	711,068
2	General	no	8,368	-307,350	717,779
3	Diagonal	$b_{od}^{OD} = 0$ if $o \neq d$	8,297	-309,083	712,367
4	Diagonal and 1 decile transition	$b_{od}^{OD} = 0$ if $o - d > 1$ and $b_{od}^{OD} = b_{do}^{OD}$	8,306	-308,560	711,423
5	Diagonal and 2 deciles transition	$b_{od}^{OD} = 0$ if $o - d > 2$ and $b_{od}^{OD} = b_{do}^{OD}$	8,314	-308,534	711,462
6	Symmetric associations	$b_{od}^{OD} = b_{do}^{OD}$	8,341	-308,517	711,734
4a	Only significant interaction effects	as Model 4	7,984	-308,910	708,466

best according to the BIC criterion, Model 4, contains only nonzero b_{od}^{OD} parameters for the main diagonal and the first subdiagonals, while the subdiagonal parameters are also restricted to be symmetrical (equal for upward and downward moves across the two same states). This model does not only present the best fit to the data according to the statistical indices, but it is also straightforward in its interpretation; Model 4 captures country differences in immobility (i.e. in the probability of changing at most one decile).

Nevertheless, Models 2-6 fit worse than the homogeneous model (Model 1) in terms of the BIC. This is probably due to the large number of parameters included in these models. Therefore, a more parsimonious version of Model 4 (Model 4a) was employed in which insignificant predictor effects have been omitted.[5] Model 4a fits much better than the homogeneous model in terms of log-likelihood and BIC values. Findings for model 4a seem to establish the existence of differences in origin-destination association between tables defined by the predictors. Since the coefficient estimates were the same for models 4 and 4a, it was decided to use estimates from model 4 since all effects (both the significant and the non-significant) are informative with respect to our expectations.

Table IV. Coefficients showing how much transition tables differ (b_{od}^{OD})

		Destination decile									
		1	2	3	4	5	6	7	8	9	10
	1	-6.38	-7.84	0	0	0	0	0	0	0	0
	2	-7.84	-16.87	-9.71	0	0	0	0	0	0	0
	3	0	-9.71	-14.78	-8.96	0	0	0	0	0	0
	4	0	0	-8.96	-15.99	-9.14	0	0	0	0	0
Origin	5	0	0	0	-9.14	-15.68	-10.75	0	0	0	0
decile	6	0	0	0	0	-10.75	-16.22	-8.18	0	0	0
	7	0	0	0	0	0	-8.18	-15.87	-10.74	0	0
	8	0	0	0	0	0	0	-10.74	-22.33	-14.87	0
	9	0	0	0	0	0	0	0	-14.87	-27.78	-19.41
	10	0	0	0	0	0	0	0	0	-19.41	-32.14

6. Parameter estimates from the multinomial logit analysis

The estimates for the coefficients a_{od}^{OD} [6] confirm the descriptive results that were presented in table II; a U-shaped patterns for wage mobility with low levels of mobility for the low and the high parts of the distribution and somewhat higher levels of mobility for the middle part of the distribution. The question that has to be addressed is how much the mobility pattern differs across countries. In Table IV, the estimates for the b_{od}^{OD} coefficients obtained with Model 4 are presented. Each of the coefficients that is not a priori fixed to zero takes on a negative

value; therefore these coefficients denote the tendency towards more mobility. This implies that a positive ϕ_g^G value corresponds to more wage mobility than average in the relevant table. The pattern of the estimates for b_{od}^{OD} shows that differences across subgroups (countries, time points, education and sector groups) are larger with respect to the mobility in the higher wage deciles (-32.14) than in the lower ones (-6.38).

The 414 ϕ_g^G coefficients obtained with Model 4 describe the differences across countries, time points, education groups, and sectors of employment. However, the interpretation of all ϕ_g^G coefficients is still unfeasible due to their large number. Therefore, ϕ_g^G coefficients were subjected to a further analysis in order to establish which of the main and interaction effects included among them, are worth being thoroughly scrutinized and interpreted. More precisely, an analysis of variance (ANOVA) was performed, the results of which are reported in Table V. The first result is that the higher-order interaction terms are of little importance as the model with main effects and two-way interaction effects explains 77.6% of the variance in the ϕ_g^G terms. Secondly, country is by far the most important factor in the explanation of mobility differences across tables (its main effect accounts for 51.3% of the total variance). This might be an important result as it shows that it is not so much the common trends and structural factors explaining

Table V. Analysis of Variance for the country effects

Dependent Variable:	Number of obs	=	414	R-squared	0.776
EFFECT	Root MSE	=	0.028	Adj R-squared	0.683
Source	Partial SS	df	MS	F	Prob>F
Model	0.776	121	0.006	8.4	0
Country	0.513	11	0.047	60.8	0
Time	0.014	5	0.003	3.6	0
Education	0.002	2	0.001	1.1	0.32
Sector	0.053	1	0.053	69.4	0
Country*Education	0.046	22	0.002	2.7	0
Country*Time	0.087	52	0.002	2.2	0
Country*Sector	0.038	11	0.003	4.6	0
Time*Education	0.004	10	0.000	0.6	0.84
Time*Sector	0.002	5	0.000	0.6	0.71
Education*Sector	0.006	2	0.003	3.7	0.03
Residual	0.224	292	0.001		
Total	1	413	0.002		

Note: the variables included in the ANOVA are country, time, time-country interaction, education (low, high school, higher) and sector (public, private).

the dissimilarities in wage mobility but primarily the particular country characteristics indicating the relevance of institutional, socio-economic (education, demography, employment structure) and also cultural explanations. Moreover, we find that differences between the mobility patterns in the public and private sectors are important determinants

of the observed variance (5.3%). The time effect is not significant, while the country-time interaction component is, explaining about 8.7% of the variation. The findings for education are similar; even though no direct education effects are found, the country-education interaction effect explains a significant part of the overall variance (4.6%). Also sector and the country-sector interaction explain a noticeable part of the variance. Again this points to the significant impact that the employment structure exerts on wage mobility patterns.[7]

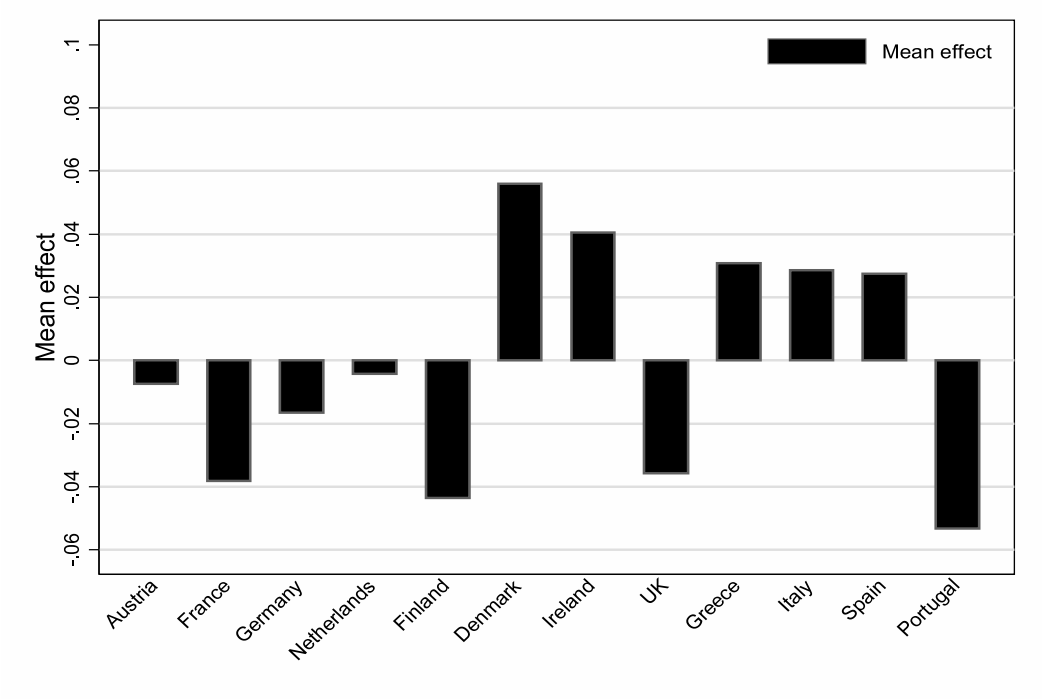

Figure 1. The mean effect of country on wage mobility

Figure 1 depicts the mean value of ϕ_g^G per country in the period of reference. As can be seen, there is no clear pattern that could associate cross-country differences with regimes types. The hypothesis that in less regulated countries individuals experience higher levels of wage mobility is confirmed in the case of Ireland but has to be rejected in the case of the prototype of a lowly-regulated country in Europe, the UK. In this country, wage mobility is lower than in most other EU countries. This difference between the UK and Ireland is probably due to the fact that the Irish economy experienced an economic boost during the 1990s. In most Southern European countries that have a rather high level of employment protection, wage mobility is higher than most other countries. However, Portugal exhibits the lowest level of wage mobility of all European countries. Except for Portugal and the UK, low levels of wage mobility are found for France and Finland, which are classified as belonging to the strongly-regulated continental regime or, like Finland, to the rather flexible Nordic countries. Finland therefore does not fit particularly well in this Nordic picture, probably because its labour market is much less flexible than its peers in this cluster combined with its underperforming economy during this period. The picture for Denmark, which presents one of the highest levels of wage mobility, confirms our prior conjectures for the Nordic regime. This might be explained by the fact that the Danish labour market seems to

be particularly successful in combining high levels of flexibility, while safeguarding simultaneously appropriate levels of income and work or employment security through active and activating labour market policy programmes (OECD, 2004). The strongly-regulated Austria and Germany are positioned somewhere in the middle of the league table of countries. A similar position is taken by the Netherlands, which we classified as also belonging to the Nordic cluster, with medium levels of regulation and a fairly favorable balance between wage flexibility on the one hand, and income and work security on the other.

The effects of labour market institutions

The results presented above indicate that countries belonging to the same country cluster according to our regime classification do not necessarily show similar mobility patterns. In order to obtain a more formal test as to whether the regime typology or the specific wage-setting institutions explain cross-country differences in wage mobility, some additional ANOVA modelling was performed, in which country was replaced by regime type, the Employment Protection Legislation (EPL) index, the union density and the collective bargaining coverage. Moreover, three time-varying macroeconomic indicators were added to the model as covariates: the Labour Force Participation rate for men

Table VI.: Percentage of variance explained

	Model 1 **Country**	Model 2 **Country and macro**	Model 3 **Union density and macro**	Model 4 **Collective bargaining and macro**	Model 5 **EPL and macro**	Model 6 **Regime and macro**	Model 8 **Institutions macro and interactions**
Country	52.1	52.1					
Regime						13	
EPL					7.1		7.1
Density			0.3				3.5
Coverage				3			0.1
Macro		0.3	1.3	0.3	6.5	5	5.5
Institution*institution[a]							26.8
R^2	77.6	77.6	11.8	14.8	34	29.9	52.1

Note: the cell entries are the percentages of the variance of the effects estimated in the multinomial logit regression that are explained by the variables included in this table. These percentages were estimated with ANOVA regressions. The rest of the variables included in the ANOVA were the same as in table V.

[a] This adds the percentage of the variance that is explained by the interactions between the measures of institutions - EPL, coverage and density.

between 15-64 years old (LFP), the unemployment rate for males and the GDP per capita (GDPpc). These indicators are included in order to explain country differences that are related to the business cycle.

The main results of these ANOVA models are presented in Table VI. The baseline model (Model 1) is the model described in Table V. This model has an overall explained variance of 77.6%. The inclusion of macroeconomic indicators leaves the explained variance practically unchanged (Model 2). As far as the wage-setting institutions are concerned, if we were to replace country by any of the direct measures of these institutions, the explained variance drops dramatically. The model with union density (Model 3) explains only 11.8% of the overall variance, and the model with bargaining coverage (Model 4) explains 14.8% of the overall variance. This indicates that although bargaining coverage is a better indicator of wage mobility than union density, these two indicators explain only a small part of cross-country differences. EPL (Model 5) performs better (34%), but is still unable to explain a large part of the cross-country variation. However, if we include all the direct measures of labour market institutions together in the ANOVA model, the explained variance increases to 52.1%. Thus, our measures for labour market institutions explain two thirds of the overall variance that is explained by country.

'Regime type' seems to perform slightly better than union density and bargaining coverage but worse than the EPL index. Nevertheless, replacing country with our regime type (Model 6) still results into a considerable reduction of the explained variance (29.9%), compared to model 1. Nevertheless, the significant part of the country variance that is explained by the regime type indicates that the way flexibility and income and work security is balanced plays a role in explaining country differences even after controlling for a number of important macroeconomic indicators. Moreover, the fact that the EPL index and regime typology perform better than single-institution indicators shows that wage mobility at the country level is a complex issue that is affected by several policies and institutional arrangements.

Figure 2 shows that the ranking of regime types varies across time points. The only expectation that is clearly confirmed is that wage mobility levels in the strongly-regulated regime (continental European countries) are lower than in all other regimes. In the southern strongly-regulated regime, wage mobility was initially high in the beginning of the period, in 1994-95, but decreased considerably thereafter, until 1998-1999, to rise again in the year after. In the Nordic countries, wage mobility was initially quite high, until 1996; but decreased, to catch up again strongly until 1999. In 1999-2000, it even ranked first among all regimes. Individuals from the very flexible liberal regime

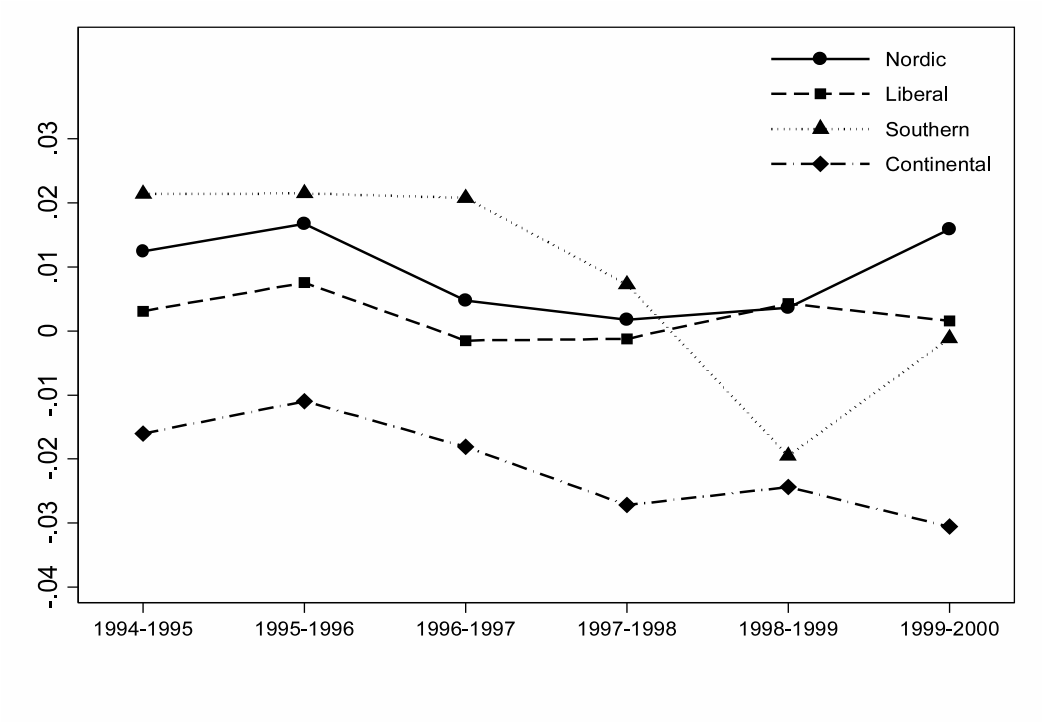

Figure 2. The effect of regime type on wage mobility across time

experience higher rates of wage mobility than individuals from the strongly-regulated continental regime but lower rates than the Nordic regime. It should, however, be noted that we need to be cautious in drawing conclusions on the basis of these regime findings only, since our evidence shows that there are large cross-country differences within the various regime types. On the other hand, the outcomes highlight a common trend; during the economic upturn period in the mid- and late-1990s, wage mobility rates tended to decline unexpectedly and to recover in some regimes (the Nordic and the Southern) only at the very

end of the period. The slow wage mobility growth during this period might be due to the rather low levels of flexibility and job mobility in the European labour markets.

7. Conclusions

In this paper we applied a restricted multinomial logit regression model to investigate cross-country differences in relative positional wage mobility in Europe, using data from the ECHP for 1995-2001. The method we applied was sufficiently powerful to allow us to control for the full set of origin states of individuals in the year-to-year transitions. It also was flexible enough to impose a variety of restrictions to the association parameters of our model, which enabled us to interpret the covariate effects and their time patterns. Both properties of our approach are unique compared to the standard (probit) regression techniques.

At the individual level, our findings suggest that controlling for the origin state is crucial when studying wage mobility. We found an inverse U-shaped pattern of wage volatility for the different parts of wage distribution. Low levels of mobility emerge for the lowest and the highest strata of the wage distribution. A low-wage earner jumping to

a highly paid managerial job, or a firm manager with a very high wage degraded to a minimum wage worker is a rather unlikely event.

At the country level, striking differences emerge compared with our expectations. Labour market institutions go some way to explain a part of these differences. In countries with a liberal labour market, where there are few institutional barriers, increased income risks do not necessarily go hand-in-hand with better wage prospects for workers. On the contrary, we find that more flexibility in wages emerges in countries that combine flexibility in the labour market with a high level of income security (the Nordic countries lead by Denmark). Contrary to our expectations, we found a high level of wage mobility in countries with strong employment protection - the Southern European countries, with the exception of Portugal. A possible explanation for this could be that the low level of wage mobility in the external labour market is counterbalanced by a high level of in-firm or in-job wage mobility. Another explanation involves the existence of a large informal sector in the Southern European labour markets that might also exert a similar up-leveling effect on wage mobility. Our conjectures are largely corroborated with respect to the finding that the strictly-regulated continental European countries ensure high levels of wage stability for workers. However, although this clustering of countries in regime types

can account for a part of the cross-country differences in wage mobility, significant variation remains within the regime clusters.

The testing of specific measures of labour market institutions showed that these measures account for the largest part of cross-country variation in wage mobility. The role of labour market institutions in explaining cross-country differences in wage mobility becomes more important if we consider that the effect of country is considerably overestimated by our analysis. Our restricted multinomial logit model does not allow us to account for the effect of many variables at the individual level. Therefore, country also captures some variation of wage mobility that is actually due to differences at the individual level.

Contrary to the direct measures of labour market institutions, the regime typology explains a small part of cross-country variation (29.9%). The lesson to be learned from this is that multiple indicators for institutional variation and the macroeconomic performance of countries should be taken into account to explain wage mobility patterns. Therefore, a regime type classification can only be effective if it takes these multiple indicators into account.

Further research is needed to investigate the effect of labour market institutions on wage mobility. Better measures for the wage-setting institutions are necessary. The direct measures of labour market institutions that were used were time-constant for the period of reference,

while the regime typologies may also partly reflect country differences that are driven by factors other than institutions, such as cultural differences.

Notes

[1] In order to test for the sensitivity of our analysis with respect to the clustering of incomes in deciles we repeated our analysis by clustering incomes in 20 categories. Results showed that country differences did not change.

[2] Trade union density refers to the percentages of workers that are members of a trade union. Collective bargaining coverage is the fraction of workers that is covered by collective employment agreements. Collective bargaining centralization refers to the degree that the wage bargaining between unions and employers is centralized. Collective bargaining coordination refers to the degree that wage bargaining in all levels (company, industry, country) is coordinated by union and employers confederations.

[3] These tables can be found in Pavlopoulos et al. (2005).

[4] More specifically, let us allow for 3 categories for the size of the move (moving 0, 1, 2 or more deciles). Then, since we have 10 origin states (deciles), 2 directions of the move (upward, downward) and 3 categories for the size of the move, we would have to perform 60 different regressions.

[5] The significance of the effects of model 4 is discussed later in this section.

[6] These estimates can be found in Pavlopoulos et al. (2005).

[7] Extensive discussion on the effect of education and sector of employment on wage mobility can be found in Pavlopoulos et al. (2005).

Acknowledgements

We would like to thank Didier Fouarge, Wilfred Uunk and Trudie Schils for their useful comments and suggestions on previous drafts. This paper was benefited by comments of the participants the EPUNet 2005 conference in Colchester and by comments of the participants of the Labour Group of CENTER/Tilburg University.

References

Aaberge, R., A. Björklund, M. Jänti, M. Palme, P. J. Pedersen, N. Smith, and T. Wennemo: 2002, 'Income Inequality and Income Mobility in the Scandinavian Countries Compared to the United States'. *Review of Income and Wealth* **48**(4), 443–470.

Bertola, G.: 1990, 'Job Security, Employment and Wages'. *European Economic Review* **34**, 851–886.

Brickman, P., D. Coates, and R. Janoff-Bulman: 1978, 'Lottery Winners and Accident Victims: Is Happiness Relative?'. *Journal of Personality and Social Psychology* **36**.

Buchinsky, M., D. Fougere, and F. Kramarz: 1998, 'Wage Mobility in France: 1967-1987'. *Revue Economique* **49**(3), 879–890.

Buchinsky, M. and J. Hunt: 1999, 'Wage Mobility in the United States'. *Review of Economics and Statistics* **81**(3), 351–368.

Burkhauser, R. V., D. Holz-Eakin, and S. E. Rhody: 1997, 'Labor Earnings Mobility and Inequality in the United States and Germany during the Growth Years of the 1980s'. *International Economic Review* **38**(4), 775–794.

Cappellari, L.: 2002, 'Do the 'Working Poor' stay Poor? An Analysis of Low-Pay Transitions in Italy'. *Oxford Bulletin of Economics and Statistics* **64**(2), 87–110.

Dickens, R.: 2000, 'Caught in a Trap? Wage mobility in Great Britain : 1975-1994'. *Economica* **67**(268), 477–498.

Duesenberry, J. S.: 1967, *Income, Saving and the Theory of Consumer Behavior*. Cambridge, Mass.: Harvard University Press.

Easterlin, R. A.: 1974, 'Does Economic Growth Improve the Human Lot?'. In: M. Abramovitz, P. A. David, and M. W. Reder (eds.): *Nations and Households in Economic Growth : Essays in Honor of Moses Abramovitz*. New York London: Academic Press, p. 411.

Esping-Andersen, G.: 1990, *The Three Worlds of Welfare Capitalism*. Oxford: Polity Press.

EUROSTAT: 2001, 'ECHP UDB Manual, European Community Household Panel Longitudinal Users' Database, Waves 1 to 5, Survey Years 1994 to 1998'.

Fritzell, J.: 1990, 'The Dynamics of Income Distribution: Economic Mobility in Sweden in Comparison with the United States'. *Social Science Research* **46**, 17–46.

Goodman, L. and M. Hout: 1998, 'Statistical Methods and Graphical Displays for Analysing how the Association Between two Qualitative Variables Differs among Countries, among Groups or over Time: a Modified Regression-Type Approach'. *Sociological Methodology* **28**, 175–230.

Goodman, L. and M. Hout: 2001, 'Statistical Methods and Graphical Displays for Analysing how the Association Between two Qualitative Variables Differs among Countries, among Groups or over Time: a Modified Regression-Type Approach. Part II: Some Exploratory Techniques, Simple Models and Simple Examples'. *Sociological Methodology* **31**, 189–221.

Hirsch, F.: 1995, *Social Limits to Growth*. London: Routledge, revised edition.

Hout, M.: 1983, *Mobility Tables*, Quantitive Applications in the Social Sciences. London/New Delhi: Sage Publications.

Lazear, Edward, P.: 1990, 'Job Security Provisions and Employment'. *Quarterly Journal of Economics* **105**(3), 699–726.

Lindbeck, A. and D. J. Snower: 1989, 'Macroeconomic Policy and Insider Power'. *American Economic Review* **79**(2), 370–376.

Luijkx, R.: 1994, *Comparative Log-linear Analyses of Social Mobility of Social Mobility and Heterogamy*, Series on Work and Organization. Tilburg: Tilburg University Press.

Muffels, R. J. A. and D. Fouarge: 2002, 'Working Profiles and Employment Regimes in Europe'. *Schmollers Jahrbuch: Journal of Applied Social Science Studies* **122**(1), 85–100.

Muffels, R. J. A. and R. Luijkx: 2006, 'Globalisation and Male Job Mobility in European Welfare States'. In: H. P. Blossfeld, M. Mills, and F. Bernardi (eds.): *Globalization, Uncertainty and Men's Careers*. Cheltenham, UK/Northampton, MA, USA: Edward Elgar.

OECD: 1999, *Employment Outlook 1999*. OECD.

OECD: 2004, *Employment Outlook 2004*. OECD.

Pavlopoulos, D.: 2007, *Wage Mobility Patterns in Europe*, PhD thesis. Tilburg: Tilburg University.

Pavlopoulos, D., R. Mufells, and J. K. Vermunt: 2005, 'Wage Mobility in Europe. A Comparative Analysis Using Restricted Multinomial Logit Regression'. OSA WP2005-24, Institute of Labour Studies, Tilburg, the Netherlands.

Runciman, W.: 1966, *Relative Deprivation and Social Justice : a Study of Attitudes to Social Inequality in Twentieth-Century England*. Berkeley [etc.]: University of California press.

Vermunt, J. K.: 1997a, 'lEM: A General Program for the Analysis of Categorical Data'.

Vermunt, J. K.: 1997b, *Log-linear Models for Event Histories*. London: SAGE publications.