Wage Mobility Patterns in Europe

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Wage Mobility Patterns in Europe

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door

Dimitrios Pavlopoulos,

geboren op 25 november 1973

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Preface: some personal thoughts

The critical attitude
Strikes many people as unfruitful
That is because they find the state
Impervious to their criticism
But what in this case is an unfruitful attitude
Is merely a feeble attitude.
Give criticism arms
And states can be demolished by it.

Canalising a river
Grafting a fruit tree
Educating a person
Transforming a state
These are instances of fruitful criticism
And at the same time instances of art.

(On the Critical Attitude, Bertolt Brecht)

I do not know if I managed to be critical enough in this thesis. I believe at least that my work contains some criticism for the state and the society. Whether people will decide to transform them, as the poet suggests, is a question to be answered in the future and by the people, including myself.

In any case, I do hope that I will get enough constructive criticism for my work. It is far from being perfect, I could continue working on it my whole life and in a sense I will do so. Nevertheless, this thesis represents my effort to develop myself from a person that stands critical against the society to a scientist that has some knowledge and potential to contribute in search of an answer to the question of how this society should and could look like. This is my perspective on economic research.

The last four years, I learnt a lot, I got direct or indirect input from many people. I had the opportunity to work in an environment completely new to me. Regardless of whether I agree or not with the 'main settings' of this environment, I benefited from it considerably. Despite the fact that I am an economist, working on the verge of two disciplines, economics and sociology was an interesting experience. Contrary to the dominant views in both disciplines in many European countries, I found the input I got from people working in these two fields very useful.

The first person I should give credit to is, of course, my main supervisor, Ruud Muffels. He introduced me to this project and, especially at the end of my PhD, he gave me very valuable help in order to complete my thesis. He encouraged me to write high-quality scientific papers and present my work in high-level conferences. Next to Ruud, I would like to thank my second supervisor Jeroen Vermunt. He was the one that introduced me to complicated statistical methodology and helped me in carrying out the analysis needed in my thesis. He was patient enough to answer all my questions, basic and complicated, on panel data methodology. Next to them, a great 'thank you' belongs to my co-promotor Didier Fouarge. Being a person very open to be contacted, many times I had the feeling that I was taking advantage of him with all the issues that come into the mind of a junior researcher. From the very start, he treated me as a colleague and this gave us the opportunity to work together. I hope that I will have the chance to continue working together with all three of them. A further 'thanks' goes to Christos Papatheodorou. He was the one that introduced me to scientific research, encouraged me to engage on this project and supported me all these years.

Despite the good words of my supervisors, I was still doubting whether or not my thesis is of good scientific quality. My doubts were gone after the 'final touch', the judgement and the comments

of my PhD committee. I would like to thank therefore, the members of this committee, Paul de Graaf, Jacques Hagenaars, Jan van Ours, Apostolos Dedousopoulos and Lorenzo Cappellari, for taking the time to read my thesis and make comments on it. I am particularly grateful to Jan van Ours for introducing me to the Labour group of CENTER/Tilburg University and giving me the opportunity to present two of my papers there.

Writing this thesis would be impossible without the help of my friends and colleagues. Many people helped me in several ways to get through this four-year period. The first one I would like to mention is Maike. Her presence in the department changed completely my views of spending my working time in Tilburg. Going drinking after work or in the Hague as well as traveling numerous times together from Tilburg to the Hague, we had good times and we shared many joyful experiences. Maike is also responsible for the fact that the 'samenvatting' is written in correct Dutch. Two 'seemingly unrelated' but very much alike (to my view) colleagues, Viki and Heejung, were also 'important players' of the last four years. Together with Viki, we have solved a large number of economic, societal and personal problems, over drinking of course! As for Heejung, she is a person that one should meet. With Dorota, we went almost all the way together these four years and shared an office as well as nice experiences and problems caused by living in the Netherlands and working in Tilburg University. She started earlier but I could catch up when something more important than a PhD (don't forget these things do exist...) came to her life; little Stella-Antonia. Minna was also a very dear colleague with whom I was engaged in many problem-solving sessions towards the last year of my PhD. Ellen is also 'responsible' for the pleasant moments I had the last two years in the department. I also am grateful to Trudie for her help in the first years of my PhD. Mathilde and Olivier were always there to carry me away from the worries of my PhD and to spend wonderful moments in the Hague, in Paris, in Lille, in Venice and other places.

Of course, all the rest of my colleagues have a contribution to my project. I want to thank Christiaan, Anna, Wilfred, Joris, Eric, Johan, Antonia and Anne for commenting on my research and for making me have relaxed moments. I also would like to thank the director of the PhD school of the Faculty of Social Sciences in UvT, Ton Heinen, for keeping an eye on the progress of my project and solving all the practical and financial issues related to it.

Back in Greece, there are many people to mention. To all my friends, to all these people that I have a lot to share with, I want to promise that I will join them again; not only in mind (this I never stopped doing) but also in person. All my visits to them gave me an impulse to continue.

My family has also a part of the credit. My parents and my brother helped me always and in any possible way these years. Their love was necessary for me to finish this effort. Last by not least (rather first I would say) I want to thank the woman of my life, Stella. This was an important part of our lives and we were together in it. Nothing would be possible without her.

Contents

Chapter 1

Wage Mobility: an Introduction

> "Britain's income distribution is like a tall multi-storey apartment building with the numbers of residents on the different floors corresponding to the concentration of people at different real income levels. The poorest at any one time are on the basement floor, the richest are in the penthouse, and the majority somewhere in between. Such snapshots at a point in time tell us nothing about the dynamics of occupancy patterns: we know little about people's movements between floors one year to the next. Are the stairs and lifts much used? Who moves the most and how far?" (Jarvis & Jenkins, 1998)

The income distribution in the countries of the European Union is similar to the British distribution with many 'multi-storey apartment buildings' having different heights, different numbers of residents per floor as well as different patterns of movements up and down lifts and stairs. An idea about what these multi-storey apartment buildings look like is given in Figure 1.1., which plots the cumulative distributions of gross hourly wages in 12 European countries. As shown in this figure, the distribution of individuals on the different floors of the storeys varies across the apartment buildings. Some buildings have fewer floors than others. For example, in Greece there are fewer floors than in the UK. The distribution of individuals on floors in some buildings is more uniform than in other buildings where individuals are more concentrated on the bottom floors. In Portugal, the group of people living in the basement is the largest among all countries. By contrast, in Germany we find the largest group of people living in the penthouse. The aforementioned differences suggest that moving from the bottom to the top of the wage distribution or vice versa requires changing a different number of floors depending on the country. This thesis focuses on wage mobility. In addition to the questions addressed by Jarvis and Jenkins, in this thesis we explore to what extent people on the various floors demonstrate different behaviour in their movements between floors. Moreover, we investigate the factors that determine whether people stay on their own floor or change floors. Finally, we compare mobility patterns across the different buildings.

More specifically, this thesis tackles the following questions: (i) Is wage mobility different

for the various parts of the wage distribution? (ii) Do European countries differ with respect to wage mobility, and which factors explain these cross-country differences? (iii) Which type of human capital determines whether a low-pay spell at the beginning of the working career is a stepping-stone to better earnings, or a trap that young workers cannot easily escape from? (iv) What is the relationship between wage mobility and a job change with another employer or within the firm, and to what extent does it differ between the low-paid workers and the high-paid workers? (v) What is the effect of measurement error on the number of low-pay transitions that we estimate in survey data and on the estimated covariate effects in a low-pay transition model?

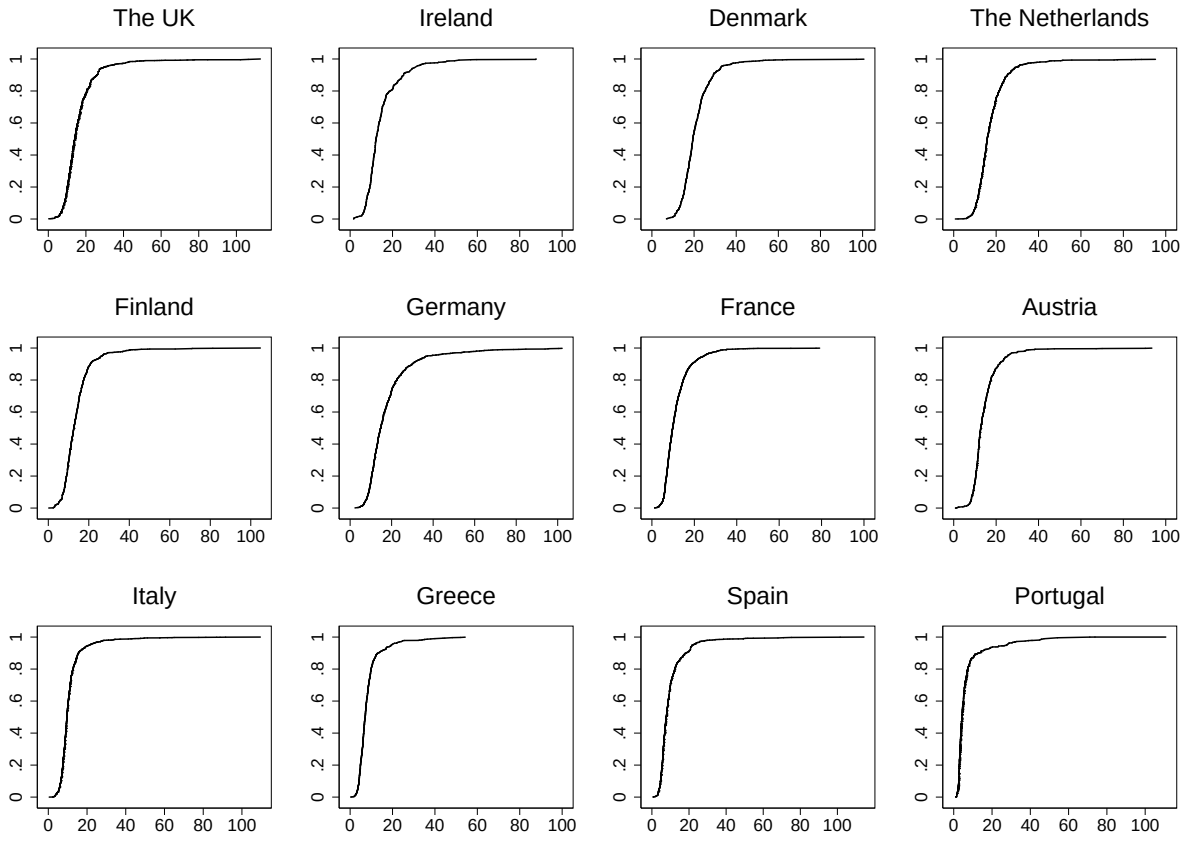

Figure 1.1: Cumulative distributions of gross hourly wages for males aged 25-55 for the year 2000. Wages are in Euros. Source: own calculations from ECHP.

Wage mobility: why do we care?

Wage mobility is an important issue from a theoretical, empirical, and policy perspective. As far as economic theory is concerned, wage mobility is related to several core issues of research. Wage mobility measures the returns to human capital investments and the relationship

between productivity and wages. Several models try to explain wage dynamics over the life course. Here, we will only discuss briefly the theories that are used in this thesis. The school-to-work transition theory (see, for example, Ryan, 2001) suggests that wage levels at the beginning of the working career are affected considerably by the link between the education system and the labour market. If the job requirements correspond to specific educational or vocational training qualifications, the screening of workers takes place at the moment of hiring, and the employer can immediately pay the worker a wage that is close to his marginal productivity. However, when there is no such correspondence, the employer has little information on the productivity of the worker. In this case, the education of the worker serves as a sign of his productivity, and the screening takes place during the initial period after hiring. After this period, the employer acquires more information on the productivity of the worker and the wage can increase.

For the prime-age working career, an upward age-earnings profile is predicted by many theories. This upward profile is realized by wage growth either within or between jobs. Human capital theory (Becker, 1962) suggests that positive wage growth takes place primarily within a job. According to this theory, earnings are higher for highly-educated individuals. Moreover, earnings grow with the accumulation of labour market experience and firm-specific skills. Within a firm, workers acquire firm-specific skills by investing in training. Therefore, the effect of a job change on wages is contingent on the ability of the workers to transfer firm-specific skills.

The job-search and the job-matching theory provide an alternative explanation for the upward age-earnings profile. According to these theories, this upward profile is the effect of the search for more efficient job matches. According to job-search theory (Burdett, 1978; Mortensen, 1986), workers enter the labour market with a given and fixed stock of human capital. Their productivity is known ex ante to employers. Firms differ in the level of productivity they can obtain from the workers. Hence, workers' productivity depends on the firm they are employed in. Employed workers are assumed to continue searching for a firm in which they will be more productive. As a result, job mobility will positively affect the wage growth. Since productivity is assumed to be fixed and known ex ante, the job-search theory suggests that controlling for individual and job heterogeneity eliminates the effect of job mobility on wages.

The reasoning of the job-matching theory (Jovanovic, 1979a) is similar to the reasoning of the job-search theory. The difference between these two theories lies in the fact that the job-matching theory assumes that the worker's productivity, although fixed, is unknown ex ante to employers. Therefore, there is initially an uncertainty about the worker's productivity. As job tenure increases, the employer gains additional information about the actual productivity

of the worker. Due to this learning effect, wages also grow within jobs. Due to the initial uncertainty about the worker's productivity, this model allows for an effect of job mobility on wage growth even after correcting for personal and job characteristics.

From an empirical perspective, there are four main strands in the literature. The first strand deals with individual wage dynamics and tests theoretical models on tenure-wage profiles, job search, job matching and employer learning (see, for example, Abraham & Farber, 1987; Altonji & Shakotko, 1987; Topel, 1991; Farber & Gibbons, 1996; Dustmann & Meghir, 2005). The studies within this strand focus typically on the effect of education, training, tenure, labour market experience, and other job characteristics on wage dynamics. Most of these empirical studies are performed in a single country or even a single-firm framework, and avoid comparing institutional contexts.[1] Moreover, these studies typically estimate an average wage effect, without controlling for the initial position in the wage distribution. The position in the distribution is usually considered as an effect of the worker's skills, ability and effort. State dependence is rarely taken into account.

The second strand of the literature derives implications for earnings mobility by modelling the covariance structure of earnings (see, for example, Lillard & Willis, 1978; Dickens, 2000b; Heider, 2001; Moffitt & Gottschalk, 2002; M. Baker & Solon, 2003; Ramos, 2003; Cappellari, 2004; Kalwij & Alessie, 2007). These studies decompose earnings into a permanent component and a transitory component. Implications for earnings mobility are derived by the relationship between the proportions of total earnings that are represented by the permanent component and the temporary component. As the studies within the first strand, the studies within the second strand of literature do not focus on the effect of institutions on wage mobility.

The third strand of the literature is smaller than the first two strands but very relevant to this thesis. This strand focuses on low-pay mobility. The studies within this strand do not compare different parts of the wage distribution, but deal extensively with the consequences of being in a particular part of the distribution, i.e. low pay (Stewart & Swaffield, 1999; Cappellari, 2000, 2002; Cappellari & Jenkins, 2002, 2004b). The main issue that is tackled by these studies is whether state dependence or heterogeneity matters more for low-pay mobility. Many of these papers also provide a contribution to econometrics, as they tackle methodological problems, such as initial conditions and non-response, which are necessary in order to estimate state dependence. However, although labour market institutions are quite relevant for low-pay mobility, these studies typically do not compare countries their institutional contexts.

The fourth strand of the literature is more policy-oriented and focuses on the conse-

[1] There are noticeable exceptions, such as Dustmann and Pereira (2005) and Perez and Sanz (2005).

quences of relative wage mobility at the macro level (see, for example, Burkhauser et al., 1997; Buchinsky & Hunt, 1999; Dickens, 2000a; Cardoso, 2006). The main interest of this strand is the relationship between wage mobility and wage inequality. Most of these studies are implicitly based on Friedman's (1962) claim that among two societies with equal income distributions, the country with the highest level of mobility is the most egalitarian. Labour market institutions are assumed to account for cross-country differences in wage mobility and wage inequality. Firstly, there are institutions that directly affect the ability of employers to adjust the wages of their workers. Such institutions are national minimum wages as well as the labour unions, whose effect can be measured typically by trade union density and collective bargaining coverage. Secondly, other labour market institutions affect wage mobility indirectly, through job mobility. The ease with which temporary contracts can be used, as well as the ease with which permanent workers can be hired or fired,is related to the aggregate level of job mobility in a country. Since wages grow more between jobs than within jobs, the level of job mobility positively affects the level of wage volatility. However, the role of all these institutions on shaping wage mobility itself has not been extensively studied. Moreover, these studies typically do not account for heterogeneity in wage dynamics. As far as the initial position in the wage distribution is concerned, in the cases where these studies account for it, their analyses are rather descriptive. In this thesis we shall attempt to deal with these shortcomings.

The policy relevance of studying wage mobility

Wage mobility is also important from a policy perspective. Achieving more flexibility in the labour market while maintaining a certain level of job security is one of the core aims of the European Union. The dominant view in the European political debate seems to be that improving labour market flexibility can help the EU to become '*the most competitive and dynamic knowledge-based economy*' in the world.[2] The idea is that due to the increased international competition, labour markets are confronted with an increasing pressure to adapt more quickly to the changing market demands and conditions. The adaptability of workers and enterprises is therefore one of the major pillars of the European Employment Strategy. At the supply side, this translates into the need to improve the 'employability' of workers. At the demand side, this translates into the need to increase the flexibility of firms. The basic understanding is that flexibility of firms is hampered by rigidities in the labour market that are caused by institutional barriers. These barriers are believed to prevent firms from adapting smoothly to the rapidly changing economic conditions. Therefore, the

[2]Strategic goal for 2010, set for Europe at the Lisbon European Council, March 2000.

political agendas of both the EU and the national governments are aimed at increasing flexibility in the employment relationships. The high levels of employment protection that existed in the labour market of many European countries are now being gradually reduced.

The issue, however, of the impact of flexibility on both economic growth and social welfare has not been extensively investigated. Within Europe, different countries are using different paths to achieve efficiency in the labour market. Countries differ in the way they are balancing flexibility with job security. Even when national policies do not seem to vary considerably, differences emerge more outspokenly between groups of countries. The UK is achieving efficiency through increased levels of job and employment mobility and low levels of government and trade union intervention in the labour market. This leads to a high level of flexibility but a low level of job security in the British labour market. The labour market in Ireland shares similarities with the UK. In Germany, collective bargaining regulates pay and employment conditions for the great majority of the workers. Furthermore, it provides a strong link between the education system and the labour market, mainly through apprenticeship. Consequently, the German labour market ensures a high level of job security but a low level of flexibility. Some characteristics of the German labour market are also dominant in Austria, France and Belgium. The Netherlands combines a high level of labour market flexibility with high level of job security, with the Dutch labour market sharing similarities with the labour markets of the Scandinavian countries. In the southern European countries - Italy, Greece, Spain and Portugal - segmentation seems to be the dominant feature of the labour market. In the primary segment, workers enjoy a high level of employment protection and a low level of flexibility. In the secondary segment, workers are employed in firms or jobs where employment protection is low and law enforcement is absent. In this segment, there is a high level of flexibility, which works only in favour of employers, and a low level of job security.

Wage mobility is interrelated with labour market flexibility and labour market institutions. As mentioned earlier, labour market institutions affect wage mobility directly or indirectly. Flexibility policies typically aim at reducing the effect of institutions that affect wage mobility indirectly, i.e. firing and hiring regulations, employment protection for temporary and permanent employment. However, wage-setting institutions, i.e. trade union density and collective bargaining, are indirectly affected by these policies. For example, unionization is much lower among flexible workers than it is among permanent workers. Therefore, it is particularly pertinent from a policy perspective to investigate the effect of labour market institutions on wage mobility. This can provide insights into the ways to increase or decrease wage mobility in a country through certain policy measures.

The aim of the thesis

The aim of this thesis is to tackle the five research questions that were raised in the beginning of this chapter. More specifically:

> Research question 1: *Is wage mobility different for the various parts of the wage distribution?*

Previous research has rarely investigated this issue. As mentioned above, the position in the distribution is usually considered as an effect of the worker's skills, ability and effort. Contrary to these accounts, we consider the position in the wage distribution to also be a determinant of the future wage and employment perspectives of an individual. We approach this issue by pursuing two paths. Firstly, we investigate the effect of the full set of origin states - deciles of the wage distribution - on wage mobility, while controlling for cross-country differences. This is achieved with a flexible multinomial logit model that applies restrictions that are common in log-linear analysis. This approach provides much more information on the effect of the origin state than the descriptive analyses that have been performed up till now. Secondly, we investigate whether the effect of certain labour market events on wage mobility, such as a job change or an employment contract change, is different across the various parts of the wage distribution. Here, the distinction between the various parts of the wage distribution is cruder - low-paid and high-paid - as our sample sizes are rather small. In one essay, we model absolute wage mobility, while in another we model transitions between different earnings states. In both essays, our econometric model involves the use of a panel regression model.

By following these approaches, we do not formally estimate true state dependence. As indicated by previous research, this would demand controlling for the endogeneity of initial conditions. In other words, in three out of the four essays of this thesis we should have taken into account that selection into the initial state (for example in low pay) may be non-random. This would complicate considerably our econometric model and make our study practically unfeasible. Nevertheless, the problem of initial conditions is partly tackled by using longitudinal data for many time points and by controlling for observed and unobserved heterogeneity. Further discussion on the relevance of the initial conditions issue in our analysis is provided in Chapters 3 and 4.

> Research question 2: *Do European countries differ with respect to wage mobility, and which factors explain these cross-country differences?*

From the cross-country comparative perspective, contrary to the largest part of the literature that studies the consequences of wage mobility, we focus on the causes of wage mobility. Our aim is to investigate the effect of labour market institutions on wage dynamics. Ideally, we would like to examine the effect of institutions that directly affect the volatility of wages. These are the wage-setting institutions: minimum wages, trade union density, as well as collective bargaining coverage, centralization and coordination. However, these institutions are poorly measured as their indicators either are more an approximation rather than a 'hard figure' or are inappropriate for cross-country comparisons. Of the wage-setting institutions, we could only take into account the trade union density and the collective bargaining coverage. Moreover, we used measures for other labour market institutions that indirectly affect wage dynamics. The effect of these institutions may be captured by the Employment Protection Legislation (EPL) index (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 to 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. Therefore, the EPL index is a useful proxy for the strictness of the wage regulation in a country.

Another approach to measuring the effect of labour market institutions is by using a classification of countries into regime types. Even when the institutions do not seem to differ considerably across countries, the dissimilarities emerge more outspokenly across particular groups of countries. 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.

We follow a two-pronged approach to investigate the effect of labour market institutions on wage dynamics. Firstly, we make use of all available measures of labour market institutions - trade union density, collective bargaining coverage, EPL index, clustering of countries in a regime typology - to explain cross-country differences in wage mobility. However, explaining wage dynamics through the use of macro determinants would only lead to an overestimation of the effect of these determinants. For this purpose, we want to account

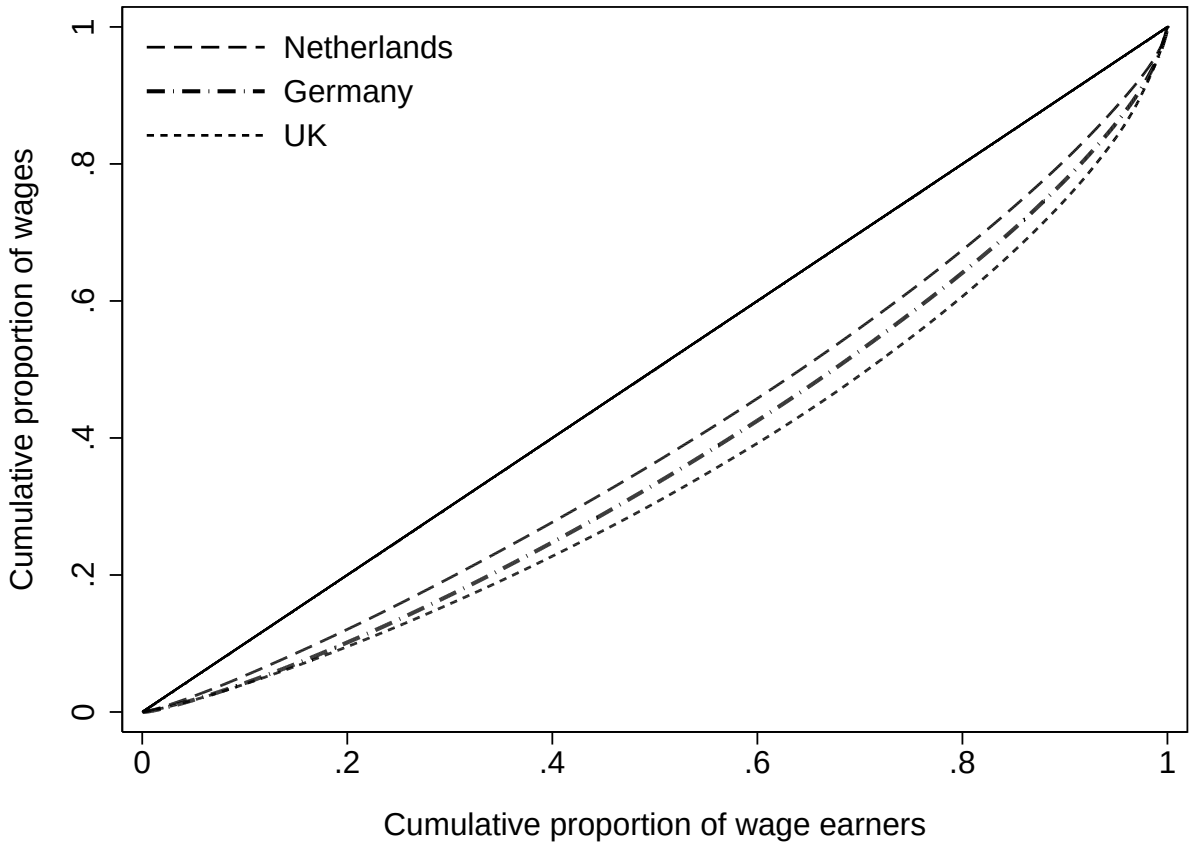

Figure 1.2: Lorenz curves based on the gross hourly wages for males aged 25-55 for the year 2000. Wages are in Euros. Source: own calculations from ECHP.

jointly for the effect of institutions and heterogeneity. Our flexible multinomial logit model allows such an analysis, despite the fact that it takes into account only a few individual characteristics. Secondly, we focus on specific countries with very different labour markets in order to investigate whether the institutional context affects the microeconomic mechanisms that determine wage mobility at the individual level. Although this approach does not allow us to test formally for country or institutional differences, it allows us to examine whether determinants of wage mobility at the individual level, such as a job change or an employment contract change, exert different effects across countries. The countries we include in this type of analysis are the UK, which has a liberal-unregulated labour market, Germany, which has a highly regulated labour market, and the Netherlands, which takes an intermediate position. The differences in the labour markets of these three countries result in differences in their wage distributions. In Figure 1.2, we present the Lorenz curves for the distribution of gross hourly wages in these three countries. In this figure, it is seen that the distribution of the Netherlands Lorenz-dominates the distributions of both Germany and the UK, while the distribution of Germany Lorenz-dominates the distribution of the UK.

The difference between the Netherlands and the other two countries is clear for all parts of the distribution. Thus, of these three countries, the most egalitarian distribution of wages is found in the Netherlands, while the most unequal one is found in the UK. The difference between Germany and the UK emerges for the middle and upper parts of the distribution, while the lower part is similar in the two countries. This gives rise to questions 3-5.

> Research question 3: *Which type of human capital determines whether a low-pay spell at the beginning of the working career is a stepping-stone to better earnings or a trap that young workers cannot easily escape from?*

Our aim here is to investigate the wage and employment perspectives of young individuals who start their career with a low-paid job. Other studies, such as Scherer (2004) and de Grip and Wolbers (2006), have approached the issue of labour market entry by studying the consequences of entering the labour market with a flexible job. The effect of entering the labour market with a low-paid job has received hardly any attention. The question that emerges concerns which factors determine whether a low-pay spell at the beginning of the working career is a stepping stone to better earnings or a trap that young workers cannot easily escape from. We test the predictions of the school-to-work transition theory that the relationship between the education system and the labour market determines the early careers of young workers. More specifically, we investigate whether general human capital - measured by education and apprenticeship - or firm-specific human capital - measured by tenure and work-related training - are more important in determining the probability of exiting low pay. This is done with a discrete-time duration model that distinguishes four competing risks, namely higher pay, self-employment, unemployment, and inactivity.

> Research question 4: *What is the relationship between wage mobility and a job change with another employer or within the firm and to what extent does it differ between the low-paid and the high-paid workers?*

Previous research has extensively dealt with the relationship between wage mobility and a job mobility. The decisions of individuals and firms about separations - layoffs and quits - and the effect of these separations on wage growth is analyzed in numerous studies that test theoretical models on tenure-wage profiles and employer learning. However, the results of these studies are contradicting; some find that a job change has a positive effect on wage growth, while others find that it has a negative effect. In this thesis, we focus on

individual behavior and we choose the on-job-search search theory to explain decisions of individuals on job turnover. We focus particularly on one property of the job-search model (Mortensen, 1986) that has been neglected in the literature. This property suggests that both the probability of changing a job and the difference between the current wage and the reservation wage are higher for the low-paid workers than for the high-paid ones (van den Berg, 1992). The reasoning behind this prediction is that a low-paid worker expects more job changes in his working life in order to improve his earnings than a high-paid worker does. Therefore, compared to a high-paid worker, a low-paid worker will choose a reservation wage that is relatively higher than the current wage (van den Berg, 1992). In this way, the low-paid worker reduces the costs related to the job-change, since he can attain his preferred life-time earnings level in fewer steps. If workers receive wage offers relatively close to their reservation wage, then the wage gains from a job change are relatively higher for the low-paid worker than for the high-paid worker. Therefore, distinguishing between the different parts of the wage distribution can resolve the ambiguity of the effect of a job change on wage growth.

A further distinction we make is between external job changes (changes of employer) and internal or in-firm job changes. According to various theories, wage careers within firms deviate from the assumptions of the fully competitive labour market model. Also, the position in the wage distribution is relevant here. Since high-paid workers are more involved in training programs (and therefore develop more firm-specific skills) they are expected to derive more utility than low-paid workers would from a promotion or a job shift within the same firm.

Our econometric approach involves the use of a panel regression model. Since several studies suggest that job mobility is endogenous to wage growth, we tackle this issue with a two-step estimation of the Heckman type. The unique features of our modelling approach is that this two-step estimation is applied on panel data, and that the effect of a job change - external or in-firm - is estimated separately for the low-paid workers and the high-paid workers.

> Research question 5: *What is the effect of measurement error on the number of low-pay transitions that we estimate in survey data and on the estimated covariate effects in a low-pay transition model?*

All the aforementioned research questions have been tackled with the use of data from panel surveys. Several studies suggest that these data contain quite a degree of measurement error that may considerably overestimate wage mobility (Rodgers et al., 1993; Bound et

al., 2001; Rendtel et al., 1998; Gottschalk, 2005). We focus on a particular type of wage dynamics - low-pay mobility - and we investigate the effect of measurement error on aggregate low-pay transition probabilities and on the estimates of the determinants of a multivariate low-pay transition model. Previous research shows that half of the poverty transitions in the German Socio-Economic Panel (GSOEP) and in the European Community Household Panel (ECHP) are spurious (Rendtel et al., 1998; Lollivier & Daniel, 2002). Rendtel et al. proposed a powerful method to correct for measurement error in poverty transitions. We extend this approach by adding heterogeneity and by working with a much longer time series. Our econometric approach is to add a 'latent structure' in a random-effects multinomial logit model.

A brief outline of the thesis

This thesis consists further of four essays and one concluding chapter. The four essays tackle the five research questions discussed above.

Chapter 2 investigates the first and the second research questions. In this chapter, we provide an overview of wage mobility patterns between the different parts of the wage distribution as well as among European countries. We use a European-wide dataset that provides data for 15 European countries (ECHP) to investigate jointly the effect of the origin state in the distribution and the effect of labour market institutions on wage mobility.

Chapters 3-5 shift to a more microeconomic approach. Chapter 3 tackles the second and the third research questions. In this chapter, we use panel data from the UK, Germany, and the Netherlands (BHPS, GSOEP and SEP, respectively) to investigate the wage and employment perspectives of the low-paid labour market entrants. We also allow for different pathways out of low pay; self-employment, unemployment, and inactivity. Chapter 4 deals with the first, second and the fourth research questions. The main issue we investigate in this chapter is the relationship between wage mobility and a job change. In investigating this relationship, we distinguish between low-paid workers, middle-paid workers and high-paid workers, as well as between external and internal job changes. The cross-country comparative perspective is provided by performing our analysis in the UK and in Germany. Chapter 5 tackles the first, second, fourth and the fifth research questions. The main focus of this chapter is to estimate the effect of measurement error on low-pay mobility. The distinction between different parts of the wage distribution is cruder than in chapter 4 as we only distinguish between low-paid workers and higher-paid workers. The cross-country perspective is provided by comparing the results of our model in the UK, Germany, and the Netherlands. Finally, in chapter 6, we summarize the main findings of the previous chapters and we formulate some conclusions. We also discuss the policy relevance of these results and

propose some issues for further research.

Chapter 2

Institutions and Wage Mobility in Europe

2.1 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. Two ways of measuring the effect of labour market institutions are compared. 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 is by using a classification of countries according to the features of the labour market institutions. This classification resembles 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 measuring and modelling wage mobility. Economists typically use individual level data to investigate the determinants of absolute changes in wages. Other approaches rooted mainly in sociology, such as Fritzell (1990), use mobility measures though their main interest is in aggregate changes in earnings. 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. In this paper, we use 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 2.2 reviews the measures of income and wage mobility. Section 2.3 elaborates on the measure of mobility that is used in this paper. Section 2.4 presents the previous findings on wage mobility and formulates some hypotheses about the dissimilarities in wage mobility patterns across countries and regime types. Section 2.5 deals with the data and sampling from the European Community Household Panel. Section 2.6 presents the results of the empirical models. The main conclusions of the study as well as the issues for further research are discussed in the final section (section 2.7) of the paper.

2.2 The measures of income and wage mobility

Different responses are to be expected when individuals are asked what changes in wages or incomes they would like to experience over time: some people would just wish to see their income rise in absolute levels (absolute mobility); another group would like to see its income improved compared to other people (relative mobility); others prefer their income not to be too volatile (income risk). In accordance to these differences in individual preferences, numerous definitions of wage mobility have been developed. These definitions correspond to different theories about the way income or wage changes affect the well-being of individuals (Fritzell, 1990).

According to standard economic theory, people are assumed to be primarily interested in the absolute changes of their (real) income. However, Hirsch (1995) suggests that even if an individual cared only for the purchasing power of his own income, his rank in the distribution still matters, as it determines his ability to acquire 'positional' goods (goods whose assigned value depends on how many other people possess them) or status goods. Hence, a change in the relative position of an individual in the distribution, referred to as 'relative positional' mobility, matters too. Other researchers, such as Duesenberry (1967) and Easterlin (1974), suggest also that since preferences are endogenous, people tend to adapt them in view of what others have and want (the 'keeping up with the Joneses' aspect). The idea of 'relative deprivation', according to which people always evaluate their income or living conditions in comparison to the conditions of their peers, was introduced by sociologists such as Runciman (1966). This theory suggests that an individual considers himself successful if his income increases more than the income of the individuals he or she compares him- or herself with. Psychologists such as Brickman et al. (1978), however, argue that individual perception of happiness tends to diminish due to the rapid adjustment of people's preferences to the new

situation and due to their raised expectations about the future. They suggest then that no gain in happiness or social welfare will occur in the end.

Most studies on wage mobility involve measures that include all the three aforementioned sorts of mobility (absolute mobility, relative mobility and income risk). Nevertheless, in many studies it is not always clear why these measures are selected (Headey & Muffels, 2003). Since we want to compare wage mobility at the macro or country level, we have transformed these measures of individual mobility into measures of overall mobility in society. At the aggregate level, absolute individual mobility translates into economic growth; relative individual mobility into income inequality or income dispersion, and income risk into income stability or income security. Dealing with macro-level mobility, Fields (2000) argues that changes in the overall wage distribution might change the ranking of the individual in the distribution without changing his absolute level of income. In metaphorical terms, this is the question regarding what matters more: 'changing rooms or rooms changing' as addressed by Fields (2000) and van Kerm (2004). The type of rank mobility where individuals exchange their income positions, while total income and overall income dispersion remain the same, is known as 'exchange' mobility. 'Exchange' mobility has to be distinguished from 'structural' mobility, which refers to the growth in absolute income of all people or to the mobility emerging from the increase in the income dispersion (Markandya, 1982a, 1982b, 1984; Fields & Ok, 1999). Yet, as in the individual case, we can decompose this structural component of aggregate mobility into a growth component (equal changes in the income of all people) and a dispersion or inequality component (a change in the dispersion without a change in the aggregate income of all people, van Kerm, 2004).

2.3 The choice for the mobility measure

The above discussion on the various types of income mobility leads to a choice for the mobility measure that is used in this study. From a macro perspective, this paper investigates the role of macro-economic conditions, regime type and labour market institutions in explaining cross-country differences in wage mobility. These labour market institutions are shaped according to policies that aim at increasing the growth component and reducing the dispersion and risk component of wage mobility in a country. Therefore, investigating the role of all three components of mobility - growth, dispersion and exchange mobility - is necessary. Nevertheless, at the individual level, we want to investigate the effect of the origin position in the wage distribution on wage mobility. Since growth mobility refers to equal absolute changes in the wage of all individuals, it does not render any information on the differences between the various parts of the wage distribution. Thus, we need to use a mobility measure

that takes into account the other two sorts of mobility components explained above: relative (dispersion) mobility and exchange mobility. For this reason, we choose relative positional mobility, which is defined as the year-to-year change in the decile ranking, as our mobility measure. The advantage of the measure is that it takes into account these two sorts of mobility, although it does not make it possible to separate them.

This can be shown with the following example that is presented in Table 2.1: consider the case of a group of four people having wages in year 1 equal to 2,000, 3,500, 4,500 and 5,000 euros, respectively. Suppose that in year 2, the individual that was originally ranked highest in the wage distribution still has a wage of 5,000 euros, but those individuals ranked second-, third and fourth in the original distribution now have wages of 8,000, 7,100 and 6,900 euros, respectively. Thus, the highest ranked individual in year 1 now has the lowest rank in the wage distribution of year 2. In this example, we can decompose mobility into a growth, dispersion, and exchange component in the following way. The growth component is the absolute change in income of 3,000 euros for all individuals. The dispersion component results from a transfer of 400 euros from individual 3 to individual 2, and the exchange component is just an exchange of rank between individual 4 and 1 without a change in the aggregate income.

Table 2.1: An example of wage mobility decomposition

Year 1							Year 2
Initial	**Growth mobility**			**Positional mobility**			Final
ranking	Growth			Dispersion	Exchange		ranking
1	**2,000**	*+3,000*	**5,000**		**5,000**	*+3,000*	**8,000**	4
2	**3,500**		**6,500**	*+400*	**6,900**		**6,900**	2
3	**4,500**		**7,500**	*-400*	**7,100**		**7,100**	3
4	**5,000**	*+3,000*	**8,000**		**8,000**	*-3,000*	**5,000**	1

The inability to decompose positional mobility into a dispersion and exchange component has to do with the fact that we only observe the rank change, but not how it emanates from changes in the underlying components. Moreover, since we only measure rank changes, we cannot examine whether there is more upward or more downward mobility in a particular country. For the same reason, our measure of relative positional wage mobility renders

little information about whether an increase in it leads to an increase or decrease of wage inequality. It informs us, however, about the extent, at least in relative terms, of wage risk and wage volatility that people experience and hence, about the overall level of wage stability. The more wages fluctuate over time the more equal they become in the medium and long-term. High rates of immobility therefore, signal a high persistence of wage inequality over time.

Table 2.2: 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 measure of positional mobility

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] Our aim is particularly to explain the 10×10 table (Table 2.2), 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 (see Table 2.2).

2.4 Theory and research on wage mobility patterns

The literature on wage mobility is rather poor compared to the number of studies on income mobility. Furthermore, studies on wage dynamics focus rather more on the consequences

[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.

of wage mobility (wage growth, long-term wage inequality) than on wage mobility as such. From a policy point of view, this is not surprising as politicians are generally more concerned with fostering economic growth, reducing inequality and increasing stability and security than with increasing wage mobility per se. However, wage mobility seems to be becoming a more important issue in both economics and policy-making. Politicians confronted with a sluggish labour market seem to be aware of the fact that promoting mobility in a labour market that is hampered by institutional barriers contributes to a more competitive and efficiently operating labour market, which may in turn raise productivity levels, and thereby growth.

Table 2.3: Levels and trends in Earnings Inequality

	Gottschalk and Smeeding (1997)		Acemoglu (2003a)	
	Level	Trend 1983-90	Level	Mid '80s - Mid'90s
Denmark			Moderate	(+) Moderate
Sweden	Low	(+) Low	Low	No change
Finland	Low	(+) Moderate	Low	(-) Slight
Netherlands	Low	(+) Slight	Low	(-) Slight
France	Moderate	(+) Slight		
Germany	Moderate	(+) Slight	Low	(+) Moderate
Belgium			Low	(-) Slight
Ireland	High	No change		
UK	High	(+) High	High	(+) High

Wage dispersion remains, of course, an important issue. Evidence suggests that from the mid-1980s until the mid-1990s, wage inequality rose steadily, although at a different level in many Western countries, except for the northern European countries (see Table 2.3). Specifically, from the mid-1980s onward, wage inequality increased strongly in the UK and in Portugal (Cardoso, 1998, 2006), but showed moderate increases in continental countries and no increases or even decreases in Scandinavian countries (Gottschalk & Joyce, 1998; Aaberge, 2002; Acemoglu, 2003b). There are three leading theories for the explanation of these changes in the wage patterns: the increased international trade and increased migration suggesting that non-sheltered sectors in the US and in Europe face increased international competition by low-wage countries, which has an adverse downsizing effect on the wages of the low-skilled workers in these sectors (Borjas & Ramey, 1995); the skill-biased technological change, which explains the increase in the dispersion of wages through the introduction and

rapid spread of new technologies and the resulting increase in the demand of high skilled workers at the expense of their low skilled peers (Acemoglu, 2003b, 2003a); the process of deregulation or removal of labour market regulations and institutions that allows wages to adjust more adequately and rapidly to market changes. This process of deregulation permits labour markets to become more flexible and to respond more swiftly to the ongoing changes. The tendency in policy to promote flexibilization by removing institutional barriers to mobility is contented to account for the differences in both the trends and the levels of wage inequality between the US, the UK and the continental European countries (Blau & Kahn, 1996).

Gottschalk and Smeeding (1997) argue that much of the change in earnings inequality occurred at the bottom of the distribution due to the sharp increase of the skill premium for the better skilled. As Acemoglu (2002, 2003b) argues, the reason for the skill premium being much larger in the US than in Europe is that in Europe supply responded more swiftly to the demand shifts caused by the process of skill-biased technological change than in the US. Lee (1999) suggests that the erosion of the minimum wage levels in the US might account for the increase in wage inequality. It is apparent, however, that the effect of skill-biased technological change is difficult to test empirically, due to the lack of appropriate data and methods to asses it.

In view of the rising wage inequality, it becomes particularly pertinent to study wage mobility. Dominant perspectives in economic theory argue that the ongoing changes in the economy and in the labour market have resulted in a higher level of wage mobility over time, which has dampened the short-term shocks in wage inequality. Although workers are less income-secure in the medium-term and long-term than in the past, as wages are more volatile, they also have more opportunities for moving into a better-paid job. Ultimately, it is an empirical question concerning how overall wage mobility, in terms of wage growth and wage dispersion, is balanced against less income security and stability. Nevertheless, whatever the balance is, there will be winners and losers in this process, dependent on the demand and supply factors involved, the level of their skills, and their earnings capacities. Recent studies show that increases in wage inequality are indeed not the result of short-term shocks in the wage distribution. Dickens (2000a) concludes that they reflect a long-term increase in the wage disparities across individuals. He finds evidence of high and increasing levels of immobility (since the 1970s), especially among the low-paid, in the UK. Burkhauser et al. (1997) conducted a comparative study of earnings mobility in the US and Germany in the 1980s. Although the welfare systems and the labour markets of the two countries differ significantly, they found 'a great deal of persistence' and a similar pattern of mobility in these two countries. Buchinsky and Hunt (1999) reach the same conclusion for the US, the

country with the most outspoken liberal labour market. 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 this result for the French workers.

The role of institutional constraints

There is a growing amount of literature suggesting that labour market institutions and employment protection regulations account for the dissimilar mobility patterns in the labour markets of different countries. The European Commission (2003) already pointed out that the wage distributions of EU member states seem to vary considerably due to differences that prevail among them with respect to different kinds and levels of employment protection. Therefore, we will examine to what extent the level of regulation contributes to explaining cross-country differences in wage mobility in Europe.

There are various ways to study the impact of institutional constraints. The most straightforward way is to examine to what extent the specific institutions and regulations have a bearing on cross-country variation in wage mobility. The OECD (2004) suggests that the main wage-setting institutions are minimum wages and trade union density, as well as collective bargaining coverage, centralization and co-ordination. Trade union density refers to the percentage of workers that are members of a trade union. Collective bargaining coverage is the proportion of workers covered by collective employment agreements. Collective bargaining centralization refers to the degree that the wage bargaining between unions and employers is centralized, while collective bargaining coordination refers to the degree that wage bargaining at all levels (company, industry, country) is coordinated by union and employers confederations. As documented in several studies, minimum wages and collective bargaining coverage have an equalizing effect on wages, especially at the bottom end of the distribution. Union density has a less clear effect since in some countries, such as Denmark and Finland, being a member of a union provides entitlement to unemployment benefit.

Our expectations for wage mobility are similar. Therefore, we contend that in countries with high levels of minimum wages affecting a large share of the working population, low levels of wage mobility will be observed, particularly in the lower part of the wage distribution. Extensive collective bargaining coverage can also prevent wages from being too volatile in the low and middle parts of the wage distribution. We also expect union density, bargaining centralization, and bargaining coordination to have a negative effect (but to a lesser extent than the other two institutions) on wage mobility in a country.

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. As a result, we cannot include a direct measure for these two institutions in our analysis.

The OECD (1999) has developed another measure of labour market regulation, the Employment Protection Legislation (EPL). 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 to job changes. Since workers will 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. Therefore, the EPL index is a useful proxy for the strictness of the wage regulation in a country.

Another 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. Countries with a more flexible labour market due to relatively low levels of employment regulation, such as the UK and Ireland, are believed to exhibit much more job and wage mobility than strongly regulated countries, such as the Southern European countries; namely Greece, Italy, Portugal and Spain. Classifying countries in clusters or regime types is quite a 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.

More specifically, according to this classification, we contend that countries characterized by a low public interference and loose levels of employment protection - denoted as liberal regimes - are likely to attain high levels of wage mobility. Southern European countries are believed to exhibit low levels of wage mobility due to the strictness of their employment protection legislation and despite their low union density. The segmented labour markets of Southern European countries primarily safeguard the position of workers in the inter-

nal labour market. Similarly, low levels of wage mobility are expected in the continental European countries - Austria, Belgium, France, Germany - due to their strongly regulated labour market, high union density, and strict compliance to collective wage bargaining. 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 & Fouarge, 2002; Muffels & Luijkx, 2006). This is the regime classification that we will be testing in this paper.

To sum up, we will test the effect of labour market institutions by examining how much of the country variation in wage mobility is explained by union density, collective bargaining coverage, and the EPL index as well as the regime typology described above.

Table 2.4: Macroeconomic and institutional variables in 12 European countries

		LFP		**Unemployment**		**GDP per capita**		**EPL**
Regime	**Country**	Mean (1995-99)	Mean change	Mean (1995-99)	Mean change	Mean (1995-99)	Mean change	
Continental	**Germany**	80.3	-0.03	8.3	0.2	104.2	-0.6	2.6
	Austria	80.9	-0.3	3.8	0.1	113.5	0	2.4
	France	74.8	0.3	9.9	-0.1	103.8	0.1	2.8
Nordic	**Finland**	77.2	0.2	12.4	-1.5	102	0.3	2.2
	Netherlands	82.3	0.6	4.3	-0.8	109.9	0.2	2.3
	Denmark	85.2	0.1	5.2	-0.4	114.6	0.1	1.8
Liberal	**UK**	83.1	-0.2	8.3	-0.9	103	0.4	1
	Ireland	78.9	0.5	9.6	-1.6	105.7	2.4	1.2
Southern	**Italy**	75	0.1	8.9	0	102.6	-0.3	3.1
	Greece	74.7	0.2	6.9	0.2	65.4	0.1	3.5
	Spain	77.3	0.5	15	-1.7	81.4	0.4	3
	Portugal	81.8	-0.2	5.3	-0.6	68.5	0.5	3.7

Source: OECD

LFP refers to the Labour Force Participation rate. EPL refers to the Employment Protection Legislation index.

Macroeconomic conditions and time

The effect of labour market institutions on wage mobility is not a static concept. These institutions and the corresponding 'regime types' might interact with other policy measures or even with the macroeconomic performance of countries. Therefore, it is important to study the evolution of cross-country differences over time and to control for the effect of the business cycle. For this purpose, we use the unemployment rate, the yearly change of GDP

per capita and the labour force participation rate for males aged 16 to 64 years old (Table 2.4).

Job and employment characteristics

A third topic covered by the paper is to what extent prevailing cross-country differences in wage mobility are associated with differences in the job and employment structure. Workers in the public sector usually face lower job turnover rates and experience relatively smaller wage changes, either upward or downward, than private-sector workers. The more workers are employed in the public sector, the lower wage mobility tends to be in a country. Workers with high-level skills and educational qualifications usually experience a steeper upward career path accompanied by faster wage growth. In contrast, low-educated workers are usually employed in low-skilled jobs with little opportunities to improve their wage prospects. Therefore, the more the distribution of education and the reward assigned to skills differ across countries, the more the wage mobility patterns tend to diverge.

2.5 Data, main concepts and some descriptives

We use the European Community Household Panel (ECHP) 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 over an eight-year period, namely from 1994 to 2001. It includes information concerning approximately 60,000 households and 130,000 individuals per wave (EUROSTAT, 2001). ECHP data were collected by the 'National Collection Data Units' by means of a centrally designed questionnaire. However, some countries (Austria and Finland) lack data for the first wave, or for the first two waves, as they started participation later. Due to artifacts in the income data, we have excluded Belgium and Luxembourg. Sweden has also been excluded, as the ECHP database includes repeated cross-section data rather than panel data for this country. The first wave of ECHP (1994) is excluded from our analysis as, in the view of EUROSTAT, the income data for this wave are much less robust than the data for the subsequent waves. Hence, our sample consists of seven 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. The main reason for restricting our analysis to male employees is that females tend to have more career breaks and more intermittent periods of temporary or permanent layoff for very different reasons than males (e.g. caring obligations). Thus, we cannot include women in our analysis without controlling

Table 2.5: 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.

for the factors responsible for their different career paths, which goes beyond the scope of this paper. We excluded men younger than 25 years old because most of them would be in some kind of education. Men older than 54 years old are also excluded from the sample as they often participate in early retirement schemes or voluntarily reduce their working hours. Furthermore, due to our focus on wage earners, we exclude the self-employed and the unemployed. Finally, in order to reduce measurement error, we follow the standard approach by trimming the wage distribution. Specifically, we exclude individuals having less than 10%, and more than 3,000% of the median wage income respectively.

Our basic unit of analysis is the working individual, and 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 ranked the wage income of individuals according to their decile position within a country, and examined 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). Henceforth, the time points of our analysis will correspond to the year from which the data originate. 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 2.5. This table presents the origin-destination transitions pooled across countries and time periods. Observations are concentrated along the main diagonal, especially at the corners of the table. As we move away from the diagonal, frequencies become significantly lower. Therefore, 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 (Tables 2.5) reveal some interesting differences. Contrary to our expectations, 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).

2.6 Models for explaining wage mobility patterns

A simple probit analysis

The method for analyzing the 414 10-by-10 transition tables needs to allow for the detection of differences in the relative positional wage mobility patterns across a large number of tables. The method should therefore be able to detect differences across countries, time points, education groups and employment sectors in the tendency of individuals to move more than one decile in the wage distribution. The log-linear variant of the multinomial logit regression model shown below can be used for this purpose, but first a simpler and

Table 2.5: Overall year-to-year transitions across regimes in percentages

Nordic

		Destination decile									
		1	2	3	4	5	6	7	8	9	10
Origin decile	1	44.3	27.5	11.1	6.7	4.2	1.9	1.5	1.4	0.9	0.6
	2	10.7	46.9	21.5	7.9	4.4	3.7	2.5	1.3	0.6	0.5
	3	3.0	14.9	44.4	21.1	7.9	3.7	2.5	1.6	0.6	0.4
	4	1.8	5.1	13.9	43.0	21.3	7.4	3.8	2.0	1.1	0.5
	5	1.5	2.7	4.9	14.4	40.5	22.7	8.2	3.1	1.2	0.7
	6	0.6	1.5	2.4	5.1	16.8	40.3	22.0	6.8	3.3	1.2
	7	1.0	1.0	1.4	2.4	5.2	15.9	42.3	22.6	6.4	1.8
	8	0.4	0.6	0.9	1.8	2.5	6.0	17.0	45.5	21.8	3.5
	9	0.3	0.3	0.4	0.7	1.3	2.6	4.1	16.4	56.8	17.2
	10	0.3	0.3	0.2	0.4	0.7	1.0	1.4	2.5	13.1	80.0

Liberal

		Destination decile										
		1	2	3	4	5	6	7	8	9	10	SUM
Origin decile	1	56.4	22.6	7.6	4.1	2.6	2.5	1.6	1.3	0.9	0.4	100
	2	8.4	55.9	21.9	6.8	3.1	1.9	0.8	0.6	0.4	0.1	100
	3	1.9	13.0	50.3	22.9	6.0	2.8	1.8	0.9	0.3	0.2	100
	4	1.2	3.2	14.6	45.3	23.4	7.5	2.9	1.1	0.6	0.1	100
	5	0.6	1.5	3.5	16.2	44.0	23.0	7.2	2.6	1.1	0.2	100
	6	0.6	0.7	1.4	4.7	16.0	44.9	22.7	7.0	1.7	0.3	100
	7	0.6	0.6	0.8	1.6	4.8	17.0	45.0	23.4	5.3	0.8	100
	8	0.2	0.2	0.4	0.8	1.6	5.5	15.0	52.4	21.5	2.3	100
	9	0.2	0.2	0.1	0.4	0.8	1.4	3.4	16.9	61.6	15.0	100
	10	0.1	0.2	0.2	0.2	0.3	0.3	0.8	1.3	12.1	84.6	100

Continental

		Destination decile									
		1	2	3	4	5	6	7	8	9	10
Origin decile	1	67.1	21.7	5.0	2.4	1.8	0.6	0.5	0.4	0.3	0.2
	2	16.8	48.2	22.8	7.0	2.6	1.3	0.8	0.2	0.2	0.2
	3	6.0	16.3	43.8	22.1	6.9	3.0	0.8	0.7	0.3	0.1
	4	3.1	5.4	18.7	40.8	20.8	7.1	3.0	0.9	0.2	0.2
	5	3.1	2.9	5.8	16.7	40.5	21.5	7.0	1.7	0.6	0.3
	6	1.5	1.4	3.0	6.7	20.4	39.3	19.6	6.1	1.5	0.5
	7	1.1	0.5	1.0	3.1	6.3	19.2	44.7	19.0	4.7	0.5
	8	1.1	0.5	0.8	0.8	1.9	4.8	20.7	50.7	17.0	1.7
	9	0.8	0.2	0.4	0.4	0.9	1.4	3.7	15.5	64.0	12.7
	10	0.7	0.4	0.0	0.3	0.3	0.5	0.8	1.7	13.4	81.9

Southern

		Destination decile										
		1	2	3	4	5	6	7	8	9	10	SUM
Origin decile	1	54.0	21.7	8.7	5.2	3.9	2.4	1.6	1.4	0.8	0.3	100
	2	12.1	47.9	20.7	8.3	4.5	3.0	1.5	1.1	0.7	0.2	100
	3	3.3	16.1	39.8	21.3	9.6	4.9	2.6	1.4	0.8	0.3	100
	4	1.7	4.8	18.2	35.8	21.4	9.5	4.5	2.6	1.0	0.4	100
	5	1.1	2.6	6.5	19.5	36.6	19.2	8.6	3.2	1.8	0.7	100
	6	0.6	1.5	3.1	6.3	18.7	36.5	21.0	7.9	3.5	0.9	100
	7	0.6	0.8	1.3	3.1	6.2	17.7	42.2	19.7	6.9	1.7	100
	8	0.4	0.7	1.0	1.2	2.4	6.3	17.9	46.0	19.3	4.9	100
	9	0.2	0.4	0.6	0.7	1.1	2.6	5.7	17.2	55.4	16.1	100
	10	0.2	0.1	0.2	0.3	0.5	0.9	1.7	3.5	15.3	77.4	100

Table 2.6: Probability of changing more than 1 decile

	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000
Austria	-	0.201	0.225	0.186	0.183	0.174
France	0.122	0.114	0.105	0.096	0.106	0.110
Germany	0.157	0.177	0.149	0.143	0.151	0.143
Denmark	0.281	0.290	0.324	0.290	0.305	0.331
Netherlands	0.152	0.157	0.168	0.171	0.208	0.241
Finland	-	-	0.134	0.120	0.148	0.161
UK	0.152	0.133	0.131	0.152	0.161	0.149
Ireland	0.258	0.283	0.219	0.245	0.262	0.239
Italy	0.281	0.259	0.265	0.226	0.201	0.236
Greece	0.289	0.293	0.261	0.248	0.182	0.185
Spain	0.228	0.238	0.218	0.244	0.263	0.275
Portugal	0.127	0.142	0.158	0.138	0.095	0.112

Note: These probabilities represent the marginal effects from the probit regression. Country, time, time-country interaction, education (low, high school, higher) and sector (public, private) are used as predictors.

more standard analysis is performed. Specifically, a standard probit regression model is applied that can serve as a benchmark for the other models. The dichotomous outcome variable indicates whether a change of more than one decile occurred or not. Country, time, time-country interaction, education and sector are used as categorical predictors in this probit regression.

Rather than reporting all the details about the obtained parameter estimates, we summarize the main results in Table 2.6 as represented by the estimated average probability (the marginal effects) of moving more than one decile for each of the combinations of country and time period. As can be seen, the highest probability of changing more than one decile in the wage distribution is found initially for Denmark, Italy and Greece, while the lowest rates are found for Portugal and France. Across the period of reference, however, the ranking of countries changes: at the end of the period, Denmark, Ireland and Spain rank first while Portugal, France and Germany come last. By summing up the results with respect to our regime typology, we observe that in Southern European countries (with the exception of Portugal), individuals face high levels of wage mobility that (with the exception of Spain) show a tendency to decrease. Nordic countries show either high (Denmark) or initially low but strongly increasing (the Netherlands and Finland) rates of wage mobility. Estimates for countries of the continental regime are situated somewhere in the middle (except for France,

which ranks lower) but they are uniformly decreasing. For the lowly regulated labour markets of the UK and Ireland, we get contradicting results. Ireland has very high levels of wage mobility, while the UK has unexpectedly significantly lower levels. In both countries, the probability of changing more than one decile does not change significantly during the reference period.

A restricted multinomial logit analysis

A limitation of this rather simple probit regression analysis is that all types of transitions are pooled; this means that it does takes into account neither the origin state from which a transition takes place, nor the size or the direction of a transition (i.e. whether it is an upward or downward transition). The analysis could be refined by doing separate analyses by origin state, by the direction of the change and by taking into account how large the change is. 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. 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. For this reason, we have opted for a method that can account for all these aspects in a single analysis. 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:

$$P\left(D=d|O=o,G=g\right)=\frac{\exp\left(\beta_{d|g}^{D|G}+\beta_{od|g}^{OD|G}\right)}{\sum_{i=1}^{10}\exp\left(\beta_{i|g}^{D|G}+\beta_{oi|g}^{OD|G}\right)}\ . \tag{2.1}$$

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 & Hout, 1998, 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 2.7 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 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

Table 2.7: 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

Table 2.8: Homogeneous part of the association ($\exp a_{od}^{OD}$)

		Destination decile									
		1	2	3	4	5	6	7	8	9	10
Origin decile	1	27.59	5.91	1.67	0.89	0.59	0.40	0.34	0.30	0.30	0.56
	2	10.36	19.98	5.73	1.58	0.76	0.43	0.21	0.23	0.13	0.27
	3	2.37	6.88	10.10	3.96	1.18	0.56	0.31	0.23	0.17	0.19
	4	0.95	2.07	4.04	6.07	2.74	0.99	0.51	0.29	0.23	0.23
	5	0.67	0.85	1.33	2.92	5.00	2.81	1.03	0.43	0.29	0.24
	6	0.34	0.50	0.71	1.13	2.72	5.09	3.17	1.02	0.54	0.30
	7	0.31	0.25	0.33	0.58	1.12	2.76	6.74	3.86	1.27	0.66
	8	0.23	0.17	0.23	0.33	0.58	1.24	3.98	11.26	6.88	1.53
	9	0.23	0.16	0.18	0.22	0.34	0.56	1.52	5.86	29.15	13.75
	10	0.42	0.20	0.20	0.21	0.23	0.38	0.67	1.94	16.26	153.85

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), which makes the results somewhat comparable with the results obtained by the probit regression. The added value of the multinomial logit analysis is its ability to discern cross-country differences in the various parts of the wage distribution.

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.[2] 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.

Results of the multinomial logit regression

Table 2.8 reports the overall association terms - in their multiplicative form $\exp(a_{od}^{OD})$ - as obtained with Model 4. The numbers indicate how much more likely the 'transition' concerned is compared to the perfect mobility situation. Perfect mobility is defined as the situation in which the origin and destination states are independent of one another. As can easily be seen, observations tend to be concentrated along the main diagonal, indicating

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

Table 2.9: Coefficients showing how much transition tables differ (b_{od}^{OD})

		Destination decile									
		1	2	3	4	5	6	7	8	9	10
Origin decile	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
	5	0	0	0	-9.14	-15.68	-10.75	0	0	0	0
	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

large immobility. Moreover, even if the huge parameter estimates for cells (1,1) and (10,10), which may be the result of ceiling effects, are ignored, the bottom right and the upper left parts of the table still contain the largest coefficients. This indicates that the highest levels of immobility emerge in the lowest and especially in the highest parts of the wage distribution. For example, an individual situated in the second lowest decile of the wage distribution in year t is almost 3.5 ($\simeq$ 19.98/5.73) times more likely to remain in the same decile than to move one decile upwards in year $t+1$ compared to the average worker. In contrast, workers with wages in the middle part of the wage distribution are more likely to change their position in a one-year period. However, transitions of more than one decile are rather rare in the whole range of the distribution. These results are in accordance with previous studies (Burkhauser et al., 1997; Bigard, Guillotin, & Lucifora, 1998; Buchinsky et al., 1998; Cappellari, 2000; Dickens, 2000a; Hofer & Weber, 2002). The next question that has to be addressed is how much the pattern presented in Table 2.8 differs across countries and whether these cross-country differences evolve with time and vary across personal and job characteristics. In Table 2.9, 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).

Table 2.10: 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 described in table 2.6

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 2.10. 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 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.

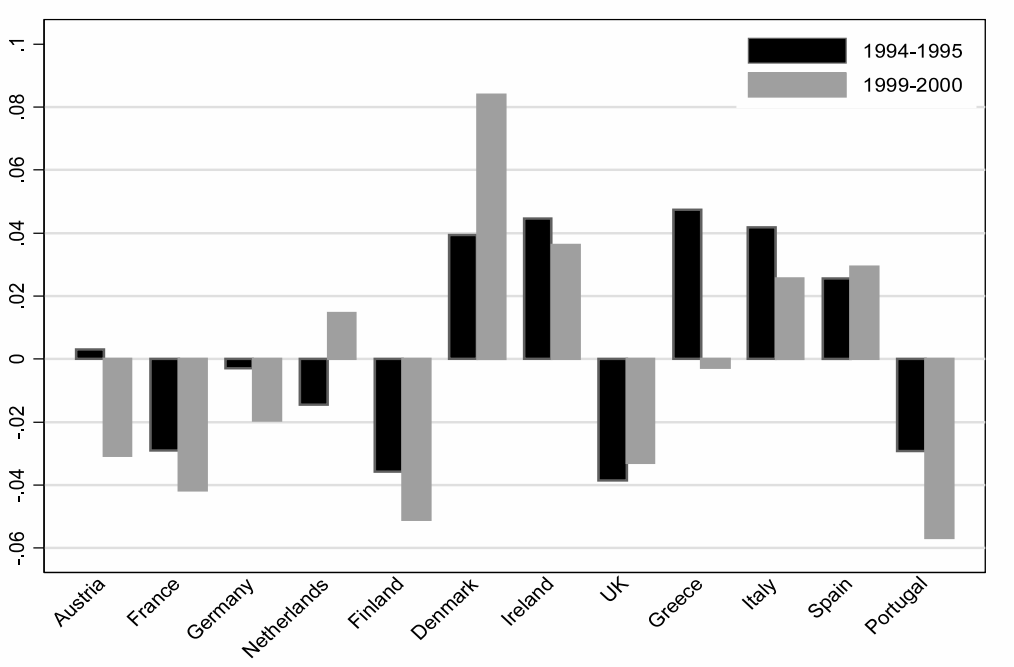

Figure 2.1: The effect of country on wage mobility in the first and the last time period

Figure 2.1 depicts the mean value of ϕ_g^G per country in the first and in the last time points. 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 (see also Table 2.4). In most Southern European countries that have a rather high level of employment protection, wage mobility is higher than most other countries. Given the segmented labour market of these countries, this might point to a high level of in-firm wage mobility in these 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 regimes 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.

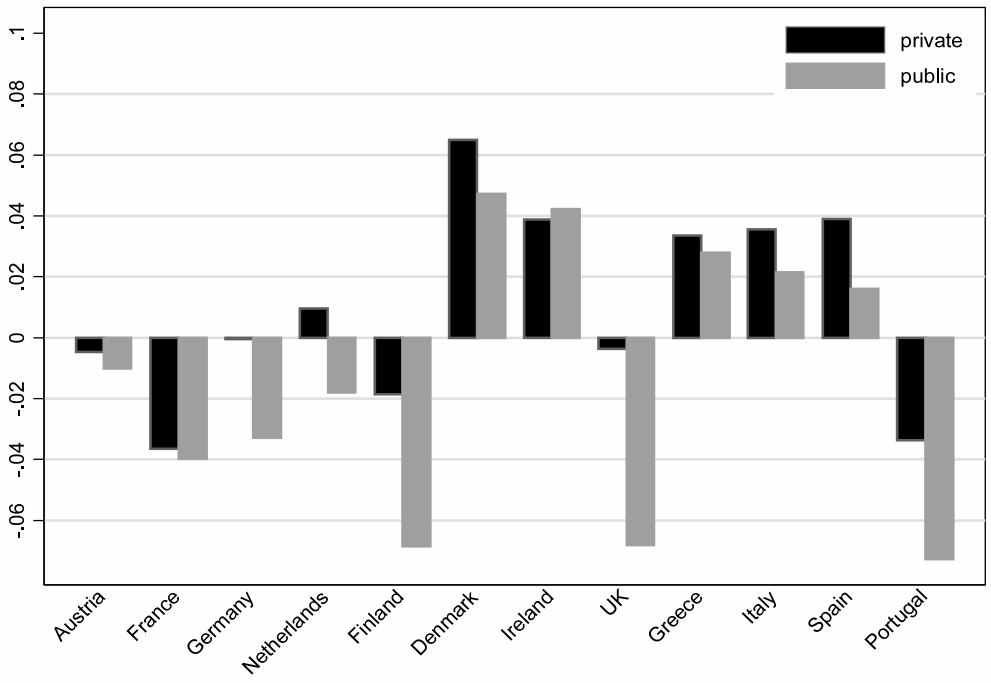

Figure 2.2: The effect of sector on wage mobility across countries

In Figure 2.1, it can be seen that the ranking of countries with respect to the levels of wage mobility varies during the observation period. In most countries, mobility rates decreased during the late 1990s. Therefore, the economic upturn during this period was not accompanied by an increase in wage mobility levels. The only countries for which we observe a considerable increase in mobility are Denmark and the Netherlands. Once again, these are

the countries that combine a flexible labour market with a high level of income and work security. In the other countries, mobility rates are decreasing or remain fairly stable.

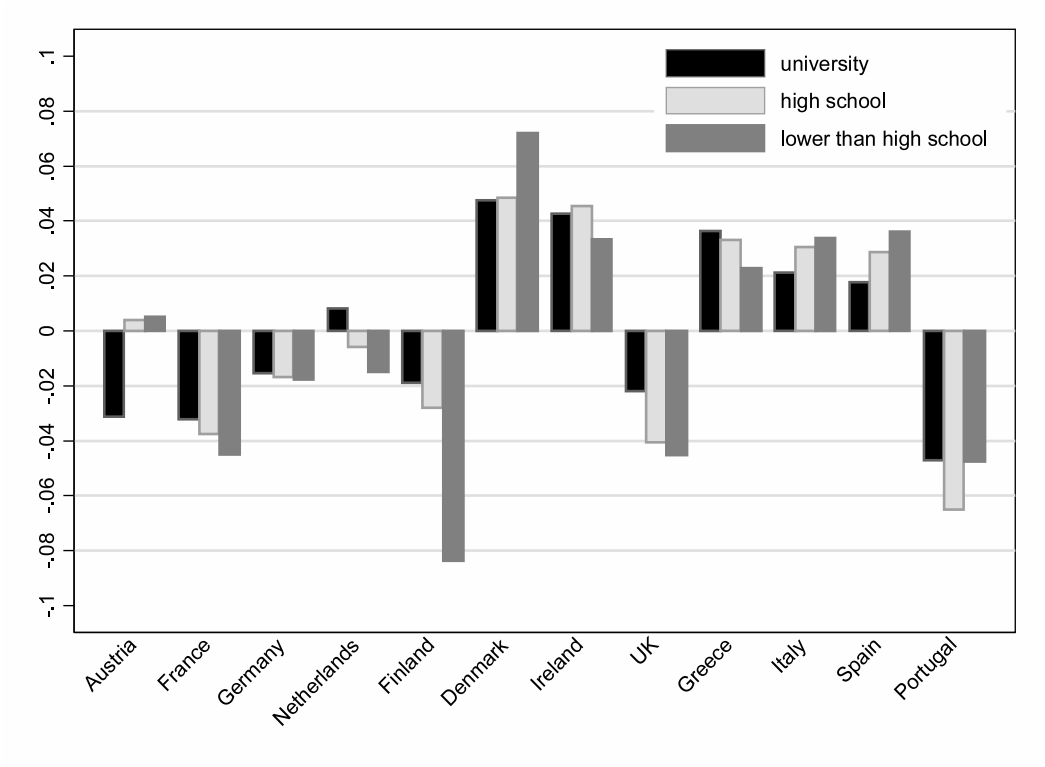

Figure 2.3: The effect of education on wage mobility across countries

As Figure 2.2 illustrates, the estimates for the sector of employment confirm our prior expectations: individuals working in the private sector experience higher levels of wage mobility than individuals working in the shielded public sector. Moreover, these differences increase over the observation period. However, comparing the sector effects across countries, some unexpected outcomes emerge: although wage mobility is lower in the public sector than in the private sector in most countries, this is not the case for Ireland, which belongs to the lowly regulated (liberal) cluster. On the contrary, in the UK, we find markedly less mobility in the public sector than in the private sector. For the other countries, mobility rates in the private sector are somewhat higher than in the public sector.

Figure 2.3 demonstrates that the impact of education level differs across countries. Highly skilled employees exhibit more wage mobility than their less educated peers in France, Germany, the Netherlands, Finland, the UK and Greece. In contrast, lower levels of education qualifications are associated with more wage mobility in Austria, Italy, Spain and especially in Denmark. No clear pattern is found in Ireland and Portugal. These results indicate that we have to be cautious when drawing conclusions on the basis of only these partial analyses.

Levels of education are not very well measured in these surveys. Moreover, education levels are very difficult to compare due to the extremely large variation in education systems.

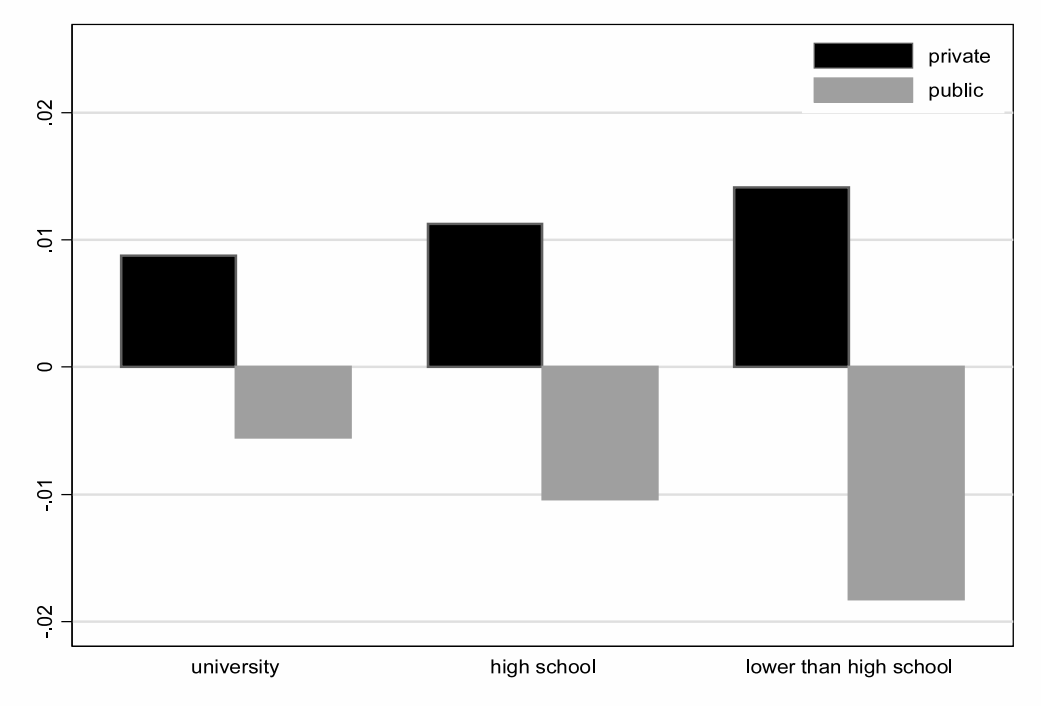

Figure 2.4: The effect of education on wage mobility across sectors

Educational effects, however, do not only vary across countries but also between sectors of employment. Figure 2.4 suggests that higher education is rewarded, in terms of more wage mobility, in the public sector but not in the private sector. This macro-level analysis, however, tends to confirm the findings of micro-level analyses of many other researchers, which show that although investments in human capital pay-off in terms of raising the employment opportunities, career opportunities and wage prospects, this pay-off is not unconditional.

The effects of regime type and macroeconomic conditions and employment protection

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

Table 2.11: 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 2.10.
[a] This adds the percentage of the variance that is explained by the interactions between the measures of institutions - EPL, coverage and density.

coverage. Moreover, three time-varying macroeconomic indicators were added to the model as covariates: the Labour Force Participation rate for men 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 2.11. The baseline model (Model 1) is the model described in Table 2.10. This model has an overall explained variance of 77.6%. The inclusion of macroeconomic indicators leaves the explained variance practically unchanged (Model 2). Macroeconomic conditions apparently explain only a small part of the total variation. Nevertheless, the findings reveal that if the interaction effect of country with time is removed from the model, the macroeconomic conditions will then explain the variance that was previously explained by this interaction term. The rising wage mobility levels would seem to coincide with a favourable economic development in a number of European countries during the late 1990s.

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. In Model 6, macroeconomic indicators take over a large part of the cross-country variance (5%). 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 2.5 shows that the ranking of regime types varies across time points. The only

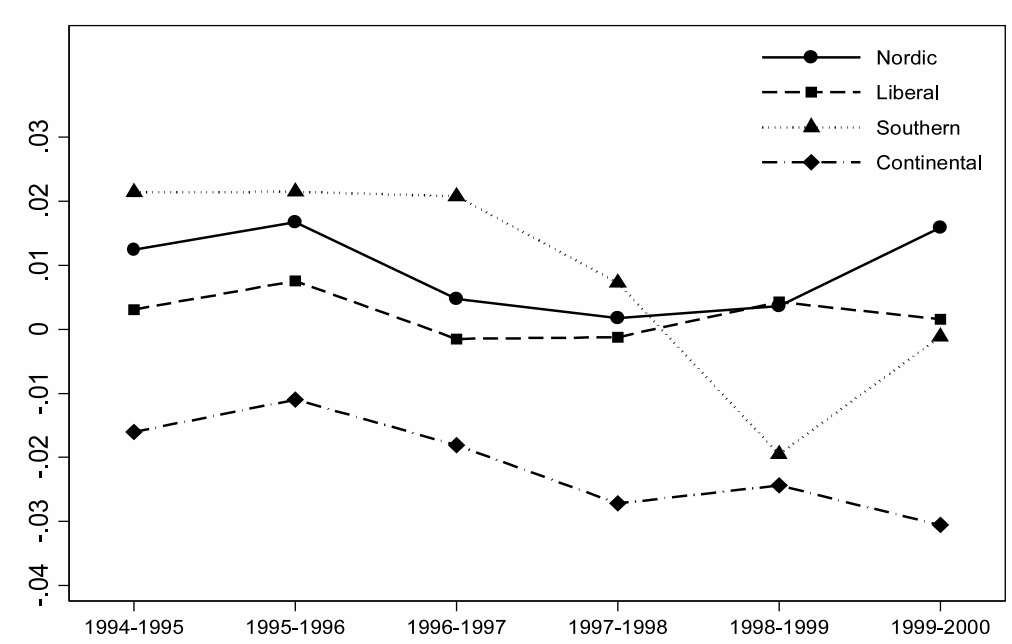

Figure 2.5: The effect of regime type on wage mobility across time

expectation that is clearly confirmed is that wage mobility levels in the strongly-regulated regimes (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 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.

2.7 Main findings and conclusions

In this paper we examined wage mobility patterns across countries and over time. 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. Firstly, 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. Furthermore, it would be particularly informative to investigate the effect of these institutions separately for the low, middle and high strata of the wage distribution, as these institutions affect the wage of these three groups of workers in different ways. Such an analysis will hopefully be possible in the future when more advanced statistical software has been developed.

Chapter 3

Escaping low pay in one's first job

3.1 Introduction

Over the past decades, the issue of the transition from education to work has gained increasing attention in the economic and political debate (Ryan, 2001). Rising youth unemployment rates and low-wage employment emerge as considerable threats for labour market entrants. The youth unemployment rate increased from 12.3% to 13.4% in OECD countries between 1990 and 2004 (OECD, 2005), and the relative earnings of youths have decreased by some 9 percentage points between the 1970s and the 1990s (OECD, 2006). Early research on the school-to-work transition scrutinized issues such as the labour force participation, the unemployment risk, the job and occupational mobility, as well as the job quality of young job starters. For example, Ryan (2001) studied the labour market position of young workers and the effects of policies in seven European countries (see also Hannan et al., 1996 for an overview of international comparative studies). Recent studies have focused on the consequences of labour market entry in flexible jobs (Gangl, 2001; Scherer, 2004; de Grip & Wolbers, 2006). However, little research has been devoted to the wage and employment consequences of entering the labour market with a low-paid job.

Investigating this issue is necessary since low pay is not specific to flexible jobs: there is increasing heterogeneity in both the type of low-paid job, and in the type of young people that get these jobs at the beginning of their career. Firstly, permanent jobs, especially in low-skilled sectors, may be low-paid. Secondly, the initial wage upon hiring does not always reflect the productivity of the worker. When the job requirements correspond to specific education or vocational training qualifications, screening takes place at the moment of hiring, and the employer can immediately pay the worker a wage that is close to his or her marginal productivity. However, when such a correspondence is absent, the employer has little information on the productivity of the worker. In this case, the education of the worker

serves as a signal for his or her productivity, and the screening takes place during the initial period after hiring. This assumption of imperfect information on the productivity of workers is typical in various economic models on wage dynamics, such as the job-matching model (Jovanovic, 1979b), the signalling theory (Spence, 1973) and the employer learning model (Farber & Gibbons, 1996). Lange (2007) suggests that it takes an employer three years to resolve 50% of the initial uncertainty about the worker's productivity. During this period of uncertainty, a worker with high skills may be getting a low wage. After this period, the employer has more information on the productivity of the worker and the wage can increase. Thus, even highly qualified young people may start their working career in a low-paid job (OECD, 2003).

However, relevant empirical findings differ across countries. Galindo-Rueda (2003) finds high levels of employer learning about worker's productivity in the UK, as employers have little direct information on the productivity of workers. On the contrary, Bauer and Haisken-DeNew (2001) find only weak evidence of employer learning for blue-collar workers and no evidence for white-collar workers, in Germany. Similar differences emerge in the types of human capital that account for low-pay exits in different countries. In the UK, job tenure is shown to be the most important determinant of upward mobility (Gosling et al., 1997). In Germany, apprenticeship is crucial for the earnings progression of young workers (Harhoff & Kane, 1997; Ryan, 2001). In the Netherlands, general skills contribute more to low-pay exits (van Opstal et al., 1998). These studies, however, are not specific to labour market entrants. Therefore, it is particularly pertinent to investigate whether cross-country differences in the early careers of low-paid job starters can be attributed to the type of human capital that is mainly rewarded in different countries.

The aim of this paper is to investigate the wage and employment perspectives of the low-paid labour market entrants in a cross-country comparative perspective. Low pay is defined as an hourly wage level below two-thirds of the median. Firstly, we investigate whether low pay at the beginning of the working career is a stepping stone to better earnings or a trap that young workers cannot easily escape from. Secondly, we examine which aspects of human capital - general or firm-specific - contribute to low-pay exits for the young workers. Thirdly, we investigate the degree to which countries with different institutions for the school-to-work transition vary with respect to the persistence and the determinants of low-pay exits of job starters. For this purpose, three European countries that differ considerably with respect to the relationship between the education system and the labour market are included in our analysis: the UK, which has a liberal labour market as well as a relatively weak link between education and the labour market; Germany, which has highly stratified education and occupational systems and a highly regulated labour market, and the Netherlands, which

takes an intermediate position (see Section 3.2).

The stepping-stone and the trap hypotheses do not necessarily refer to wage increase and low-pay persistence, respectively. Alternative paths in the labour market, such as self-employment, may be a 'way-out' for the low-paid job starters. Accordingly, several studies find a large number of transitions between low pay and non-employment (Dickens, 1997; Sloane & Theodossiou, 1998; Stewart & Swaffield, 1999; Cappellari & Jenkins, 2003). Hence, we analyze the exits out of low pay, not only to higher pay but also to unemployment, to self-employment and to inactivity by employing a competing-risks discrete-time duration model. Contrary to most of the relevant studies that control only for observed characteristics, our model also controls for unobserved heterogeneity.

The rest of the paper is organized as follows. Section 3.2 discusses the findings of the relevant literature and elaborates on the hypotheses of our analysis. In Section 3.3, the econometric model is described. The data used for the estimation is discussed in Section 3.4. Section 3.5 presents the results from the estimations. Conclusions are drawn in Section 3.6.

3.2 Theoretical background

The interplay between the education system and the labour market

The idea that labour market institutions account for differences between the liberal labour markets of the US and the UK, and the regulated markets of continental Europe is well-established in the literature (Freeman & Katz, 1995; Blau & Kahn, 1996). According to this literature, in regulated labour markets, institutions - such as minimum pay regulation and extensive collective bargaining - create wage rigidity at the bottom of the wage distribution. This wage rigidity leads to high rates of unemployment as employers cannot pay the marginal product of labour to their workers. Moreover, a high level of regulation can lead to a segmentation of the labour market. In the primary segment, workers enjoy a high level of security, while in the secondary segment compliance to employment regulation is low, and the wage and employment prospects of workers are minimal. In such labour markets, low-paid workers are highly concentrated in the secondary segment. These workers are threatened by low-pay persistence. Segmentation is even stronger in Southern European countries where compliance to employment regulation in the secondary segment is minimal (Muffels & Luijkx, 2006). In liberal countries, however, there is more flexibility in wages, and therefore unemployment is lower, but low pay is more prevalent.

A particular strand of this 'institutional' literature attempts to explain cross-country differences in patterns of labour market entry. More specifically, Marsden (1990), Marsden

and Ryan (1990), Hannan et al. (1997), Ryan (2001) and de Grip and Wolbers (2006) suggest that the link between the education and the vocational training system on the one hand, and the labour market on the other plays a key role in determining the prospects of labour market entrants. In countries with both a highly stratified education system and a high level of job classification in the labour market, job requirements are strongly connected to specific education or vocational training qualifications. Hence, education and vocational training qualifications provide all the necessary information that employers need in order to screen job applicants. Moreover, skills are transferable across employers. In such countries, a low-pay episode is usually a temporary incident for the highly-qualified job starters, but a trap for their low-skilled colleagues.

In contrast, in countries with a more universal education system, less centralized vocational training, and a low level of job classification in the labour market, firm-specific skills are the most important determinant of earnings. In such countries, the 'internal labour markets' dominate. Employers seek to fill vacancies for unqualified jobs with workers from outside the firm, while vacancies for more qualified jobs are filled with workers from within the firm (Doeringer & Piore, 1971; Marsden, 1990; Ryan, 2001). Such firms rely heavily on 'on-the-job' training. This, however, does not mean that education credentials are not relevant for the working career. On the contrary, employers use education qualifications as an initial screening device for assigning tasks and functions to their employees. As firm-specific skills are rewarded, and because it takes time to acquire such skills, earnings progression of both high-qualified and low-qualified employees is strongly related to tenure.

The reward of human capital in the UK, Germany, and the Netherlands

Three countries that comply remarkably well with the above-mentioned different patterns of labour market entry are included in our analysis: the UK, the Netherlands, and Germany. Germany is a country where the link between the education system and the labour market is strong (Gangl, 2001; Scherer, 2004; de Grip & Wolbers, 2006). Many young people go through a period of apprenticeship lasting up to three years. Employers are directly involved in the provision and delivery of apprenticeships (Hannan et al., 1997; Ryan, 2001). Therefore, approximately half of the apprenticeships end in regular jobs as apprenticeship is the main screening device for recruitment (CPB, 1997). Especially apprentices trained in large firms are more likely to experience a smooth transition to regular employment (Winkelmann, 1996). Apprenticeships develop skills that are transferable across jobs and employers. Although most job matches of the ex-apprentices with their employer terminate within five years of the end of the apprenticeship, these ex-apprentices do enjoy a higher wage growth by changing jobs (Dustmann et al., 1997; Franz et al., 2000). Furthermore, the labour

market is strongly regulated by collective bargaining, which covers more than 80% of West-German workers. Since long-term cooperative employment relationships are widespread in the German labour market, the German employment system can be characterized as a typical insiders' labour market (Blossfeld, 2001).

In the UK, the link between the education and vocational training system with the labour market is weaker than in Germany (Hannan et al., 1997; Gangl, 2001). Compared to the German system, the UK education system is more flexible and only weakly stratified. Apprenticeships are much less widespread in the UK, and hold a considerably lower status than in Germany (Brauns et al., 2000).[1] There are also more possibilities to move across vocational training and university education than in Germany (Müller & Shavit, 1998). Market forces rather than statutory regulations are dominant in the British labour market. Collective bargaining is less widespread and unionization rates are low. Only 22% of the private sector workers are covered by collective bargaining. In addition, minimum wage regulation was absent from 1993 until 1999, when a national minimum wage was introduced. Efficiency is achieved through an increased level of job mobility and facilitation of entrepreneurship. Consequently, the employment system of the UK is much more open than that of Germany; low pay is observed among all categories of employees and not just among labour market entrants. Therefore, skills acquired on the job are a more important factor for earnings progression. This is supported by previous evidence. Gosling et al. (1997) find that job tenure is the most important determinant of low-pay transitions in the UK. Using matched employer-employee data, Belfield and Wei (2004) suggest that wage growth is higher for workers in large firms.

The Dutch labour market offers an interesting case that is situated between the highly-regulated German dual system, and the liberal system of the UK (van der Velden & Lodder, 1995). It combines some institutional arrangements for the promotion of job security that are dominant in Germany, with extensive flexibility in employment in terms of temporary contracts and working hours (Wilthagen et al., 2004). Although the overall setting of the education system resembles the German one, the association between education and employment is weaker than in Germany but stronger than in the UK. There is an extensive range of occupational entries (approximately 200) with specified education or training credentials as prerequisites according to Hannan et al. (1997). The main difference between the Netherlands and Germany is that apprenticeship is less common in the Netherlands than in Germany. Moreover, it is distributed across all age groups (CPB, 1997), while in Germany it is observed predominantly among young people. Previous research shows that general

[1] This applies only after the deregulation of the UK labour market in the 1980s. The characteristics of the countries presented here are not static. Marsden (1990), for example, suggests that the UK labour market resembles the German one, as he uses data from the early 1980s.

skills are more important than firm-specific skills for escaping low pay in the Netherlands (van Opstal et al., 1998).

Table 3.1: Indicators on youth employment and unemployment

(in percentages)

		Germany		Netherlands		UK	
		1995	**2005**	**1995**	**2005**	**1995**	**2005**
Low-pay incidence	15-24	50.4	-	-	-	45.8	-
	25-34	6.7	-	-	-	15.0	-
	Total (15-64)	14.3	15.7	13.3	16.6	20.9	19.4
Low-pay persistence [a]	15-24	10.7	-	-	-	23.6	-
	25-34	12	-	-	-	35.6	-
	Total (15-64)	15.5	-	-	-	33.8	-
Labour force participation rate	15-24	56.8	53.5	65.5	68.8	74.4	69.0
	25-34	90.2	90.6	93.5	92.4	94.1	92.0
	Total (15-64)	79.5	80.6	80.8	81.4	84.7	82.8
Unemployment rate	15-24	8.3	16.1	12.0	9.5	17.9	13.4
	25-34	7.0	12.0	6.2	4.3	10.1	4.7
	Total (15-64)	7.2	11.5	5.9	4.9	10.2	5.1
Share of long-term unemployment (> 1 year)	15-24	25.2	32.0	38.5	20.8	30.5	17.3
	Total (15-64)	45.9	53.8	51.6	44.7	49.6	26.2
Share of temporary employment	15-24	41.6	60.4	29.5	41.3	13.4	11.3
	Total (15-64)	9.9	14.0	8.6	13.8	6.2	5.2
Share of part-time employment	15-24	31.8	37.7	45.7	46.2	41.6	40.5
	Total (15-64)	12.6	17.5	26.1	22.7	17.7	22.1

Source: OECD, online statistical database, OECD (1996) and European Commission (2004).

[a] This refers to the 5-year period 1986-1991.

The different patterns of labour market entry in these three countries are projected in the main indicators for youth employment (Table 3.1). This table illustrates that, in the UK, youth labour force participation is high and unemployment is decreasing. More importantly, long-term unemployment decreased sharply between 1995 and 2005. However, the British labour market does not perform well with respect to low-pay mobility. Low-pay persistence and increased mobility between low pay and unemployment is a well-established fact for the UK (Stewart & Swaffield, 1999; Dickens, 2000a; Cappellari & Jenkins, 2004a; Stewart,

2007).

In Germany, the picture is reversed. Youth participation rates are much lower than in the UK. Unemployment is increasing and becoming more persistent. Temporary contracts are much more widespread than in the UK, as employers try to avoid the strict arrangements that regulate permanent contracts. Low pay is common among workers below 25 - although many of these are apprentices. Nevertheless, low-pay is less persistent in the UK. This indicates that in Germany, young low-paid workers have more chances of improving their earnings than their counterparts in the UK.

The Dutch labour market seems to have performed quite well during the decade 1995 - 2005. Youth participation rates increased and unemployment fell. Furthermore, long-term youth unemployment was almost halved. Unfortunately, no data on low pay among young workers exist for the Netherlands.

3.3 A duration model for low-pay mobility

Our aim is to study transitions of young labour market entrants out of low pay. However, transitions out of low pay are not restricted to transitions within paid employment (e.g. from low to 'higher' pay). Low-paid workers often become unemployed, start their own business or move to inactivity. Therefore, we need to apply an econometric model that allows for these different exit states while controlling for low-pay duration. For this reason, we apply a discrete-time duration model with four competing risks. These competing risks are: moving to higher pay, unemployment, self-employment, and inactivity, with remaining in low pay as the reference state.[2] We use a discrete-time model and not a continuous-time model as our data come from yearly observations. After organizing our data in a person-period file (where the number of observations per individual equals the number of years at risk), we estimate the model through the use of a multinomial logit regression.

Our choice for the duration model entails a cost. The possible endogeneity of initial conditions may bias our analysis. As our sample includes only people who gain their first job within the reference period, the problem of initial conditions does not emerge from left-censoring [3]. However, the sample of individuals that start employment may be selective. Individuals that expect to find a low-paid job may postpone labour market entry by enrolling in an education or training program or even by remaining jobless. In this way, they wait

[2]We consider that workers are constrained in their transitions. Namely, we suggest that all low-paid workers would like to move to higher pay and that staying in low pay as well as moving to unemployment or inactivity is an involuntary action. Therefore, we can estimate the model in a reduced form.

[3]There still may be some endogeneity if the unobserved characteristics that determine the initial pay level are correlated with low-pay transitions.

until labour market opportunities improve while - if following an education/training program - they increase their human capital. The problem of endogeneity of initial conditions could be tackled with the model of Stewart and Swaffield (1999). However, controlling for the endogeneity of initial conditions in a competing-risks duration model is much more difficult and lies beyond the scope of this study. To control partly for the endogeneity of initial conditions, we include as covariates a dummy variable for calendar time - that pick the effect of the business cycle - as well as a dummy for the existence of a non-employment spell before starting the first job.

Let $P_m(\mathbf{X}_{it}, t)$ be the probability that individual i escapes the low-pay status (remaining in low pay is the reference state) to a status m after t years. Let $\mathbf{X}_{it}$ denote a vector of covariates for individual i after being at risk for t years. Covariates can be either time-constant or time-varying. The transition probability is specified by the following multinomial logit model:

$$P_m(\mathbf{X}_{it}, t) = \frac{\exp\left(\mathbf{b}'^m_0 + \mathbf{b}'^m_1 \ln t + \mathbf{b}'^m_2 \mathbf{X}_{it}\right)}{1 + \sum_{n=1}^{4} \exp(\mathbf{b}'^n_0 + \mathbf{b}'^n_1 \ln t + \mathbf{b}'^n_2 \mathbf{X}_{it})} \ , \tag{3.1}$$

for $1 \leq m \leq n$ and $P_0(\mathbf{X}_{it}, t) = 1 - \sum_{m=1}^{4} P_m(\mathbf{X}_{it}, t)$. $\mathbf{b}^m_0, \mathbf{b}^m_1, \mathbf{b}^m_2$ are vectors of coefficients to be estimated. Therefore, the likelihood contribution of an individual for whom no event has taken place until $T_i - 1$ is:

$$L_i = \left[\prod_{t=1}^{T_i-1} P_0(\mathbf{X}_{it}, t)\right] \left[P_0(\mathbf{X}_{iT_i}, T_i)\right]^{\left(1 - \sum_{m=1}^{4} \delta_{tim}\right)} \prod_{m=1}^{4} \left[P_m(\mathbf{X}_{iT_i}, T_i)\right]^{\delta_{tim}} \ , \tag{3.2}$$

$$\text{where } \delta_{tim} = \begin{cases} 1 & \text{if} \quad d_{ti} = m \\ 0 & \text{if} \quad d_{ti} = 0 \end{cases} .$$

In equation (3.1), it is assumed that transition probabilities depend only on observed characteristics and time. This might not be the case, as unobserved characteristics, such as ability and effort, are likely to be relevant. Duration models that fail to account for unobserved heterogeneity run the risk of overestimating negative duration dependence (or underestimating positive duration dependence) as well as underestimating the effect of time-varying covariates (Lancaster, 1990; Vermunt, 1997b). Therefore, we control for unobserved heterogeneity using the non-parametric mass-points approach introduced by Heckman and Singer (1984). According to this approach, the transitions to different states vary between a finite number of mass points or groups of people in the sample. These L groups, which are indexed by ℓ, are not a priori defined but they refer to groups of people with a different probability of exiting low pay (e.g. those with a high exit probability to high pay and those with a low

exit probability). This methodology involves allowing the intercept and the slopes to vary across the L mass points. The slopes are allowed to vary across mass points as it is possible for the returns to specific observed characteristics to be different across mass-points. Such a model is known as a random-slope model. Each mass point (or group) is indexed by ℓ in the relevant parameters. We base our choice for the number of mass points on the Akaike (AIC) and Bayesian (BIC) Information criteria. All estimations were carried out in Latent Gold (Vermunt & Magidson, 2007).

The transition probability for individual i that belongs to mass-point ℓ is given by:

$$P_m(\mathbf{X}_{it}, t, \ell) = \frac{\exp\left(\mathbf{b}'^m_{0\ell} + \mathbf{b}'^m_1 \ln t + \mathbf{b}'^m_{2\ell}\mathbf{X}_{it}\right)}{1 + \sum_{n=1}^{3} \exp(\mathbf{b}'^n_{0\ell} + \mathbf{b}'^n_1 \ln t + \mathbf{b}'^n_{2\ell}\mathbf{X}_{it})} \ . \tag{3.3}$$

In two out of the three countries under scrutiny, we allow the group membership ℓ to affect only the constant $\mathbf{b}^m_{0\ell}$. Thus, we usually assume that $\mathbf{b}^m_{2\ell} = \mathbf{b}^m_2$. The likelihood contribution of an individual belonging to group ℓ is obtained as follows:

$$L'_i = \sum_{\ell=1}^{L} L_{i|\ell} \ \pi_\ell \ , \tag{3.4}$$

where π_ℓ is the probability of belonging to the mass point ℓ and the likelihood $L_{i|\ell}$ is defined as in equation (3.2), but now with $P_m(\mathbf{X}_{it}, t)$ replaced by $P_m(\mathbf{X}_{it}, t, \ell)$.

3.4 Data and Main Concepts

The study uses panel data covering the period 1984-2004. For the UK, we use the British Household Panel Survey (BHPS). The BHPS waves 1-14, covering the years 1991-2004, are used. For Germany, we make use of the German Socio-Economic Panel (GSOEP). All the available waves are used covering the period 1984-2004. Note that we use data only for former West Germany, as the labour market of East Germany presented considerable differences with the West German one. For the Netherlands, our data come from all 18 waves of the Socio-Economic Panel (SEP), covering the years 1985-2002. The information from the three datasets has been made highly comparable for the purpose of this study.[4] Furthermore, the selected waves from these panels cover similar parts of the business cycle in the three countries.

Since our focus is on labour market entrants, males aged 16-30 are selected who are

[4]The BHPS data (Taylor et al., 2006) were made available by the Data Archive at Essex University. The GSOEP (Wagner et al., 1993) was provided by the German Institute for Economic Research. The SEP (CBS, 1991) was made accessible by Statistics Netherlands.

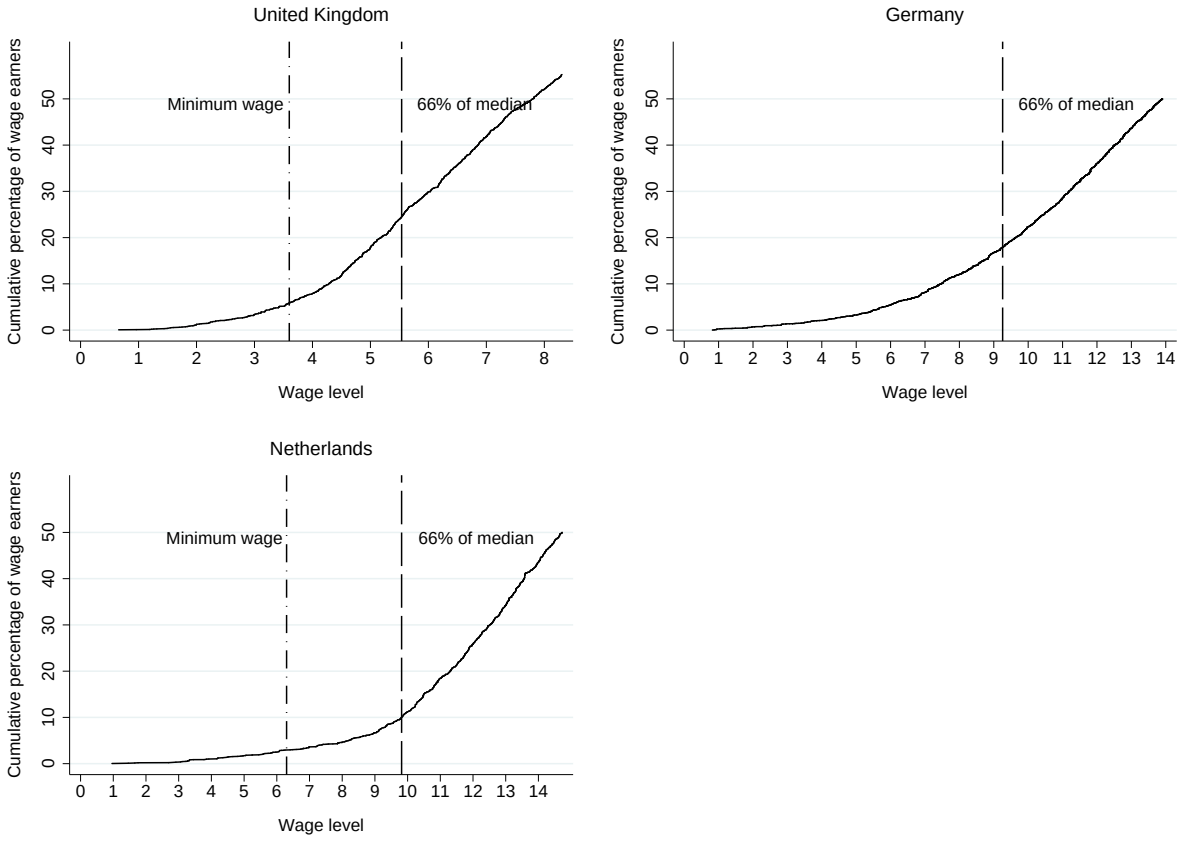

Figure 3.1: Distribution of gross hourly wages, males aged 16-55, year 2000. The minimum wage applies to workers above 21 years old.

entering the labour market for the first time in the period under scrutiny. This is why most of them are school leavers. Seasonal or part-time jobs that are combined with education are not taken into account. Female employees are excluded as they tend to leave the labour market more often and for very different reasons than males (such as caring obligations). Thus, we cannot include female workers in our analysis without controlling for the factors responsible for their different career paths, which goes beyond the scope of this study. In Germany, many young people enter the labour market through an apprenticeship, which is part of the education system. For this reason, we consider them as labour market entrants only after they have completed their apprenticeship. The possession of apprenticeship qualifications is used as a covariate in the model.

Our main economic variable is the gross hourly wage. Since only retrospective wage information is available from the SEP and the GSOEP, wage in t is derived from wave $t+1$. The low-pay threshold is set to two-thirds of the median hourly wage income. This threshold is the one most commonly used (for a discussion about low-pay thresholds see OECD, 1996).

The analyses have also been performed using the first quartile of the wage distribution as the low-pay threshold, which did not affect the results in any significant way. Figure 3.1 plots the lower part of the cumulative distribution of hourly wages for male workers in the year 2000. In Figure 3.1, we also plot the low-pay threshold and the legal hourly minimum wage for workers above the age of 21. The line for the minimum wage appears only in the UK and in the Netherlands as there is no national minimum wage in Germany. Our low-pay threshold 'cuts' the distribution at a bit higher than the minimum wage. In the UK, about 21% of the workers are low-paid, while the relevant proportion in Germany is approximately 19% and in the Netherlands in only 10%. The fact that no spike of the distribution is observed at the minimum wage can be explained by the fact that our measure for the working hours refers to the actual working hours rather than the contracted working hours.

Three measures of human capital are included in the model. General human capital is captured by the highest education level completed by the individual. Apprenticeship is also a measure of general human capital in Germany. Firm-specific human capital is measured by the length of the tenure in the current job and by the occurrence of formal training. Formal training, however, may also be a measure of general human capital as it sometimes provides general skills that are transferable across employers. This can especially be the case in the Netherlands and in Germany, where job requirements usually correspond to certain education or vocational training qualifications. All the covariates included in the analysis are described in the Appendix.

3.5 Results

Low-paid entrants

Our sample consists of 613 individuals for the UK, 251 individuals for the Netherlands and 900 individuals for Germany. Table 3.2 shows some descriptives for our sample. This table indicates that the incidence of low pay is higher in Germany and in the UK than in the Netherlands. The longest mean duration is observed in the Netherlands (2.5 years), while the shortest is observed in Germany (1.6 years). The composition of our sample shows that the low-paid job starter is usually a single individual younger than 25 years of age, with high school education, working as a blue-collar worker on a temporary contract in the commercial services or in the industry sector. He has often experienced a period of non-employment after completing his education, and before getting his first job. Some cross-country differences emerge. Low-paid labour market entrants are on average younger in the UK, and relatively older in Germany than in the other two countries. The majority of the Dutch low-paid job starters did not complete their high school education. As expected, the distribution of

Table 3.2: Composition of the sample of low-paid labour market entrants, pooled years

(in percentages)

		UK	Netherlands	Germany
Incidence of low pay[a]		55.6	33.9	48.4
Mean low-pay duration (in years)		2.2	2.5	1.6
Age	16-20	60.0	48.6	32.6
	21-25	31.8	44.2	48.9
	26-30	8.2	7.2	18.5
Married		5.1	3.2	11.8
Education	low	22.9	51.6	28.8
	high school	53.2	36.4	65.9
	tertiary	23.8	12.0	5.3
Training		33.3	45.1	58.6
Firm size	small	44.1	-	32.0
	medium	26.6	-	29.1
	large	29.3	-	38.9
Industrial sector	commercial services	42.4	45.7	21.1
	industry	24.9	35.3	51.5
	primary sector	22.6	4.7	2.3
	non-commercial services	5.1	4.3	12.9
	public sector	5.0	9.9	12.2
White collar		12.1	7.4	27.6
Part-time		10.1	32.3	12.3
Temporary contract		21.2	43.0	36.9
Non-employment spell		25.5	36.3	13.0
Apprenticeship (prior to labour market entry)		-	-	70.1
Cases		613	251	900

[a] This is the incidence of low pay among all labour market entrants.

the British sample is more uniform across education levels than in the other two countries. In Germany, the low-paid job starter works more often in the industry sector than in the UK and in the Netherlands. A period of non-employment before the first job is much more common for young Dutch job starters.

Exits from low pay

A straightforward means for investigating cross-country differences in exits from low pay is to use turnover tables. As shown in Table 3.3, low-pay persistence is higher in the Netherlands and in the UK than in Germany. Although low-pay persistence is somewhat higher in

Table 3.3: Overall year-to-year transition rate, pooled years
(in percentages)

	UK	**Netherlands**	**Germany**
Remaining in low pay	61.0	68.8	41.9
Higher pay	24.8	24.6	39.5
Unemployment	9.4	3.5	6.8
Self-employment	2.9	-	2.4
Inactivity	2	3.1	9
Total	100	100	100
Transitions	1,192	545	1,355

the Netherlands than in the UK, transitions to higher pay are almost equal in these two countries. The earnings of the German low-paid labour market entrants increase more often above the low-pay threshold than in the other two countries. This suggests that low-paid job starters in Germany experience more upward wage mobility. As expected, transitions from low pay to unemployment are more common in the UK than in Germany and in the Netherlands. In the Netherlands, transitions to unemployment are much lower than in the other two countries. Employment growth in the Dutch economy in the period under scrutiny resulted in a substantial increase in labour market participation as well as in a sharp decrease in unemployment. Therefore, the labour market opportunities of the low paid improved considerably.

Transitions to self-employment are rather rare in our sample. Although we expected transitions to self-employment to take place more often in the liberal labour market of the UK than in the regulated German labour market, transition rates to self-employment do not differ considerably between these two countries. An explanation for this is provided by Thurik (2003), who suggests that the favorable conditions for entrepreneurship in the UK concern mainly large firms. Therefore, individuals starting their employment career with a low-paid job do not find an "easy way out" to self-employment by starting a small business. Transitions to inactivity are much more common in Germany than in the other two countries.

Low-pay duration

Information on the duration of low-pay spells is provided by the survival functions. Figure 3.2 plots the cumulative staying probability after t years of low-pay employment for all three countries, considering only transitions to higher pay. Escaping low pay appears to be easier in Germany than in the UK or the Netherlands.

Plotting the survival functions per education status reveals more differences both between

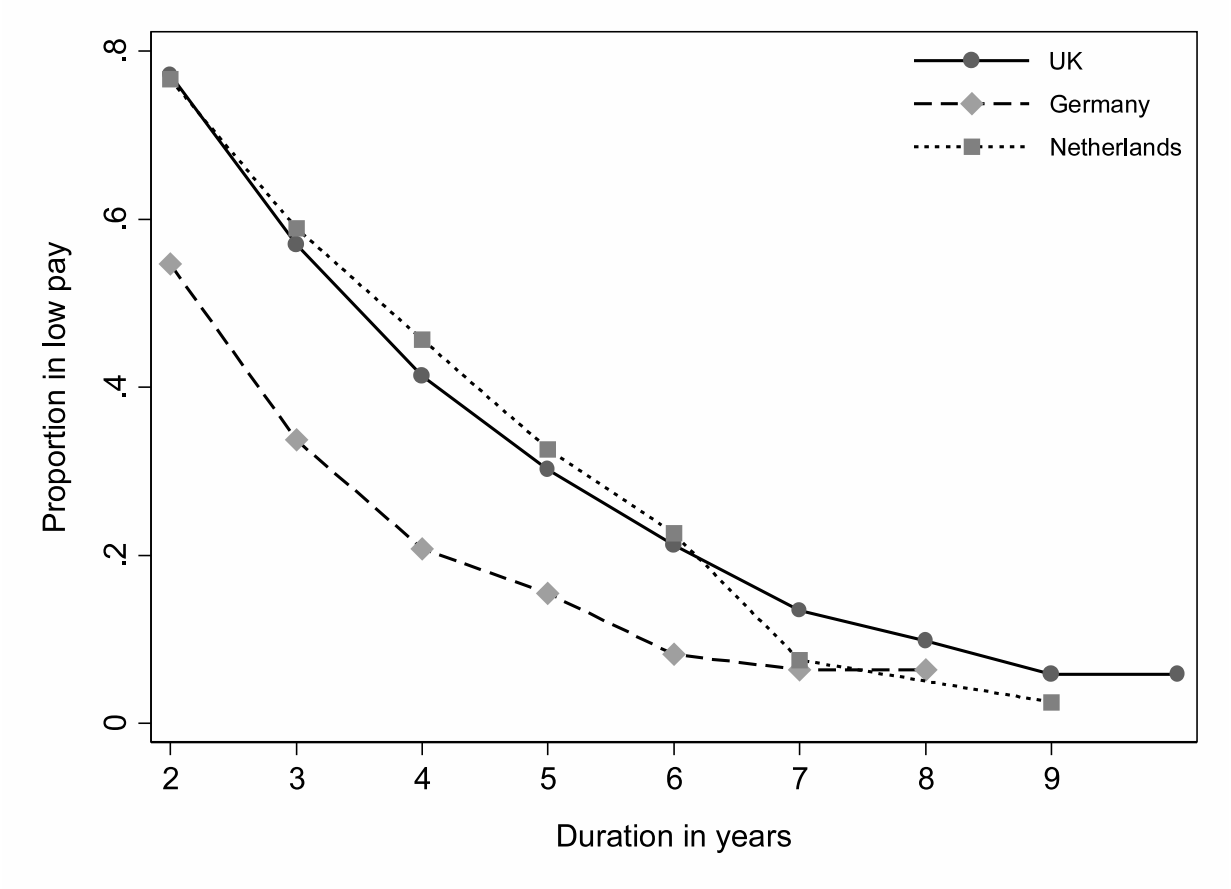

Figure 3.2: Cumulative staying probability in low pay

and within countries. Figure 3.3 shows that the most obvious differences in the staying probability between the three education levels emerge in the Netherlands. In this country, the highly educated exit quickly from a low-pay spell. After a duration of four years, the high school graduates also have an advantage over their less educated colleagues. In the UK, high school and tertiary education graduates have a similar advantage over the low educated. Finally - contrary to our expectations - no obvious differences between education groups emerge in Germany. We shall investigate this issue in more detail later on.

Results from the competing-risks model

Tables 3.5, 3.6 and 3.7 present the main estimates for the coefficients from the competing-risks model. The competing-risks analysis is performed separately for each country. Since we do not observe exits to self-employment in the Netherlands, these have not been modelled. Thus, our model has four competing risks for the UK and for Germany, and three for the Netherlands. In all countries, the model that best fits the data is the two-mass-points

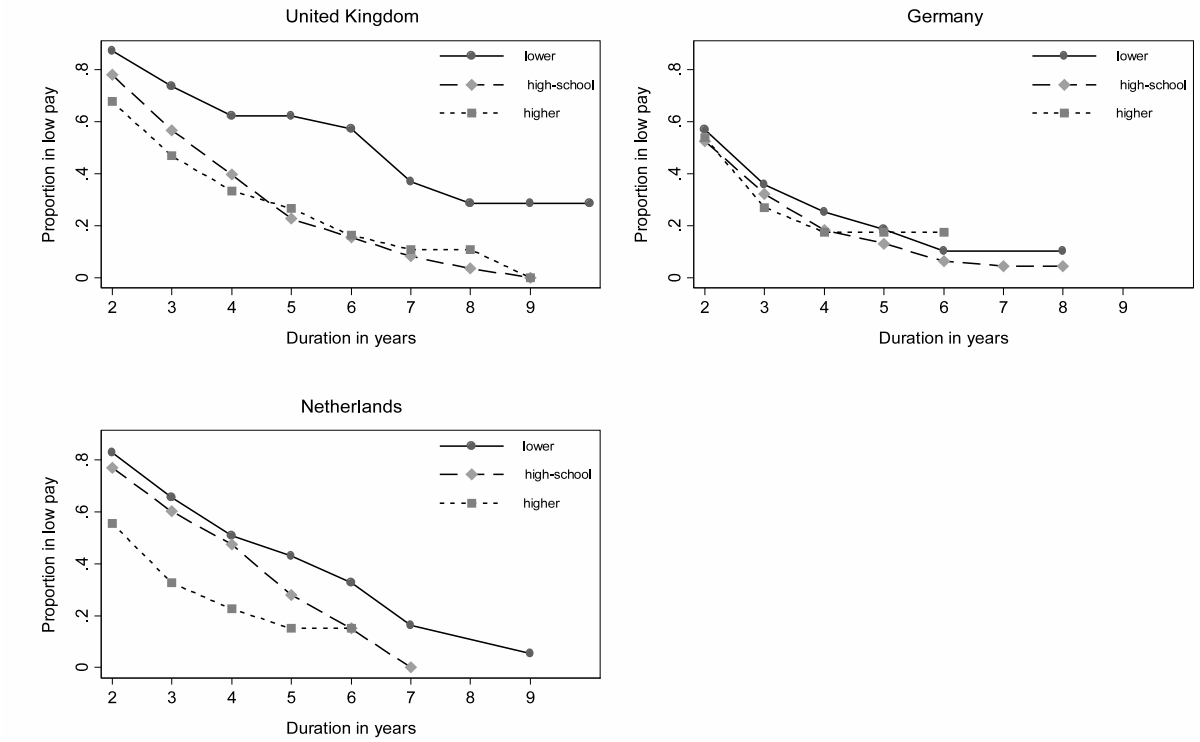

Figure 3.3: Cumulative staying probability in low pay per education level

model. In the Netherlands and in Germany, the best model is the one allowing only the constant to vary across groups (mass-points). In the UK, however, the main variables of interest (education and tenure) are found to have a different effect across groups. In the UK, tenure is also allowed to have a different effect for the various firm sizes. Allowing the same coefficients to differ in the other two countries did not improve the fit of the model. Moreover, the interaction effect of tenure with firm size was significant only in the UK.

Before interpreting the covariate estimates, we discuss our findings with respect to unobserved heterogeneity. This feature of the approach of Heckman and Singer (1984) has rarely been exploited, despite the fact that it provides very useful information. The two-mass-points model suggests the existence of two types of labour market entrants, each with common unobserved characteristics. These two groups of individuals have intrinsically different transition probabilities (see Section 3): the group of 'movers', and the group of 'stayers'. These probabilities are derived from equation 3.3 by filling in the average values of the covariates for our sample and are presented in Table 3.4. Taking the weighted average of the probabilities in the two groups in Table 3.4 shows that the probability for a transition to

Table 3.4: Group size and transition probabilities in the two classes

	UK		**Netherlands**		**Germany**	
	Group 1	**Group 2**	**Group 1**	**Group 2**	**Group 1**	**Group 2**
Remaining in low pay	0.396	0.809	0.719	0.466	0.400	0.385
Higher pay	0.432	0.071	0.274	0.083	0.467	0.019
Unemployed	0.121	0.057	0.007	0.259	0.022	0.419
Self-employment	0.036	0.021	-	-	0.033	0.000
Other	0.015	0.043	0.000	0.192	0.078	0.177
Total	1.0	1.0	1.0	1.0	1.0	1.0
Group Size	0.675	0.325	0.796	0.204	0.857	0.143

higher pay is higher in Germany (.40) than in the UK (.32) and in the Netherlands (.24).

In all three countries, the first and largest group of workers (67.5%-85.6% of the sample) has a high probability of moving to higher pay. This is the group of movers. The transition probability to higher pay is much higher in the UK and in Germany (.43 and .47 respectively) than in the Netherlands (.27). In the UK, however, workers from this group also have a high probability of moving to unemployment (.12). This probability is almost negligible in Germany (.02) and in the Netherlands. In Germany, individuals from this group have a small but non-negligible probability of falling into inactivity (.08). In the Netherlands, the staying probability for workers in this group is higher (.72) than in the other two countries. If we assume that transitions to higher pay and to self-employment are transitions that improve the earnings status of the worker, a low-paid labour market entrant from group 1 has a .47 chance of improving his earnings status in the UK, .50 in Germany, and only .27 in the Netherlands. In the Netherlands, the probability of entering the labour market in a low-paid job is low, but even in the group of movers, the chances of improvement are much lower than in the other two countries.

In all three countries, the second group (the group of stayers) is considerably smaller than the first one. The main characteristic of this group is the small probability of increasing the wage above the low-pay threshold: in all three countries this probability is between .01 and .08. However, important cross-country differences emerge. In the UK, the wages of workers from this group do not change easily, due to the high staying probability (.81). In the Netherlands and in Germany, however, the staying probability is much lower (.47 and .39 respectively). In Germany, this probability does not differ much from the corresponding probability of the workers from group 1. The bad news for the Dutch and German low-paid workers in this group is that they have a very high transition probability to unemployment

and inactivity. All in all, of all the three countries, German stayers are in the most disadvantaged position compared to movers. This is consistent with the existence of segmentation in the German labour market.

Table 3.5: Parameters from competing-risks model for exit from low pay - the UK

Part A: Coefficients common across groups

	Higher pay	**Unemployment**	**Self-employment**	**Other**
Log duration	**1.453***** (0.360)	**-0.181** (0.380)	**-0.899** (0.727)	**-0.604** (0.557)
Age (16-20 years)				
21-25 years	**1.049***** (0.277)	**0.305** (0.295)	**-0.096** (0.509)	**0.098** (0.641)
26-30 years	**2.074***** (0.273)	**-0.222** (0.687)	**-0.477** (0.812)	**0.374** (0.448)
Training	**-0.041** (0.187)	**-0.615**** (0.521)	**-1.504***** (0.704)	**-0.506** (0.329)
Firm size (small firm)				
Medium size firm	**-0.643*** (0.345)	**0.127** (0.392)	**0.671** (0.705)	**0.871** (0.870)
Large firm	**-0.204** (0.328)	**-0.276** (0.397)	**-0.149** (0.751)	**-0.898** (0.852)
Part-time job	**0.462** (0.411)	**0.242** (0.476)	**1.502***** (0.620)	**1.164** (0.887)
Temporary contract	**0.068** (0.288)	**0.844***** (0.301)	**0.575** (0.544)	**2.217***** (0.643)
White collar job	**0.658***** (0.275)	**-0.222** (0.413)	**0.051** (0.650)	**0.690** (0.671)
Industrial sector (commercial services)				
Industry	**0.708***** (0.263)	**-0.095** (0.281)	**0.121** (0.572)	**-0.728** (0.655)
Primary sector	**0.227** (0.309)	**-0.457** (0.396)	**-0.222** (0.691)	**-1.799**** (0.859)
Non-commercial services	**0.624** (0.496)	**-0.916** (0.651)	**0.587** (0.793)	**-3.016** (2.787)
Public sector	**0.926**** (0.470)	**-2.747*** (1.562)	**-19.117** (64.408)	**0.054** (1.372)
Non-employment spell	**-0.340** (0.258)	**-0.147** (0.285)	**0.106** (0.484)	**-0.873** (0.676)

Remaining in low pay is the reference state. In the variables Age, Industrial sector and Firm size the reference categories are in brackets.
The brackets under the coefficient values contain the standard errors.
* significant at 10%; ** significant at 5%; *** significant at 1%

The covariate estimates are presented in Tables 3.5, 3.6 and 3.7. Since, remaining in low pay is treated as the reference category, the estimates in Tables 3.5, 3.6 and 3.7 concern the transitions to higher pay, unemployment, self-employment (in the UK and in Germany) and inactivity. We tested several specifications of duration dependence (linear, nominal,

quadratic). The logarithmic specification performed best. In addition to the variables presented in Tables 3.5, 3.6 and 3.7, we control for marital status and business cycle effects through the inclusion of year dummies. In the discussion of the results, we mainly focus on the covariates that are of interest in the light of our expectations (see Section 3.2): duration dependence, formal education level, training and job tenure.

Table 3.5 (continued), Part B: Coefficients different between groups

	Group 1				Group 2			
	Higher pay	Unemployment	Self-employment	Other	Higher pay	Unemployment	Self-employment	Other
Education (low)								
High-School	**0.075**	**-1.408*****	**-0.796**	**-11.643**	**1.549*****	**-0.654**	**-5.287**	**3.077***
	(0.394)	(0.441)	(0.604)	(18.852)	(0.628)	(0.873)	(22.093)	(1.775)
Tertiary	**0.531**	**-1.323****	**-0.519**	**-15.237**	**1.918*****	**-0.154**	**5.684**	**2.589**
	(0.448)	(0.626)	(1.873)	(34.863)	(0.678)	(0.895)	(3.572)	(1.871)
Tenure	**-0.026**	**0.015**	**0.050****	**0.062*****	**0.004**	**-0.304****	**0.067***	**-0.017**
	(0.016)	(0.020)	(0.022)	(0.027)	(0.010)	(0.120)	(0.036)	(0.028)
Tenure*medium size firm	**0.050*****	**-0.021**	**-0.080**	**-0.054**	**-0.011**	**0.209***	**-0.021**	**-0.226**
	(0.020)	(0.025)	(0.051)	(0.060)	(0.015)	(0.123)	(0.036)	(0.137)
Tenure*large firm	**0.051*****	**0.003**	**-0.022**	**0.096**	**-0.060****	**0.240****	**-0.089**	**0.018**
	(0.021)	(0.027)	(0.041)	(0.121)	(0.027)	(0.122)	(0.079)	(0.036)
Constant	**-2.041*****	**0.489**	**-1.547*****	**-3.500*****	**-6.383*****	**-0.341**	**-7.222**	**-6.089*****
	(0.518)	(0.475)	(0.774)	(1.163)	(0.976)	(0.926)	(4.419)	(2.075)

Remaining in low pay is the reference state. In the variables Age, Industrial sector and Firm size the reference categories are in brackets. The brackets under the coefficient values contain the standard errors.

* significant at 10%; ** significant at 5%; *** significant at 1%

The results indicate the presence of positive duration dependence for transitions to higher pay in all three countries. However, the relevant coefficient is only significant for the UK. Positive duration dependence is found for transitions to unemployment in the Netherlands. For self-employment, positive duration dependence is evident in Germany but no significant results in the UK. For transitions to inactivity, duration dependance is found to be positive in the Netherlands but negative in Germany. Therefore, the longer the low-pay spell, the higher the probability that a UK job starter will increase his earnings above the low-pay threshold. For a German labour market entrant, the longer the low-pay spell, the higher the probability of becoming self-employed, and the lower the probability of becoming inactive. For their Dutch colleague, the longer the low-pay spell, the higher the probability of becoming unemployed or inactive.

General and firm-specific human capital accounts for a large share of the differences in exit probabilities at the individual level. In Germany, although education appears to be

Table 3.6: Parameters from competing-risks model for exit from low pay - the Netherlands

	Higher pay	Unemployment	Other
Log duration	**0.166** (0.253)	**3.195***** (1.264)	**2.654***** (1.049)
Age (16-20 years)			
21-25 years	**0.619**** (0.272)	**1.405** (1.286)	**-0.590** (1.203)
26-30 years	**0.566** (0.432)	**20.991**** (10.060)	**14.187** (12.587)
Education (low)			
High-School	**0.804***** (0.255)	**-1.374** (1.426)	**0.209** (1.320)
Tertiary	**1.735***** (0.431)	**2.055** (2.083)	**1.900** (1.937)
Training	**0.149** (0.330)	**7.117** (3.832)	**1.973** (1.769)
Tenure	**0.008** (0.008)	**-0.106**** (0.052)	**-0.051** (0.035)
Part-time job	**-0.496** (0.354)	**-0.134** (1.116)	**0.418** (1.001)
Temporary contract	**-0.467** (0.350)	**1.840** (1.752)	**1.720** (1.329)
White collar job	**-0.201** (0.422)	**-29.723** (69.604)	**-13.610** (12.680)
Industrial sector (commercial services)			
Industry	**-0.362** (0.264)	**1.033** (1.012)	**-0.236** (0.875)
Primary sector	**-0.420** (0.557)	**17.543*** (9.219)	**16.015** (9.503)
Non-commercial services	**0.301** (0.536)	**-0.935** (3.116)	**-1.114** (1.880)
Public sector	**-0.242** (0.415)	**0.449** (1.557)	**-0.773** (1.515)
Non-employment spell	**0.284** (0.300)	**-3.514** (3.186)	**-1.181** (1.717)
Constant group 1	**-1.479***** (0.356)	**-27.190***** (10.330)	**-25.173**** (12.576)
Constant group 2	**-2.320***** (0.889)	**-4.187**** (1.966)	**-1.521** (1.145)

* significant at 10%; ** significant at 5%; *** significant at 1%
In the variables Age, Education and Industrial sector the reference categories are in brackets.
The brackets under the coefficient values represent the standard errors.

unimportant for transitions to higher pay, it is found that the higher the education level, the lower the probability of moving to unemployment. What matters more in Germany is apprenticeship. Apprenticeship raises the probability of increasing the wage above the low-pay threshold. Apprenticeship also protects workers from becoming unemployed. These

Table 3.7: Parameters from competing-risks model for exit from low pay - Germany

	Higher pay	Unemployment	Self-employment	Other
Log duration	**0.195** (0.183)	**0.590** (0.524)	**1.191***** (0.449)	**-1.335***** (0.373)
Age (16-20 years)				
21-25 years	**0.259** (0.185)	**-0.023** (0.459)	**0.340** (0.713)	**-0.750***** (0.260)
26-30 years	**1.019***** (0.273)	**-0.636** (0.687)	**1.201** (0.812)	**-0.978**** (0.448)
Education (low)				
High-School	**0.123** (0.171)	**-1.383***** (0.443)	**0.929** (0.578)	**0.177** (0.273)
Tertiary	**0.226** (0.366)	**-2.026**** (1.275)	**1.752*** (0.931)	**-0.546** (0.736)
Training	**0.520***** (0.187)	**0.864*** (0.521)	**-1.231*** (0.704)	**0.643*** (0.329)
Apprenticeship	**0.46**** (0.198)	**-2.024***** (0.717)	**0.431** (0.481)	**-0.082** (0.486)
Firm size (small firm)				
Medium size firm	**0.212** (0.192)	**-1.611***** (0.596)	**-1.047**** (0.516)	**-0.047** (0.332)
Large firm	**0.908***** (0.208)	**-1.315***** (0.536)	**-1.751**** (0.758)	**-0.097** (0.409)
Tenure	**0.003** (0.004)	**-0.028***** (0.010)	**0.006** (0.009)	**0.005** (0.006)
Part-time job	**0.133** (0.277)	**0.105** (0.751)	**1.816***** (0.562)	**1.920***** (0.348)
Temporary contract	**-0.286*** (0.168)	**1.072***** (0.425)	**-0.205** (0.566)	**0.377** (0.273)
White collar job	**0.321*** (0.192)	**-1.067**** (0.520)	**0.784** (0.469)	**0.318** (0.366)
Industrial sector (commercial services)				
Industry	**0.633***** (0.210)	**0.843** (0.559)	**-0.193** (0.568)	**0.221** (0.317)
Primary sector	**0.412** (0.576)	**-1.716** (1.311)	**0.850** (1.488)	**0.051** (0.737)
Non-commercial	**-0.033** (0.284)	**-0.124** (0.654)	**-0.390** (0.666)	**-0.426** (0.393)
Public sector	**-0.471** (0.292)	**0.029** (0.814)	**-1.078** (1.000)	**-0.335** (0.576)
Non-employment spell	**-0.300** (0.235)	**1.480***** (0.598)	**-0.988** (0.678)	**-0.055** (0.463)
Constant group 1	**-0.906***** (0.324)	**-2.197***** (1.011)	**-2.624***** (0.958)	**-2.000***** (0.513)
Constant group 2	**-4.553***** (1.102)	**2.389**** (1.038)	**-10.423** (9.313)	**-0.921** (1.380)

* significant at 10%; ** significant at 5%; *** significant at 1%
In the variables Age, Education, Industrial sector and Firm size the reference categories are in brackets.
The brackets under the coefficient values contain the standard errors.

findings suggest that in Germany, general human capital that is directly related to the job is crucial for moving out of low pay at the beginning of the working career. As far as firm-specific human capital is concerned, formal training increases the probability of a transition to higher pay, while tenure decreases the probability for a transition to unemployment but is not significant for transitions to higher pay. We should stress again here that, especially in Germany, training can be also considered as a measure of general human capital. As the coefficients for firm size indicate, German low-paid job starters have better prospects in large firms than in small firms. Moreover, the larger the firm, the less likely it is for a worker to make a transition to unemployment. The firm size is probably a variable related to the duality in the German labour market. In large firms, workers are more often covered by collective bargaining than in small firms.

For the Netherlands, the picture is clear. Education rather than firm-specific capital is the main determinant of low-pay transitions. This confirms the earlier findings of van Opstal et al. (1998). Workers possessing a high-school degree or a tertiary education degree have a higher probability of moving to higher pay than their colleagues with lower education.

The picture is more complex in the UK than in the other two countries. The estimates for education and tenure, as well as the interaction effects of tenure with firm size, differ considerably between the stayers and the movers. In the group of movers, firm-specific skills are more important. These skills, however, are only important in medium-size and large firms. Young low-paid workers employed in such firms can increase their wage above the low-pay threshold by developing their skills in the internal labour market. For the British movers, education merely protects them from becoming unemployed.

In the group of stayers, however, the picture is reversed. Education increases significantly the probability of moving to higher pay, while tenure has a zero or even a negative effect. In large firms, the longer a young worker stays in a low-paid job, the lower his probability of moving to higher pay.[5] Therefore, for the group of movers, firm-specific skills in medium and large firms can make the low-pay spell a stepping stone to better earnings, while for the group of stayers, this can be achieved by a high-school or tertiary education degree. Finally, training has a smaller effect in the UK than in Germany, as it only protects workers from unemployment. It should be stressed again, however, that training in the UK is more a measure of firm-specific skills than of general skills.

Further interesting findings from the model concern age, the sector of industry, the type of employment contract, and the occurrence of a non-employment spell between leaving full-time education and the first job. Late labour market entry is related to faster exits to

[5]We should stress here that tenure refers to the time that the workers is employed in the same job. If the worker changes a job within the same employer, tenure starts back at zero.

higher pay. This is found for all age categories in the UK and for some age groups in the Netherlands (21-25 years) and in Germany (26-30 years). Working with a temporary contract increases the probability of a transition to unemployment in the UK and in Germany but not in the Netherlands. Differences between sectors of industry are found in the UK and in Germany. In the UK, chances for increasing the wage above the low-pay threshold are higher in industry and in the highly-unionized public sector, than in commercial services. In Germany, transitions to higher pay are more common in the highly-regulated industry sector than in commercial services. Germany is the only country where a non-employment spell before the commencement of the first job has a scarring effect on the early career of the labour market entrant. The occurrence of such a non-employment spell increases the probability of becoming unemployed.

3.6 Concluding remarks

In this paper, we performed a cross-country comparison of the wage and employment perspectives of the low-paid labour market entrants. This subgroup of wage earners has received little attention in research to date. We assessed the role of two types of human capital - general and firm-specific - on transitions from low pay, and in three countries with different school-to-work institutions: the UK, Germany, and the Netherlands.

Our results from a competing-risks duration model suggest the existence of two types of low-paid job starters. For the largest group of these (the movers), a low-pay spell is only a stepping stone to better earnings. The smaller, but still significant group of these (the stayers) is trapped between low-pay, unemployment and inactivity.

In compliance with the theory on the school-to-work institutions, we find striking cross-country differences in the transition probabilities of the movers and the stayers as well as in the type of human capital that determines low-pay transitions. In Germany, the dual education system and the regulated labour market provide more upward mobility opportunities to the low-paid labour market entrants in the movers' group than in the UK and in the Netherlands. The transition probability to higher pay is .40 in Germany, while it is .32 in the UK and only .24 in the Netherlands. However, we found a strong indication of segmentation in the German labour market. In contrast to the other two countries, the group of stayers has almost no chances of improving its earnings status. The German stayers are threatened more by unemployment and inactivity than by low-pay persistence. General human capital that is directly related to the job (i.e. apprenticeship) accounts for low-pay exits in Germany. On the contrary, both tenure, which is a measure of firm-specific human capital, and education are much less important.

In the UK, the disadvantaged group of low-paid labour market entrants (the stayers) faces a different threat than its German counterpart. In accordance with previous studies, this large group of British young workers is found to be threatened by low-pay persistence. Contrary to Germany, firm-specific human capital and education account for low-pay transitions. In both medium-sized and large firms, the majority of low-paid job starters can improve their earnings in the internal labour market.

For the Netherlands, some estimation results do indeed position this country in between the UK and Germany. The group of stayers is threatened by unemployment and inactivity, as in Germany. Dutch stayers have, however, some chances of improving their earnings, as is the situation in the UK. The most important determinant of low-pay transitions is education. However, the overall characteristics of low-paid labour market entrants in the Netherlands lead to the conclusion that this is a quite selective group. Most of these young workers did not finish high school - and are probably drop-outs - and remained jobless for some time before getting their first job. Therefore, the initial wage is quite crucial for the prospects of Dutch job starters. Individuals who get their first job with low-paid earnings will most probably remain low-paid for a lengthy period of time, unless they have (or manage to get) a higher-education degree.

Further research should elaborate more on cross-country differences. The development of large panel datasets containing more detailed information on the actual education level, skills, and the firm characteristics of workers could contribute to such research.

Appendix: the description of the variables

Low-pay duration: This refers to the duration as measured in years of the low-pay spell till the time of the interview.

Age: We defined the following age groups: (0) 16-20 years, (1) 21-25 years and (2) 26-30 years.

Married: This is a dummy (0/1) indicating whether the individual is legally married.

Education: This refers to the education level completed by the individual with respect to high school. It, therefore, has three values: (0) lower than high school, (1) high school and (2) tertiary education.

Training: This is a dummy indicating whether the individual participated in a formal training scheme in the year prior to the interview.

Apprenticeship: This is a dummy (0/1) indicating whether the individual has ever finished an apprenticeship. It is only valid for Germany.

Firm size: We defined three firm sizes: (0) small, (1) medium and (2) large firm. In the UK these three values refer to firms with less than 25 employees, firms with between 25 and 99 employees, and firms with more than 100 employees. In Germany, they refer to firms with less than 20 employees, firms with between 20 and 199 employees and firms with 200 employees or more. In the Netherlands, we did not include this variable in the analysis as there were too many missing values.

Industrial sector: We defined five industrial sectors: (0) commercial services, (1) industry, (2) primary sector, (3) non-commercial services and (4) public sector.

Part-time: This is a dummy (0/1) indicating whether the individual is working part-time. An individual is defined to be working part-time if he is employed for less than 35 hours per week.

White collar: This is a dummy (0/1) indicating whether the individual is performing supervising work.

Temporary: This is a dummy (0/1) indicating whether the individual is employed under a temporary contract.

Tenure: This is the length of employment in the current job, measured in months.

Non-employment spell: This is a dummy indicating whether the individual had a non-employment spell after finishing education and before getting his first job.

Chapter 4

Who Benefits from a Job Change?

4.1 Introduction

Job mobility is an important determinant of lifetime wage growth. Topel and Ward (1992) suggest that job mobility accounts for one third of overall wage growth in the early stages of the working career. However, the effect of a job change on the wage growth remains an open issue. Some theories predict a positive effect, others a negative one. Empirical research has failed to resolve this debate since it has produced contradictory findings (see section 4.2). In all these studies, however, the effect of a job change on wage growth is assumed to be independent of the position in the wage distribution. This assumption is questionable since on-the-job search theory suggests that the decision of a worker to change job is contingent on the level of the initial wage. More specifically, on-the-job search theory suggests that both the hazard rate of leaving the current job and the difference between the current wage and the reservation wage decrease with the current wage (Mortensen, 1986; van den Berg, 1992).[1] A low-paid worker expects more job changes in his working life than a high-paid worker does in order to improve his earnings. Therefore, compared to a high-paid worker, a low-paid worker chooses a reservation wage that is relatively higher than the current wage (van den Berg, 1992). In this way, the low-paid worker reduces the costs related to the job change, as he can attain his preferred life-time earnings level in a fewer number of steps. If workers receive wage offers relatively close to their reservation wage, then the wage gains from a job change are relatively higher for the low-paid than for the high-paid worker. Therefore, distinguishing between the different parts of the wage distribution can resolve the ambiguity of the effect of a job change on wage growth.

The type of job change - within the firm or with another employer - is also relevant for

[1] The reservation wage refers to the lowest wage that the worker will accept in order to leave his current job.

these differences between low-paid and high-paid workers. According to various theories, wage careers within firms deviate from the assumptions of the fully competitive labour market model. Employers in large firms often pay a wage above the market wage, in order to retain the most productive workers. Therefore, on average, we would expect positive returns due to job changes in the internal labour market. However, since high-paid workers are more involved in training and therefore develop more firm-specific skills, they are expected to derive more utility than low-paid workers from a promotion or a job shift within the same firm.

The aim of this paper is to compare the effect of a voluntary job change on wage growth for the low-paid and the high-paid worker, accounting for the different mechanisms driving them to change jobs, and differentiating between external and in-firm job changes. From a policy perspective, this is an important issue as the demand for low-skilled/low-paid employment has considerably decreased over the past decades (Acemoglu, 2003b). Moreover, the creation of jobs of a given quality and earnings level (i.e. high-level jobs) is considered to be a significant policy tool to tackle earnings inequality within European labour markets (Salverda et al., 2001).

Another novel aspect of this study is that it investigates the costs and benefits related to a job change in a cross-country comparative perspective. These costs and benefits are not uniform across countries, since they can be influenced by labour market institutions. More specifically, in the presence of strong wage regulation - due to collective bargaining or a national minimum wage - downward wage adjustments will be rather rare at the bottom of the earnings distribution, but not necessarily at the top. Furthermore, in countries where jobs are closely linked to educational qualifications, a change of employer will mean fewer costs being incurred by a worker who invests in firm-specific skills. Such a worker is more often a high-paid worker than a low-paid worker. Therefore, the analysis is performed in two countries: in Germany where all of the above-mentioned institutional characteristics prevail, and in the UK, where these characteristics are absent.[2]

Investigating the effect of job mobility on wage growth entails several methodological complications. The most important one is the endogeneity of job mobility. The wage is not only dependent on a job change, it is also a determinant of it (Topel & Ward, 1992; Le Grand & Tåhlin, 2002). To tackle this endogeneity, we apply a two-step approach of the Heckman type. In a first step, we model job mobility with a panel multinomial logit model. In a second step, we use the predicted probabilities derived from the first step to control for endogeneity in a panel wage-growth equation. The interesting feature of our approach is

[2]By restricting the analyses to two countries, we are not able to test formally the effect of institutional differences. This would require data for a large number of countries, which are not readily available yet.

that we control for unobserved heterogeneity in both steps of the estimation procedure.

The remainder of this paper is organized as follows. Section 4.2 elaborates on the findings of the relevant literature. Section 4.3 presents the job-search model from which we derive our expectations. The role of the institutional framework is explained in section 4.4. The data used in our analysis are discussed in Section 4.5. The econometric model is developed and explained in Section 4.6. Some descriptive results are reported in Section 4.7. Section 4.8 reports on the results from the two-step estimation of the effect of job mobility on wage growth. Conclusions are drawn in Section 4.9.

4.2 The link between wage mobility and job change

Several theories attempt to establish a link between job turnover and wage dynamics. Four main approaches can be identified in the standard economic theory: the movers-stayers approach, the job-search approach, the job-matching approach, and the human capital approach.

The movers-stayers model of Blumen et al. (1955) is rooted in psychology. In this model, some workers are expected to be more likely to move than others. This instability is assumed to lower productivity, and thereby to reduce the wage of movers below the wage of stayers.

The job-search model (Burdett, 1978; Jovanovic, 1979b; Mortensen, 1986) predicts a positive effect of job mobility on wages. According to this model, workers enter the labour market with a given and fixed stock of human capital. Firms differ in the level of productivity they can extract from the workers. Hence, workers' productivity depends on the firm they are employed in. Employed workers are assumed to continue searching for a firm in which they will be more productive. As a result, job mobility will affect wage growth positively.

In both the movers-stayers model and the job-search model, productivity is assumed to be fixed and known ex-ante. Therefore, these two models suggest that controlling for individual and job heterogeneity eliminates the effect of job mobility on wages. This prediction is not supported by longitudinal empirical research. A series of studies, such as those conducted by Light and McGarry (1998) and Munasinghe and Sigman (2004), finds that job mobility has an effect on wages even after controlling for observed and unobserved personal and job characteristics. In general, voluntary employer changes are associated with wage gains in the US (Royalty, 1998; Gladden & Taber, 2000) and in Europe (Davia, 2005; Perez & Sanz, 2005). Black (1980) suggests that the positive wage gains are higher when on-the-job search precedes a voluntary job change. However, these gains decrease with age as well as with tenure and with the number of job changes (Jovanovic, 1979b; Blau & Kahn, 1981; Bartel & Borjas, 1981; Topel & Ward, 1992; Farber, 1994; Light & McGarry, 1998; Dustmann &

Meghir, 2005).

The matching model (Jovanovic, 1979a) has a dynamic approach as it allows for both within-jobs wage growth as well as between-jobs wage growth. According to this model, the worker's productivity, although fixed, is unknown ex-ante to employers. Therefore, jobs are considered as 'pure experience goods'. In other words, there is initially an uncertainty about the worker's productivity. As job tenure increases, the employer gains additional information about the actual productivity of the worker. Due to this learning effect, wages grow also within jobs. Wages can also grow due to job changes, as a reward for searching for more efficient job matches. Due to the initial uncertainty about the worker's productivity, this approach allows for an effect of job mobility on wage growth even after correcting for personal and job characteristics. However, employers may interpret frequent job changes as a signal for poor productivity. Hence, frequent job mobility may reduce future wage prospects. A contradicting approach stems from Lazear (1986). In his 'raiding' model, Lazaer suggests that firms compete for high-quality workers. For this reason, job movers are workers with high skills and high quality, and job mobility has a positive effect on wage growth.

According to human capital theory (Becker, 1962), productivity is largely determined by firm-specific human capital. Job mobility is strongly related to investments in specific human capital. Returns to job mobility depend on the transferability of specific human capital across jobs. The more specific human capital can be transferred, the smaller the wage loss will be due to a job change. Therefore, human capital theory does not provide clear predictions about the wage differences between movers and stayers. Mincer (1986, 1988) finds evidence that, although movers gain from changing a job, stayers experience a higher wage growth as they invest more in specific human capital in the form of getting involved in job training.

The effect of within-firm job changes has received much less attention in economics, whereas within-firm mobility is found to account for a considerable part of the life cycle earnings variation (McCue, 1996). Efficiency wage theory suggests that employers of large firms motivate their employees by offering them wages above the market rates. According to this theory, then, we would expect positive returns of within-firm job changes (see, for example, Shapiro & Stiglitz, 1984; Akerlof & Yellen, 1986).[3] Empirical studies, however, provide contradicting evidence. Lazaer (1999) argues that promotions have an immediate positive effect on wages. Booth et al. (2003) quantify this effect to 5% for the British workers. However, Hannan et al. (1990) find that within-firm job mobility does not result

[3]All the above-mentioned approaches assume that job turnover is voluntary and direct (job-to-job). Involuntary mobility and mobility through unemployment is associated with loss of specific human capital and therefore result in slowed wage careers. In this paper, however, we restrict our analysis to job-to-job transitions.

in faster wage growth for West German workers, while G. Baker et al. (1994) find that the wage premium of an in-firm promotion in the US is significantly less than the average wage disparity between the same job positions.

But these studies only estimate an average wage effect. To our knowledge, no study has ever differentiated the effect of a job change on wages between the different parts of the wage distribution. Such differences, as argued above are likely to exist.

4.3 The on-the-job search model

Our theoretical model follows closely Mortensen (1986). Let us assume that workers are homogeneous and rational in their choices. Every worker aims at maximizing the expected life-time utility $U(c, l)$, where c represents consumption and l leisure. Workers allocate their time between labour supply, job search, and leisure. Job offers for employed workers arrive from two sources: from other employers and from their own employer. Both job-offer flows follow a Poisson process with rate λ. These job offers are random draws from a wage offer distribution $F(x)$. Every job can last for ever and it is fully described by the wage w. All workers are assumed to be involved in on-the-job search. In every time period dt every worker can receive a maximum of one job offer with wage x. This job offer may come either from another employer or from his own employer. Every worker chooses his search intensity s and his leisure consumption l. Therefore, the worker's job offer arrival rate is λs. Conditional on the arrival of a job offer, the worker employed with wage w has two choices: reject the job offer and continue working with wage w, or accept the job offer with wage x.

In the absence of search costs, the decision would be determined solely by the offered wage. The worker would just choose the $\max\{x, w\}$. The assumption of zero search costs, however, is unrealistic. Firstly, there are several fixed costs associated with search. Furthermore, there are opportunity costs of search. When an individual spends time on job search, he has less time to spend on leisure. Finally, there are costs associated with moving from one job to another. Job movers may have to move to another city. They may lose pension claims or job-specific benefits. Moreover, a change in social and working environments may involve psychological costs, such as getting acquainted with a new working environment and new colleagues. It is, therefore, reasonable to assume that there are non-zero search costs c_1 for moving to another employer and c_2 for changing a job within the same employer. Following Mortensen (1986), we assume that the search cost function is twice differentiable, increasing and convex, with zero initial value for the total cost, i.e. $c(0) = 0$, $c'(w) > 0$ and $c''(w) > 0$. Costs related to a change of employer are usually higher than costs related to changing a job within the same firm. Therefore, it is also reasonable to assume that $c_1(w) > c_2(w)$. It

is also reasonable to assume that search costs in the external labour market increase faster with the wage than search costs in the internal labour market, so $c_1'(w) > c_2'(w)$.

The optimal search strategy maximizes the sum of the instantaneous utility level net of search costs and the expected gain attributable to search. For an employed individual, this problem can be expressed with the following Bellman equation:

$$\begin{aligned} W(w) &= \frac{1}{1+r}\max_{s,l}\left\{ w - c(s) - l(w) + \lambda s \int_0^\infty \max\left[V, W(x), W(w)\right] \mathrm{d}F(x) \right. \\ &\quad \left. +(1-\lambda s)W(w)\right\}, \end{aligned} \tag{4.1}$$

where $c(s) = \begin{cases} c_1(s) & \text{for an external job change} \\ c_2(s) & \text{for an internal job change} \end{cases}$ and $s = s(w)$.

The first term on the right hand side is the instantaneous utility level $w - c(s) - l(w)$.The second and third parts represent the expected gain from the two options that the worker faces, times the relevant probability. All terms are discounted with the intertemporal discount rate r.

A wage offer x is now acceptable if $W(x) - c(s) > W(w)$.

The lowest wage for which the worker would accept a job offer is the reservation wage $\xi = \xi(w)$. In the presence of non-zero search costs, every worker has two reservation wages, one $\xi_{i1}(w)$ for offers from the external labour market, and another $\xi_{i2}(w)$ for offers from the internal labour market.

Since the value of leisure V is the lowest value for which a worker will accept being employed, equation (1) is transformed:

$$rW(w) = \max_{s,l}\left\{ w - c(s) - l(w) + \lambda s \int_w^\infty [W(x) - W(w)]\mathrm{d}F(x_1) \right\}.$$

The optimal search effort $s^*(w)$ and the optimal leisure consumption $l^*(w)$ equate the relevant marginal return and cost. The first order conditions for the previous equation suggest that:

$$\frac{r\partial W(w)}{\partial s} = 0, \text{ thus } c'(s^*(w)) = \lambda \int_w^\infty [W(x) - W(w)]\mathrm{d}F(x) \ . \tag{4.2}$$

It is shown by Mortensen (1986) and Christensen et al. (2005) that the optimal search effort is continuous and strictly decreasing with respect to the current wage w, if $b < w < w^*$ where b is the value of leisure and w^* is a sufficiently high wage above which the worker stops searching altogether (the search reservation wage). Specifically, since $c'(w) > 0$ and

$W(w)$ is increasing with w, it follows from equation 4.2 that $s^*(w)$ is decreasing with w. As $c_1'(s) > c_2'(s)$, then the optimal search effort in the external labour market should be decreasing faster with the wage than the optimal search effort in the internal labour market. This means that $ds_1^*(w)/dw > ds_2^*(w)/dw$. The wage w^* for which the optimal search effort becomes 0 is given by:

$$c'(0) = (\lambda/r) \int_w^\infty (x - w^*) \mathrm{d}F(x) \ . \tag{4.3}$$

It follows from equation 4.3 that $w_2^* > w_1^*$. Thus, the search reservation wage for searching in the internal labour market is higher than the search reservation wage in the external labour market.

The hazard rate for leaving the current job is given by: $\varphi(w) = (\lambda_1 + \lambda_2)s^*(w)[1 - F(w)]$. Since both the optimal search effort $s^*(w)$ and the probability of getting an acceptable job offer $[1 - F(w)]$ are decreasing functions of the current wage w, the instantaneous quit rate declines also with the wage. Moreover, since $ds_1^*(w)/dw > ds_2^*(w)/dw$, the instantaneous quit rate in the external labour market declines faster with the wage than the instantaneous quit rate in the internal labour market.

What is important in our case is an expression of the reservation wage. However, it is extremely difficult to get an analytical solution for $\xi(w)$. Van den Berg (1992) approximates $\xi(w)$ with a Taylor series around $c(w) = 0$. This is done under the following assumptions:

1. $0 < \lambda < +\infty$.
2. $F(x)$ is a strictly increasing differential function on $[0, \bar{w}]$, where $\bar{w}$ is a number $0 < \bar{w} < +\infty$. For $x \leq 0$, $F(x) = 0$, while for $x \geq \bar{w}$, $F(x) = 1$. Further $0 < w \leq \bar{w}$.
3. $c(w)$ is a continuously differentiable function on $[0, \bar{w}]$.
4. For each $w \epsilon (0, \bar{w}]$, $c'(w) < 1/\lambda$.

Assumption 4 means actually that $c(w)$ increases only slowly, as a function of w.

If the above-mentioned assumptions are met, and if further $c(w)$ depends on a parameter η such that $c(w) - \eta$ does not depend on η and η does not depend on w, van den Berg (1992) shows that for every $w \epsilon [0, \bar{w}]$:

$$\xi(w) = w + \frac{r + \varphi(w)}{1 - c'(w)\varphi(w)} c(w) + o(c(w)). \tag{4.4}$$

The term $o(c(w))$ can be neglected as $\mathrm{d}t \longrightarrow 0$.

Equation 4.4 suggests that the gap between the reservation wage and the current wage, $\xi(w) - w$, is a decreasing function of the current wage. This result is quite plausible: a

low-paid worker needs a larger relative increase of his income in order to change job than his high-paid colleague. This is because the low-paid worker expects many job changes in order to reach a higher earnings level. Therefore, he wants to minimize the search costs that he will pay, and he sets his reservation wage relatively higher than his current wage than his higher-paid colleague. Since $c_1(w) > c_2(w)$ and $c_1'(w) > c_2'(w)$ this gap between the reservation wage and the current wage decreases faster with the wage in the external labour market than in the internal labour market.

4.4 The role of the institutions

The two countries - UK and Germany - included in this study present important differences with respect to their labour market institutions. In fact, they are often perceived as different worlds of labour and as each other's opposites within Europe. The liberal British labour market is characterized by low levels of job protection through public regulation. Efficiency in the British labour market is achieved through a high level of labour market mobility and job turnover. Government intervention is reduced to a minimum, and the extent and impact of collective bargaining is rather limited (only 22% in the private sector). Minimum wage regulation was been absent from 1993 until 1999, when a national minimum wage was introduced. Wage inequality is much higher in the UK than in Germany; the D9/D1 ratio[4] in 1996 was 4.14 compared to 2.67 for Germany (Salverda et al., 2001).

Compared to the UK, the German labour market is characterized by a high level of job protection through public law and an extended system of collective bargaining. Even the wages of the upper middle-class workers are set by collective employment agreements. Minimum pay regulation is determined at both the sectoral level and the regional level. Specifically, collective bargaining covers about 70% of the West German workers in the private sector. Jobs are closely linked to educational credentials, which are acquired through formal education and apprenticeship. Apprenticeship lasts for a period of up to three years and many young people go through it. Furthermore, employers are directly involved in the provision and delivery of apprenticeships (Hannan et al. 1997). Thus, apprenticeships are aimed at developing skills that are transferable across jobs and employers (Winkelmann, 1996). This strengthens the position of workers who change jobs. As a result, in Germany we expect to find smaller differences between internal (within-firm) job moves and external job moves, as skills are more transferable across employers. In the UK, on the other hand, job-specific skills, acquired in the internal labour market, are more important. Since educational qualifications act more as a signal or a screening device for learning about the ability of the

[4]This is the ration of the 90th to the 10th percentile of the wage distribution.

worker's potential to acquire these skills, job movers may suffer from a severe loss of human capital.

The macroeconomic performance of the two countries also shows considerable variation since the early 1990s. The UK was engaged in a considerably stronger economic upturn than Germany. The average annual GDP growth rate in the UK was twice that of Germany in the period 1991-2004 (2.8 and 1.4 percent respectively). The average labour productivity (for the years 1992-2004), in the UK, measured in GDP per hours worked was 2.58, whereas it was only 1.97 in Germany. The male unemployment rate in the UK dropped sharply from 12.1 percent in 1993 to 5.5 percent in 2003, while in Germany it increased from 5.9 percent to 8.7 percent in the same time period. Male labour force participation rates remained stable between 1991-2004 in the UK (79.6% and 78.9% respectively), but decreased considerably in Germany (77.6% and 71% respectively).[5] Consequently, we expect to find higher returns to job mobility for the British workers than for the German workers.

4.5 Data and main concepts

Our data cover the period 1991-2004 and originate from two national panel datasets. For the UK, we use the British Household Panel Survey (BHPS), which contains information on labour market participation and income of approximately 10,000 individuals per wave aged 16 years or above. For Germany, we use the German Socio-economic Panel (GSOEP), which covers about 13,000 individuals aged 16 years or above. Waves 8-21 are used, which refer to the period 1991-2004.[6] The information from the two datasets has been made highly comparable for the purpose of this study.

The sample is restricted to full-time working males between 25 and 55 years of age. Specifically, we select males that declared paid employment as their main activity and who work at least 35 hours a week. We exclude the self-employed and the apprentices. Our main economic variable is the gross hourly wage. This hourly wage is calculated from the previous month's earnings from paid employment, and the usual number of hours worked per week. Monthly pay includes overtime but no other kind of additional payments. Including additional payments, such as bonuses and fringe benefits, would certainly be informative since the high-paid might receive more of these payments than the low-paid. However, in GSOEP, information on these payments is only available on a yearly basis and therefore it

[5] All the data in this paragraph come from OECD (2006).

[6] The BHPS data (Taylor et al., 2006) were made available by the Data Archive at Essex University. The GSOEP (Wagner et al., 1993) was provided by the German Institute for Economic Research. We only use data for the former West Germany as the labour market of East Germany differed considerably from that of the West Germany, especially at the beginning of the 1990s.

does not necessarily refer to the current job. From the GSOEP dataset, only retrospective wage information about the previous year is available. As a result, information for wave t is derived from wave $t+1$. Unfortunately, these panel surveys offer no information on the reservation wage so we are assuming that the workers accept job offers with a wage close to their reservation wage. We define as low-paid and high-paid workers those belonging to the lowest and the highest quartile of the wage distribution, respectively. We should stress here that there is no widely agreed threshold for high pay. This threshold is sometimes defined in terms of the median wage (e.g. 1.5 times the median wage) or in terms of quartiles or deciles. A caveat is always involved when comparing countries with very different wage distributions. Setting the high-pay threshold to 1.5 times the median wage would result in having very different population proportions for the various countries, while choosing the fourth quartile as the threshold implies that workers included in different country samples vary a lot with respect to the proportion of the median wage they earn.

Following similar approaches in the literature (Perez & Sanz, 2005), we define as voluntary, a job change that is direct,, i.e. without any intervening spell of unemployment or inactivity. Since our focus is on voluntary separations, involuntary job changes are excluded from the analysis.

4.6 The two-step Heckman empirical model

We aim at investigating the wage returns to job mobility in the different parts of the wage distribution. This is done by modelling the year-to-year relative wage growth of individuals. Let w_{it} be the natural logarithm of the wage of the individual i in the time period t. Consider the following standard panel wage equation that includes job mobility as one of the predictors:

$$w_{it+1} - w_{it} \;=\; \mathbf{x}'_{it}\boldsymbol{\beta} + \sum_{j=1}^{2} p_{ijt} b_j + \sum_{j=0}^{2}\sum_{k=1}^{2} \left(p_{ijt} d_{ik(t+1)} c_{jk}\right) + u_i + \varepsilon_{it} \;, \tag{4.5}$$

where $\mathbf{x}_{it}$ is a vector of covariates including a constant term (see note in Table 4.2). p_{ijt} is an indicator variable representing the position in the wage distribution and taking one of the two values 0 or 1. The index $j = 0, 1, 2$ corresponds to low-, medium- and high-paid, respectively. The categorical variable for the job change appears in the equation as dummies ($d_{ik(t+1)}$) indicating whether a change of employer or job change within the firm takes place between t and $t+1$ ($d_{i1(t+1)} = 1$ for an external job change and $d_{i2(t+1)} = 1$ for an in-firm

job change).[7] To capture the differentiating effect of the job change in the various parts of the wage distribution, we interact the dummies for the job change with the dummies for the position in the distribution. For identification, we assume that $b_0 = 0$ and $c_{j0} = 0$. The term u_i represents the individual-specific unobserved fixed effects and ε_{it} the idiosyncratic error. The term ε_{it} is assumed to be normally distributed with mean 0 and uncorrelated with u_i.

Clearly, the issue of initial conditions emerges in our analysis. This means that the group of individuals that is in a certain pay level at a given point in time may be endogenous. However, controlling for initial conditions in a panel model is rather difficult and thus left as an issue for further research. By controlling for observed and unobserved heterogeneity we are able to control at least partly for the possible endogeneity of initial conditions.

Furthermore, in this study we focus on another problem of endogeneity: the endogeneity of the job change. There are two potential sources for endogeneity. The first is reverse causality; the decision of a worker to change job may be caused by the expectation of a higher wage-growth in the new job. Munasinghe (2000) suggests, accordingly, that high wage-growth jobs are less likely to end than low wage growth jobs. Secondly, there may be unobserved factors such as ability and effort affecting both the wage and the decision of a worker to change jobs. Both sources of endogeneity might lead to bias in the parameter estimates.

The estimation of equation 4.5 involves a panel model with a continuous dependent variable and a categorical endogenous predictor (for changes of employer and for job changes with the same employer). In a cross sectional framework, endogeneity is usually tackled by the approach introduced by Heckman (1978, 1979) and developed further by others, such as Vella and Verbeek (1999). Other approaches, such as the endogenous switching model used by Perez and Sanz (2005) provide a better estimate of the effect of job mobility on wages, but fail to control for unobserved personal characteristics. Our approach is to employ a two-step procedure of the Heckman type in a panel framework, applying correction for unobserved heterogeneity: first, we model the probability of job mobility; second, we estimate a wage regression that includes the correction terms for endogeneity that are derived from the first step.

In order to respect the panel structure of our sample in the first step, we apply a random-effects multinomial logit model for job mobility, distinguishing between no job change, external job change, and within-firm job change.[8] Non-pay related components of job satisfaction

[7] If we restrict $c_{jk} = c_k$ we get a simpler model, in which the effect of the job change is independent of the position in the wage distribution.

[8] The multinomial logit model has been criticized for producing biased estimates when the assumption of the Independent Irrelevant Alternatives (IIA) is violated. However, Bourguignon et al. (2007) argue that the multinomial logit model can be trusted in the first step of a cross-sectional selection model when the propensity scores are transformed in a certain way before being used as controls for endogeneity in the second

are used as the exclusive variables that allow the identification of the model. For the UK, we use the satisfaction with working hours and with the work content. For Germany, we use the variable indicating how much the worker is worried about job security.[9] The components of job satisfaction that are used as exclusive instruments are not influenced by thesatisfaction for the wage. The overall job satisfaction would be inappropriate as exclusive variable as it is correlated with the wage (see, among others, Clark, 1999). This correlation, however, is produced mainly by the satisfaction for the wage. In BHPS, respondents are asked to report their satisfaction for pay, working hours, work content, as well as their overall job satisfaction. In GSOEP, respondents are asked to report their overall job satisfaction, and their worry about job security. Thus, we can safely assume that our exclusive variables are uncorrelated with wage growth.

The probability that worker i makes a job change k at time point t, conditional on observed characteristics $\mathbf{z}_{it}$ and unobserved characteristics μ_{is} can be written as follows:

$$P\left(d_{ikt}=1\right)=\frac{\exp(\mathbf{z}_{it}'\boldsymbol{\gamma}_k+\mu_{ik})}{1+\sum_{n=1}^{2}\exp\left(\mathbf{z}_{it}'\boldsymbol{\gamma}_n+\mu_{in}\right)}\ , \tag{4.6}$$

where $\mathbf{z}_{it}$ is a vector of covariates including human capital and job characteristics. $\mathbf{z}_{it}$ also includes a vector of intercepts. k represents the three destination states: remaining in the same job, moving to another job outside the firm, and changing job with the same employer. Parameters are estimated by maximum likelihood using LatentGold (Vermunt & Magidson, 2007). The likelihood contribution of an individual i is the joint probability of obtaining the T outcomes of $d_{i1}, d_{i1}, ..., d_{iT}$. This joint probability can be written as:

$$P\left(\mathbf{d}_i|\mathbf{z}_i\right)=\int_{\mu} f(\mu_i)P\left(\mathbf{d}_i|\mathbf{z}_i,\boldsymbol{\mu}_i\right)\mathrm{d}\mu_i\ , \tag{4.7}$$

where

$$P\left(\mathbf{d}_i|\mathbf{z}_i,\boldsymbol{\mu}_i\right)=\prod_{t=0}^{T}\left[P\left(\mathbf{d}_{it}|\mathbf{z}_{it},\boldsymbol{\mu}_i\right)\right]^{\delta_{it}}\ , \tag{4.8}$$

and

$$\delta_{it}=\begin{cases}1 & \text{if } d_{it} \text{ is observed in time period } t\\ 0 & \text{otherwise}\end{cases}\ . \tag{4.9}$$

We use this model to estimate the probability of a job change with another employer

step of the estimation procedure. The transformation they suggest is based on the approach of Dubin and McFadden (1984).

[9]We also tested other instruments, such as the housing tenure status. The results we obtained were similar. These results can be obtained upon request from the author.

$\left(\hat{P}\left(d_{i1t}=1\right)\right)$ and the probability of a job change with the same employer $\left(\hat{P}\left(d_{i2t}=1\right)\right)$. Note that the unobserved individual effects (μ_{is}) are specific for each destination state s. They follow the normal distribution with variance Σ_μ, $\mu_{is} \sim N(0, \Sigma_\mu)$. For the identification of the model we assume that $\mu_{i0} = 0$. In the variance-covariance matrix Σ_μ, we also impose the restrictions:

$$\sigma_{11} = (\upsilon_1)^2, \quad \sigma_{22} = (\upsilon_2)^2$$
$$\text{and } \sigma_{12} = \sigma_{21} = (\upsilon_1 * \upsilon_2)$$

Therefore, the variance-covariance matrix Σ_μ of the random effects has the structure (Vermunt, Tran, & Magidson, 2007):

$$\Sigma_\mu = \left\{ \begin{array}{ccc} 0 & 0 & 0 \\ 0 & (\upsilon_1)^2 & (\upsilon_1 * \upsilon_2) \\ 0 & (\upsilon_1 * \upsilon_2) & (\upsilon_2)^2 \end{array} \right\} \tag{4.10}$$

The second step of the estimation procedure is a fixed-effects linear wage regression[10], where the inverse Mills ratios (λ_1 and λ_2), derived from the first step, are used as controls for endogeneity. For computing the inverse Mills ratios we use the specification of Dubin and McFadden (1984):

$$\lambda_s = \sum_{\substack{j=0 \\ j \neq s}}^{2} \left(\frac{\hat{P}_j \ln \hat{P}_j}{1 - \hat{P}_j} - \ln \hat{P}_s \right), \tag{4.11}$$

where $\hat{P}_s = \hat{P}\left(d_{ikt}=1\right)$. For a particular individual, this is the expected posterior mean of this probability. The dependent variable is the year-to-year wage growth $w_{it+1} - w_{it}$. The wage regression can be written as follows:

$$w_{it+1} - w_{it} = \mathbf{x}'_{it}\boldsymbol{\beta} + \sum_{j=1}^{2} p_{ijt} b_j + \sum_{j=0}^{2}\sum_{k=1}^{2} \left(p_{ijt} d_{ik(t+1)} c_{jk} \right) + \sum_{r=1}^{2} \lambda_{rit}\delta'_r + u_i + \varepsilon_{it} \ . \tag{4.12}$$

where w_{it} is the natural logarithm of the hourly wage and $\mathbf{x}'_{it}$ is a vector of covariates. ε_{it} is the idiosyncratic error, while u_i represents unobserved individual specific characteristics. The vector $\boldsymbol{\beta}$ and the scalars b_j, c_{jk}, δ'_1 and δ'_2 are the regression parameters to be estimated.

[10]In first step, we use a random-effects multinomial logit model because there is no way of estimating a fixed-effects multinomial logit model. In the primary equation the Hausman test rejects the null assumption of the joint coefficients' equality of the fixed-effects and random-effects model, suggesting that the fixed-effects specification should be preferred.

Table 4.1: Composition of the sample

(in percentages)

	Germany			UK		
	Stayers	**Movers**		**Stayers**	**Movers**	
		External	In-firm		External	In-firm
Married	82.2	79.8	84.4	75.6	63.5	67.1
Age (in years)	38.9	36.4	36.7	39.1	34.9	36.4
Education						
Low	20.7	21.0	10.3	18.9	17.7	10.0
Medium	32.1	31.7	30.5	58.0	60.3	48.0
High	47.3	47.3	59.2	23.2	22.0	42.0
Training	34.0	30.9	48.2	3.5	4.7	11.6
Industry						
Manufacturing	26.2	25.5	23.2	46.0	37.7	35.3
Energy	1.6	1.7	0.6	1.5	0.8	3.1
Mining	3.4	2.6	4.2	1.1	0.6	0.6
Agriculture	5.7	3.2	5.9	0.8	0.9	0.2
Construction	6.5	8.5	4.0	9.8	13.9	3.5
Trade	11.6	16.9	13.0	7.2	13.2	3.3
Transport	9.9	10.1	7.4	4.9	6.7	6.4
Banking, Finance	12.7	17.4	17.4	3.7	2.3	7.6
Other services	22.5	14.1	24.5	25.0	23.9	40.0
Firm size						
Small firms	26.3	35.6	17.7	13.6	29.3	2.9
Medium-sized firms	25.9	28.3	24.7	26.0	33.6	12.4
Large firms	47.8	36.1	57.6	60.4	37.1	84.7
Temporary	2.4	10.4	2.8	3.8	13.1	6.1
White collar	47.0	43.2	62.5	39.0	45.9	52.3
Apprenticeship	74.4	72.5	70.2			

4.7 Descriptive results

The composition of our sample is represented in Table 4.1. Workers staying in the same job and workers changing an employer do not differ significantly. Especially in Germany, the two groups look remarkably similar. However, in both countries stayers are, on average, older than movers. Moreover, external movers are employed more often than stayers in small firms and in the sectors of trade, banking and finance and less often than stayers employed in the

Table 4.2: Proportion of job movers and stayers, and associated relative wage growth (in percentages)

		UK			Germany		
		Stayers	**Movers**		**Stayers**	**Movers**	
			External	In-firm		External	In-firm
Low paid	proportion	80.2	10.8	9.0	92.0	6.8	1.2
	wage change	13	27	24	12	14	14
Medium paid	proportion	80.1	7.3	12.6	93.4	4.6	2.0
	wage change	5	8	10	4	6	8
High paid	proportion	78.4	6.3	15.2	92.3	4.7	3.1
	wage change	0	1	3	1	2	1
Total	proportion	79.8	8.0	12.3	92.8	5.2	2.1
	wage change	6	13	11	5	7	6
	cases	12,968	1,300	1,999	11,404	639	258

Note: A worker is low paid when his earnings belong to the lowest quartile of the hourly wage distribution, and high paid when his earnings belong to the upper quartile of the wage distribution. The worker is middle paid if his earnings are in the second or third quartile of the distribution.

sector of 'other services'. These differences between external movers and stayers are more pronounced in the UK. Employer changes are more common for workers in construction and trade and less common for workers in manufacturing. The same applies for workers of small and medium sized firms, as well as for white collar workers.

Large differences in human capital characteristics emerge between workers that change jobs within the same firm and the rest of the workers. There are more highly educated among the workers that change jobs within the firm than among the rest of the workers. Work-related training also more often precedes an in-firm job change. This type of job change is also more common for white collar workers and for large-firm employees. With respect to sector differences, German in-firm movers are more usually employed in banking and finance, while their British colleagues are also more usually employed in banking and finance, but also in 'other services', and less usually employed in manufacturing, construction and trade.

Table 4.2 presents the proportion of job movers as well as the relative wage growth between t and $t+1$ averaged over the years, with a breakdown according to the initial position in the wage distribution. It shows that job mobility rates and the corresponding wage returns are higher in the liberal British labour market than in the regulated German labour market. Furthermore, Table 4.2 indicates that in both countries, the low paid tend to change employer more often than the high paid, while the high paid change jobs within the firm more often

than the low paid. The average relative gain for the low paid, in terms of year-to-year wage growth, is larger than for the high paid. On average, high-paid workers do not experience any significant relative change in their wage.

4.8 Results from the two-step estimation

First-step results: the job mobility equation

Table 4.3 shows the main results of the first-step regression for job mobility. The main finding is that the probability of changing job varies across the different parts of the wage distribution only in the UK. In this country, we find that the higher the position in the distribution the lower the probability of changing employer. The probability of an internal job change is higher for the middle part of the wage distribution than for the upper or lower parts. Our exclusive variables (satisfaction for working hours and satisfaction with work content in the UK and worry concerning job security in Germany) are strongly significant for external mobility. These variables also have the expected effect: the more satisfied a worker is, the lower the probability of changing employer. For the UK, Table 4.3 shows only the results for working hours satisfaction. The results for work content satisfaction are similar. Despite the lack of significance of the exclusive variables in the in-firm mobility equation, additional tests on the wage equation confirmed the adequacy of the instruments.[11]

The estimates for the rest of the covariates are not presented here. However, all the estimates are consistent with previous findings. Correction for unobserved heterogeneity is important in both countries: unobserved idiosyncratic characteristics, such as ability and effort, affect the likelihood of a job transition. The estimated variance-covariance matrices of the individual effects are:

UK

$$\Sigma_\mu = \begin{Bmatrix} 0 & 0 & 0 \\ 0 & 0.830 & -0.625 \\ 0 & -0.625 & 0.471 \end{Bmatrix}$$

Germany

$$\Sigma_\mu = \begin{Bmatrix} 0 & 0 & 0 \\ 0 & 0.287 & -0.860 \\ 0 & -0.860 & 2.576 \end{Bmatrix}$$

The variance-covariance matrices show that the individual effects for external and internal

[11] Specifically, the Wald test for the overall significance of the exclusive variables rejects the null hypothesis that these variables can be omitted from the regression. The full results for this regression can be obtained from the author.

job changes are negatively correlated in both countries. Therefore, in both countries workers with a higher propensity for changing employer have a lower propensity for changing their job within the firm.

Table 4.3: Random effects multinomial logit model for the job change
(robust standard error)

		UK		Germany	
		External movers	Internal movers	External movers	Internal movers
Hours satisfaction (reference category 1 - not satisfied at all)	**value 2**	**-0.170** (0.229)	**0.025** (0.214)		
	value 3	**-0.265** (0.200)	**-0.044** (0.186)		
	value 4 (neutral)	**-0.410**** (0.202)	**0.076** (0.186)		
	value 5	**-0.499***** (0.196)	**0.128** (0.181)		
	value 6	**-0.484***** (0.195)	**0.057** (0.181)		
	value 7 (completely satisfied)	**-0.713***** (0.219)	**0.204** (0.192)		
Worry about job security (very concerned)	**Somewhat concerned**			**-0.533***** (0.107)	**-0.062** (0.236)
	Not concerned at all			**-0.710***** (0.111)	**-0.190** (0.240)
Position in the distribution (low paid)	**medium paid**	**-0.195**** (0.086)	**0.159**** (0.073)	**0.000** (0.087)	**-0.077** (0.191)
	high paid	**-0.313***** (0.117)	**0.012** (0.091)	**0.033** (0.129)	**0.248** (0.239)
Constant		**0.426** (0.967)	**-2.208***** (0.753)	**0.499** (1.068)	**-5.783***** (2.069)
Random effect		**0.911***** (0.068)	**-0.686***** (0.050)	**-0.536***** (0.094)	**1.605***** (0.127)
Log likelihood		-11,397.50		-5,281.75	

Reference categories in brackets

Note: The following variables are included as controls in the regression: a dummy for married, age in years, age squared, labour market experience in months, experience squared, education with respect to high school (low, high-school, tertiary), a dummy for formal training in the previous year, the industry sector (sic level 1), the firm size (small, medium and large firms), the type of contract (permanent/temporary), tenure in months, yearly dummies, and the regional unemployment rate. For Germany, we also included a dummy indicating whether the worker ever acquired apprenticeship qualifications.
* significant at 10%; ** significant at 5%; *** significant at 1%

Second-step results: wage mobility

Table 4.4 presents the results of the second step, the fixed-effects regression on wage growth. We applied four versions of the model, namely first a simple fixed-effects regression, a second one correcting for endogeneity, a third one correcting for the position in the wage distribution but not endogeneity and finally a model applying both corrections.

For both countries, in Models 1 and 2 the F-test for the individual effects does not reject the null hypothesis that individual effects u_i are jointly significantly different from zero. Therefore, the OLS specification is to be preferred to these fixed-effects models. However, the joint zero-hypothesis for the individual effects is rejected when we take into account the position in the wage distribution (Models 3 and 4). The inclusion of the 'position' terms also increases the percentage of variance explained (in terms of the R^2) from 3.6% to 19.6% in the UK and from 1.9% to 22.3% in Germany.

The significance of the endogeneity terms depends on the model specification. The endogeneity coefficients are significant in Model 2 (see Table 4.4)[12], but become insignificant in Model 4, the model that corrects for the position in the wage distribution. This finding suggests that the endogeneity of job mobility in the wage equation disappears when we correct for the position in the wage distribution. Therefore, the discussion of the results is based on Model 3 for both countries.

Our model contains two dummies for the position in the distribution and six cross-terms between the position in the distribution and the type of job change (see equation 4.5). The parameters corresponding to the dummies for the position in the distribution represent the difference in wage growth of the low-paid worker with the middle-paid and high-paid worker, respectively. The cross-terms represent the difference in the wage growth between the relevant groups of movers and stayers. For example, the term 'external change * high paid' represents the difference in wage growth between the high-paid external mover and the high-paid stayer. In other words, we estimate conditional effects with these cross-terms. In both countries, the low-paid worker experiences, on average, a higher relative wage growth than the high-paid worker, regardless of whether he changes job or not. This difference is more pronounced in the UK than in Germany. Moreover, in both countries, the low-paid external mover enjoys a higher wage growth than the low-paid stayer (6.7% higher in the UK and 6.3% higher in Germany). The British low-paid in-firm mover also experiences a higher wage growth than the low-paid stayer. The wage growth of the German low-paid in-firm mover does not differ significantly from the wage growth of a colleague who stays in the same job. A change of employer has a negative effect on the wage growth of the British high-paid worker. The German high-paid external mover does not differ significantly from a colleague who stays in the same job. Finally, the wage growth of the high-paid in-firm mover does not differ significantly from the growth of the high-paid stayer, in any of the two countries under scrutiny. If within-firm job changes were to refer only to promotions, this finding would be surprising. However, in our sample, in-firm job changes also include job

[12]According to Vella and Verbeek (1999) the t-test for the coefficient of the inverse Mills ratio is an adequate test for endogeneity.

Table 4.4: Second step regression - Fixed effects model for wage growth

(robust standard error)

	UK				Germany			
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Mills ratios								
Mills ratio for external job change		**0.042***** (0.007)		**0.002** (0.007)		**-0.018***** (0.004)		**-0.004** (0.004)
Mills ratio for in-firm job change		**-0.114***** (0.010)		**0.001** (0.008)		**-0.023***** (0.003)		**0.002** (0.003)
Job change (reference category: no change)								
External job change	**0.031***** (0.008)	**0.018*** (0.010)			**0.032***** (0.008)	**0.031***** (0.010)		
In-firm job change	**0.025***** (0.007)	**0.023***** (0.006)			**-0.008** (0.012)	**-0.005** (0.010)		
Position in the distribution (reference category: low paid)								
Medium paid			**-0.260***** (0.007)	**-0.259***** (0.008)			**-0.217***** (0.005)	**-0.217***** (0.005)
High paid			**-0.521***** (0.541)	**-0.520***** (0.114)			**-0.441***** (0.089)	**-0.439***** (0.150)
Cross terms								
Low paid * No change			**ref**	**ref**			**ref**	**ref**
Low paid * External change			**0.065***** (0.013)	**0.067**** (0.020)			**0.061***** (0.011)	**0.062***** (0.014)
Low paid * In-firm change			**0.051***** (0.014)	**0.054**** (0.018)			**-0.023** (0.024)	**-0.017** (0.025)
Medium paid * No change			**ref**	**ref**			**ref**	**ref**
Medium paid * External change			**-0.001** (0.010)	**-0.001** (0.013)			**0.002** (0.009)	**0.002** (0.010)
Medium paid * In-firm change			**0.008** (0.008)	**0.007** (0.007)			**-0.004** (0.015)	**-0.000** (0.012)
High paid * No change			**ref**	**ref**			**ref**	**ref**
High paid * External change			**-0.033**** (0.016)	**-0.035** (0.021)			**0.010** (0.015)	**0.005** (0.019)
High paid * In-firm change			**0.012** (0.011)	**0.011** (0.010)			**-0.024** (0.017)	**-0.029*** (0.015)
Constant	**0.801** (0.817)	**0.412** (2.306)	**0.245** (0.736)	**0.235** (2.169)	**0.346***** (0.106)	**1.334***** (0.155)	**0.200**** (0.094)	**0.121** (0.164)
R^2	**0.006**	**0.036**	**0.196**	**0.196**	**0.014**	**0.019**	**0.223**	**0.220**
F-test ($u_i = 0$)	0.62	**0.72**	**1.36*****	**1.36*****	**0.57**	**0.58**	**1.30*****	**1.26*****

* significant at 10%; ** significant at 5%; *** significant at 1%

The list of the control variables is the same as in Table 4.3.

changes at the same level and demotions.[13] Furthermore, as indicated by G. Baker et al. (1994), a wage gain from a job promotion might not take immediate effect, but be delayed

[13]For the UK, two-thirds of the internal job changes are related to promotions. For Germany, we cannot distinguish promotions from other types of internal job changes.

until a certain point in the future.

In order to visualize the above-mentioned effects, in Figure 4.1 we present the estimated wage change for the stayers, the external movers, the within-firm movers, and for the low-paid, medium-paid and high-paid workers.[14] Figure 4.1 shows that, in both countries, the low-paid worker that changes employer enjoys a considerably high relative wage increase. The British low-paid in-firm mover also enjoys a wage gain. This gain is, however, smaller than the gain of a colleague who changes employer. The rest of the effects are negligible. For the high-paid worker, we find that his average wage growth is negative regardless of the type of job transition made.

Two words of caution should be added to the interpretation of these results. First, the finding that the low-paid worker experiences, on average, a higher relative wage growth than the high-paid worker should not be interpreted as an indication of decreasing earnings inequality. This finding is due to the fact that we are only observing part of the overall wage mobility, as we have excluded workers moving in and out of paid employment. Secondly, our wage measure is the hourly wage. The high-paid worker might derive more utility than the low-paid worker from bonuses paid on a yearly basis or from fringe benefits.

A sensitivity analysis: long-term effects

Up till now, we have only modelled year-to-year wage growth. However, wage gains from a job change might not take immediate effect, but be delayed until a certain point in the future (Blau & Kahn, 1981). Workers might accept the same, or even a lower, wage when changing a job, if they expect a steeper wage growth in the new job.[15] Therefore, it is also necessary to compare the long-term wage growth of movers and stayers. For this purpose, we repeat the same multivariate analysis by using the wage growth between t and $t+3$ as the dependent variable.[16] In this analysis, our sample consists of workers that were continuously employed from t until $t+3$ and did not change jobs between $t+1$ and $t+3$. Thus, we compare workers that changed jobs between t and $t+1$ and then remained in this new job at least until $t+3$, with workers that remained in the same job from t until $t+3$.

Table 4.5 shows the results of the second-step regression for the long-term wage growth.[17] This table indicates that the main finding remains the same. The low-paid worker that

[14] The baseline of this figure is the wage growth of the low-paid stayers, which is rather arbitrary. It represents the wage growth of a low paid stayer having average personal and job characteristics.

[15] A reservation wage lower than the current wage is not allowed by a job-search model, but is allowed by a job-matching model.

[16] Our data do not allow the use of a time span longer than three years. This would dramatically reduce the number of cases in our sample.

[17] The results of the first step of the estimation are not presented, but are available on request from the author.

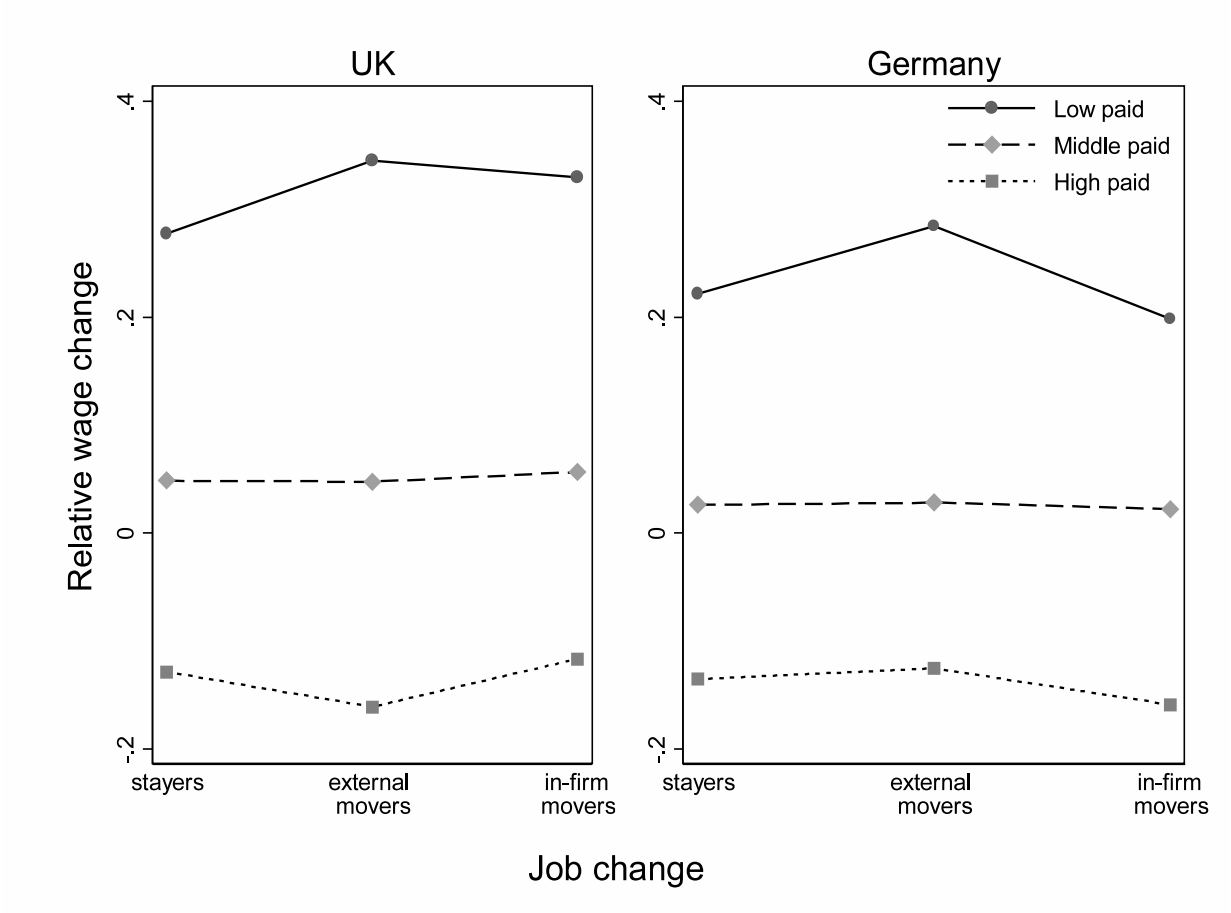

Figure 4.1: Wage changes across job transitions

changes employer experiences a larger wage growth than the low-paid stayer. An employer change is also profitable for the middle-paid worker in the UK. The gains of the middle-paid British worker are, however, lower, than the gains of his low-paid colleague. By contrast, in a three-year period, the German middle-paid external mover experiences a lower wage growth compared to the middle-paid stayer. In both countries, a high-paid worker who changes employer does not differ with respect to wage growth from a colleague who stays in the same job. Finally, as in the case of the year-to-year wage growth, a job change within the same firm is only profitable for the British low-paid worker. Therefore, we can conclude that the main findings of our study indicate little sensitivity to the time period for which the wage growth is observed.

Table 4.5: Long-term effects - Fixed-effects model for wage growth
(robust standard error)

	UK				Germany			
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Mills ratios								
Mills ratio for external job change		**0.051***** (0.010)		**0.008** (0.009)		**-0.021***** (0.006)		**-0.009** (0.006)
Mills ratio for in-firm job change		**-0.147***** (0.017)		**-0.024** (0.015)		**-0.030***** (0.005)		**-0.007** (0.004)
Job change (reference category: no change)								
External job change	**0.050***** (0.011)	**0.033***** (0.011)			**0.026**** (0.012)	**0.027*** (0.015)		
In-firm job change	**0.023***** (0.009)	**0.019**** (0.009)			**0.012** (0.017)	**0.011** (0.019)		
Position in the distribution (reference category: low paid)								
Medium paid			**-0.314***** (0.010)	**-0.300**** (0.013)			**-0.212***** (0.006)	**-0.212***** (0.007)
High paid			**-0.595***** (0.014)	**-0.569**** (0.017)			**-0.428***** (0.009)	**-0.424***** (0.010)
Cross terms								
Low paid * No change			**ref**	**ref**			**ref**	**ref**
Low paid * External change			**0.064***** (0.019)	**0.059**** (0.021)			**0.078***** (0.018)	**0.083***** (0.024)
Low paid * In-firm change			**0.061***** (0.019)	**0.065**** (0.022)			**-0.016** (0.038)	**-0.016** (0.038)
Medium paid * No change			**ref**	**ref**			**ref**	**ref**
Medium paid * External change			**0.027**** (0.014)	**0.024*** (0.013)			**-0.031**** (0.014)	**-0.032**** (0.016)
Medium paid * In-firm change			**0.016** (0.010)	**0.016** (0.011)			**0.022** (0.021)	**0.024** (0.024)
High paid * No change			**ref**	**ref**			**ref**	**ref**
High paid * External change			**-0.028** (0.021)	**-0.033** (0.022)			**0.010** (0.026)	**0.013** (0.027)
High paid * In-firm change			**-0.008** (0.014)	**-0.013** (0.015)			**-0.027** (0.027)	**-0.026** (0.027)
Constant	**1.121** (0.937)	**0.512** (5.400)	**0.697** (0.839)	**0.638** (4.926)	**0.692***** (0.155)	**0.547***** (0.186)	**0.534***** (0.139)	**0.478***** (0.167)
R^2	**0.015**	**0.057**	**0.231**	**0.231**	**0.034**	**0.041**	**0.235**	**0.235**

* significant at 10%; ** significant at 5%; *** significant at 1%

The list of the control variables is the same as in Table 4.3.

4.9 Conclusions

Most studies on the effect of job mobility on wage growth implicitly assume that this effect is the same at all wage levels. In this paper, we developed a simple variant of the on-the-job search model of Mortensen (1986). According to this theoretical model, both the hazard rate

of changing a job and the difference between the current wage and the reservation wage are decreasing functions of the current wage. Moreover, these differences between the low-paid worker and the high-paid worker are more pronounced for external job changes than for in-firm job changes.

These predictions were tested with a panel regression model, using data from the UK and Germany. Since we had no information on the reservation wage, we approximated the reservation wage with the wage in the new job. The prediction that the probability of changing jobs is higher for the low-paid worker than for the high-paid worker is only verified for the British external movers. In all other cases, no differences between the low-paid workers and the high-paid workers emerge. By contrast, the findings on wage growth are more in accordance with the expectations of our theoretical model. The relative wage returns to external job changes are higher for the low-paid worker than for the high-paid worker in both countries. On average, the low-paid external mover enjoys (in the UK) a 6.7% or (in Germany) a 6.3% higher wage growth than the low-paid stayer. The wage growth of the high-paid external mover is, on average, the same (in Germany) or even lower (in the UK) than the wage growth of the high-paid stayer. This means that a voluntary change of employer might be a good career move for the low-paid worker. With respect to in-firm job changes, our results are in accordance with the predictions of the model only in the UK. In the liberal UK labour market, the low-paid worker enjoys a higher wage growth than his high-paid colleague by an in-firm job change. In Germany, however, an in-firm job change does not produce any gains or losses either for the low-paid worker or for the high-paid workers.

The main findings of this study remain the same if we extend the period for which we model wage growth, from one to three years. The only difference refers to the middle-paid worker who derives long-term gains from an employer change in the UK, as opposed to losses in Germany.

Caution should be taken with respect to the initial conditions problem. Several studies, such as Stewart and Swaffield (1999) and Cappellari and Jenkins (2004a) suggest that initial conditions are endogenous. Other studies, such as Ramos (2003) argue that initial conditions are less of a problem. In this study, we have considered initial conditions (i.e. the selection in the pay level) exogenous as controlling for endogeneity would complicate our analysis. Further research can elaborate on the possible bias that initial conditions may cause.

Country differences concerning the return to job change emerge in two points. Firstly, the differences in wage returns from an external job change between low-paid, medium-paid and high-paid workers are more pronounced in the UK than in Germany. In fact, the findings for the UK are in accordance with the predictions of our on-the-job search model, as wage

returns to an external job change decrease with the position in the wage distribution.[18] Secondly, we found some evidence of positive returns to job changes in the internal labour market only in the UK. We expected more returns to in-firm job changes in the UK than in Germany. However, such country differences were found only for the low-paid workers.

Further research can shed more light on the alternative explanations of why people change jobs. Devine and Kiefer (1991) suggest that empirical findings on the effect of job mobility on wage mobility are contradicting because of heterogeneity in the reasons that drive individuals to change jobs. This is particularly important for the high-paid workers. Our study suggests that changing jobs does not, on average, result in higher hourly wages for this group of workers. These workers are likely to benefit more often from bonus payments that are paid on a yearly basis, or from other forms of fringe benefits.

[18]This was also verified by using quintiles of the wage distribution.

Chapter 5

How real is low-pay mobility?

5.1 Introduction

The issue of low-pay mobility is receiving increasing interest in economic and political debate (OECD, 1996, 1997, 2003; Acemoglu, 2003b, 2003a). Low-pay mobility may have an equalizing effect on the earnings of workers at the bottom of the wage distribution. The higher the level of upward low-pay mobility in a country, the greater the chances low-paid workers have of improving their earnings level. Previous research, using data from household surveys, suggests that there is substantial year-to-year mobility, especially at the bottom of the wage distribution. Using data from the BHPS, Stewart and Swaffield (1999) find that, depending on the low-pay threshold used, between 29% and 48% of the British low paid move to a higher earnings state within one year. Cappellari and Jenkins (2004b) conclude from their analysis that the fraction of the British low-paid workers is 42.3% if we take into account non-response and attrition. Similar percentages are found inseveral other studies and for several other countries (see, for example, Cappellari, 2002). These studies show that although there is a considerable state dependence in low pay, the average transition probabilities are much higher than common sense would suggest.

A possible methodological explanation for these rather unexpected findings is that panel surveys contain measurement error. Survey respondents may misreport their income and interviewers do not always record the responses correctly, which can produce a substantial amount of error in wage measurement. Using the SIPP dataset, Gottschalk (2005) argues that two-thirds of the observed downward adjustments of nominal wages without a job change are due to measurement error. When, as in the majority of economic studies on wages, hourly wages are recorded instead of yearly earnings, measurement error may even be greater (Rodgers et al., 1993). When these hourly wages are derived from annual, monthly or weekly earnings, the amount of measurement error may be increased even more, as measurement

error is introduced via two sources: wages and hours of work. In an investigation of the effect of measurement error on poverty transitions in the German Socio-Economic Panel (GSOEP), Rendtel et al. (1998) conclude that approximately half of the observed transitions are due to measurement error. Lollivier and Daniel (2002) corroborate this result for the European Community Household Panel (ECHP). Despite the enormous bias that measurement error can cause in the estimation of wage dynamics, most relevant studies ignore this phenomenon.

The aim of this paper is to investigate the bias that measurement error causes on transitions from low pay. For this purpose, we develop a panel regression model for low-pay transitions that corrects for measurement error. To correct for measurement error we use a Mixed Latent Markov model, advancing the approach of Rendtel et al. (1998). While Rendtel et al control for measurement error in aggregate transition probabilities, we also correct for observed and unobserved heterogeneity and moreover work with a much longer time series. Using three panel surveys (BHPS, GSOEP, SEP) we determine which proportion of the observed low-pay transitions are spurious. Furthermore, we examine how much bias ignoring measurement error causes in the effects of certain determinants of wage mobility in a panel regression model. We choose to focus on those determinants that can account for a considerable upward or downward change in the wage, and can therefore cause a worker to move from low pay to high pay or vice versa. Such determinants include labour market events, such as a job change, a change of the employment contract type, or a considerable change in working hours. We expect the effects of these determinants to be considerably underestimated by measurement error. In our analysis, we distinguish between two earnings states, low-paid and higher-paid, as well as the state of non-employment. For low pay, we apply the most common definition: a low-paid worker is someone who earns less than two-thirds of the median wage (OECD, 1996). Moreover, we test the sensitivity of our results to alternative definitions of low pay.

Another novel aspect of this paper is that it investigates low-pay transitions in a cross-country comparative perspective. Labour market institutions are believed to account for differences in the opportunities and the risks that individuals face in the labour market (Freeman & Katz, 1995; Blau & Kahn, 1996). In liberal-unregulated labour markets, such as the UK, there is a much higher level of job and wage mobility than in regulated labour markets, such as Germany. Countries combining protection of employment security with flexibility in the labour market in terms of regulations enhancing job mobility, such as the Netherlands, occupy an intermediate position. Investigating low-pay transitions that are corrected for measurement error can be more informative concerning the real extent of cross-country differences in low-pay mobility than by simply looking at observed transitions.

The rest of the paper is organized as follows: Section 5.2 discusses further the implications

of measurement error on wage mobility and reviews the previous approaches to correct for it. Section 5.3 elaborates on the model we apply. The three datasets we use are presented in section 5.4. In section 5.5, we discuss the results of our data analysis. These results consist of a descriptive part, where the aggregate amount of measurement error is estimated as well as an analytical part, where we discuss the effect of measurement error in low-pay transitions on the parameter estimation of a multivariate panel regression model. Finally, section 5.6 contains the conclusions of our study..

5.2 Previous approaches on measurement error

An simple conclusion from the above-mentioned studies on measurement error could be that income data from household surveys contain so much error that they are not worthy of being used for the purpose of investigating earnings dynamics. However, as will be shown below, this is not necessarily the case. Hagenaars (1990, 1994) shows that even small amounts of classification error can lead to considerable bias in the estimation of transition matrices. As a simple illustration, let us assume a fictitious transition matrix for a discrete variable X with two categories and between two time points. We further assume that there is error in the observation of the variable X. Instead of X_1 and X_2, we rather observe the states Y_1 and Y_2. The model for the joint distribution of Y_1 and Y_2 has the form of a Latent Class model for two time points. More specifically, the joint distribution of the observed states Y_1 and Y_2 can be expressed as follows:

$$\begin{aligned} P(Y_1 = y_1, Y_2 = y_2) &= \sum_{\mathbf{Y}_1, \mathbf{Y}_2} [P(X_1 = x_1) P(X_2 = x_2 | X_1 = x_1) \\ &\qquad P(Y_1 = y_1 | X_1 = x_1) P(Y_2 = y_2 | X_2 = x_2)] \,. \end{aligned} \tag{5.1}$$

In the above probability expression $P(X_1 = x_1)$ denotes the probability of being in the latent (true) state x_1 at the first time point and $P(X_2 = x_2|X_1 = x_1)$ the probability of being in the latent state x_2 at the second time point, conditional on being in the latent state x_1 at the first time point. The other two terms refer to the relationship between the latent and observed states, and represent the measurement error component. $P(Y_1 = y_1|X_1 = x_1)$ denotes the probability of observing the state y_1 conditional on being in the latent (true) state x_1. The expected observed transition probability is:

$$P(Y_2 = y_2 | Y_1 = y_1) = \frac{P(Y_1 = y_1, Y_2 = y_2)}{P(Y_1 = y_1)} = \frac{P(Y_1 = y_1, Y_2 = y_2)}{\sum_{Y_2} P(Y_1 = y_1, Y_2 = y_2)} \quad . \tag{5.2}$$

To illustrate the impact of measurement error, assume that $P(X_2 = x_2|X_1 = x_1) = .05$ for $x_1 \neq x_2$ and that $P(Y_1 = y_1|X_1 = x_1) = P(Y_2 = y_1|X_2 = x_2) = .05$ for $y_1 \neq x_1$ and $y_2 \neq x_2$. Using equations (5.1) and (5.2) one can easily verify that the probability $P(Y_2 = y_2|Y_1 = y_1)$ for $y_1 \neq y_2$ equals .136 . In other words, even a small amount of classification error (5%) results in a large increase in the number of the observed transitions, here by a factor of 2.72 (13.6% observed versus 5% real transitions).

Measurement error does not only result in an overestimation of the aggregate number of transitions, but may also have severe implications when trying to explain earnings dynamics. When failing to control for classification error, the dependent variable in an earnings transition model is full of noise. Therefore, the effect of covariates in such a model will, most probably, be underestimated. This will happen even if these covariates are error-free. Following Bound et al. (2001), let us assume a simple regression $y = z\beta + \epsilon$, with y measured with error v ($y = y^* + v$, where y^* is the true value of the dependent variable) and $v = \delta y + v^*$, where v^* is uncorrelated to z and ϵ. Then even if z is measured without error, there is bias in the estimation of β, which is proportional to δ. Empirical findings, however, are scarce and contradictory. Using the PSID validation study, Duncan and Hill (1985) find that measurement error in log earnings attenuates the effect of tenure by 30% in a wage regression.[1] However, they do not find a significant effect on the coefficient for education and labour market experience. Comparing data from the Current Population Survey and the Social Security records, Bound and Krueger (1991) fail to find any significant bias in the effects of education, experience, age or other covariates on log earnings. The detection of this particular type of bias, however, is difficult since, in practice, these covariates are never error-free. The error in these covariates can be correlated with the error in earnings causing either an increase or decrease of the bias in the wage-regression coefficients.

The conclusion of the above-mentioned illustrations is that when using survey data to investigate earnings transitions, the results can be severely affected by measurement error. An obvious solution is to circumvent this issue by using error-free data. Many researchers suggest that administrative records provide such data. Administrative records usually offer larger sample sizes than panel surveys, and allow the matching of firms and workers. However, such datasets are available in only a few countries, and there are severe restrictions regarding their accessibility. Moreover, subjective information on attitudes and preferences that is useful in explaining employment behavior - and is therefore needed in labour market research - is unavailable in administrative records. Thus, the use of panel surveys is sometimes preferable and tackling measurement error is unavoidable. Finally, some researchers

[1]The PSID validation study does not refer to the same individuals as in the original survey. It was in fact conducted on a sample of employees from a large firm.

suggest that administrative data are not necessarily error-free (Kapteyn & Ypma, 2005).

Indisputably, the optimal way to correct for measurement error is by using validation or re-interview data. This approach does not require the use of strong assumptions about the structure of the error. Pischke (1995), using the PSID validation study, suggests that measurement error in PSID overstates annual earnings fluctuation by 20%-45%. Poterba and Summers (1986) use the re-interview of the Current Population Survey to investigate the effect of classification error in labour market dynamics. Nevertheless, although very useful, validation studies are costly and therefore rarely available.

In the absence of a validation study, research has to rely on assumptions about the nature of measurement error. The usual assumption made by economists is that measurement error in wages is uncorrelated with either the true wage, the true value of all covariates, the measurement error in these covariates, or with the disturbance terms. This type of error, which is referred to as classical measurement error, reduces the efficiency, and biases the regression estimates downwards (Bound et al., 2001). Classical measurement error is usually tackled by instrumental variables estimation (see, for example, Lewbel, 1997). However, if the assumption of classical measurement error is violated, IV estimation may increase instead of reduce the relevant bias. And, indeed, this is often the case, as a number of studies find that measurement error in earnings is mean reverting; that is, that measurement error in earnings is negatively correlated with the observed value of earnings (Bound & Krueger, 1991; Bound et al., 1994; Bollinger, 1996). Moreover, in categorical variables measurement error is always mean reverting, a simple illustration of which, using the case of a binary response variable, is proposed by Bound et al. (2001). As in the current paper, we model transitions across wage categories, the possible measurement error is mean reverting, thereby making IV estimation inappropriate for our study.

An approach that is more suitable for the study of earnings transitions has also been proposed by Rendtel et al. (1998). Rendtel et al. use a Latent Markov model with two measurements of income to correct for measurement error in the German Socio-Economic Panel (GSOEP). This approach is similar to several models dealing with classification error in categorical variables (van de Pol & Langeheine, 1990; Vermunt et al., 1999; Bassi et al., 2000; Paas et al., 2007). It is based essentially on the same idea as the model by Poterba and Summers (1986, 1995) who assume a probabilistic relationship between the observed and true states to estimate the true transitions. The difference between their approach and that of Rendtel et al. is that the latter estimate this probabilistic relationship using longitudinal information from a single sample rather than deriving this relationship from external data. In this paper, we extend the approach of Rendtel et al. (1998) in two ways. Firstly, while Rendtel et al. investigate the effect of measurement error on aggregate transition probabil-

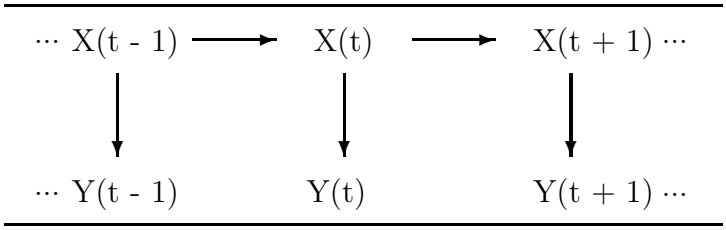

Figure 5.1: Path diagram for the Latent Markov model

ities, we add to the model correction for observed and unobserved heterogeneity. Secondly, because of our more efficient estimation algorithm, we are able to use many more panel waves than Rendtel et al. did, yielding a much more realistic panel regression model.

5.3 A Mixed Latent Markov model

Specification of the model

Our aim is to control for measurement error in the year-to-year transitions from and to low pay. This can be achieved with a Latent Markov model (van de Pol & Langeheine, 1990) as depicted in Figure 5.1. According to this model, the true state X_{it} of an individual i at a time point t cannot be observed; it is a latent state. We rather observe state Y_{it}, which might differ from the true (latent) state X_{it}. Y_{it} and X_{it} are probabilistically related. The observed states at different time points are mutually independent, conditional on the true latent states. In other words, we assume that measurement error is not serially correlated in any way. This means that the independent classification error (ICE) assumption is made (Bassi et al., 2000).

The true state X_{it} follows a Markov process. Thus, the state of an individual i at time point t, X_{it}, is independent of the state at time point t', $X_{it'}$, where $t' < t-1$, conditionally on the state at $t-1$, X_{it-1}. An arrow indicates a direct effect, for example of the state at one time point on the state at the next time point. In our study, X_{it} and Y_{it} are the true and observed earnings state, respectively that are assumed to take on three values: low-paid, higher-paid and non-employed.[2]

The joint probability of following a certain path over the $T+1$ time points can be specified

[2]It is obvious that our definition of earnings states includes a state where the individual has no income from paid employment, the 'other' or non-employment state. For reasons of simplicity, however, we will refer to these states as 'earnings states'.

as:

$$P(\mathbf{Y}_i = \mathbf{y}_i) = \sum_{x_0=1}^{3} \sum_{x_2=1}^{3} ... \sum_{x_T=1}^{3} P(X_{i0} = x_0) \prod_{t=1}^{T} [P(X_{it} = x_t | X_{it-1} = x_{t-1})] \prod_{t=0}^{T} P(Y_{it} = y_{it} | X_{it} = x_t) , \quad (5.3)$$

where $i = 1, ..., I$ is the index for the individual, and $t = 0, ..., T$ represents the time points.

The probability $P(Y_{it} = y_{it}|X_{it} = x_t)$ represents the measurement error. For identification reasons, we restrict the probability of observing a state Y_{it} conditional on the true state X_{it} to be constant over time, so $P(Y_{t-1} = s|X_{t-1} = r) = P(Y_t = s|X_t = r)$ for every t. With these restrictions, the model is identified with at least three time points (Vermunt et al., 1999).

Since controlling for heterogeneity in Markov models for income mobility is necessary (Shorrocks, 1976), we control for observed time-constant and time-varying characteristics in our Latent Markov model following the approach suggested by Vermunt et al. (1999). Specifically, we allow the covariates $\mathbf{Z}_{it}$ to affect the latent transition probabilities between latent states X_{it-1}, X_{it}. These covariates are assumed to be uncorrelated to measurement error. This assumption seems to be plausible, as Bound et al. (2001), in their survey of studies on measurement error, found no consistent evidence that measurement error is correlated with demographic or human capital characteristics, especially when restricting the estimation to male workers.

The transition probabilities between earnings states can also be affected by unobserved personal characteristics, such as ability and motivation. Failing to control for such unobservables may result in an overstatement of the effect of the observed covariates. In the framework of Markov models, this is usually tackled in a non-parametric way by assuming that individuals belong to different Markov chains. The simplest form of these models is the mover-stayer model of Blumen et al. (1966), which assumes that the population can be split into two groups with different Markov chains. In one chain (the 'movers' chain'), transitions are unrestricted, while in the 'stayers' chain' the transition probability from state j in time point $t-1$ to the state k in time point t is 1 if $j = k$ and 0 otherwise. Other, more complicated Mixed Markov models assume the existence of more than two chains and may even allow for turnover between the chains (for an overview of these studies, see, van de Pol & Langeheine, 1990).

We prefer to adopt a parametric approach of correcting for unobserved heterogeneity, which makes our model similar to a random-effects panel regression. Specifically, we introduce an individual-specific unobserved variable F_i that captures time-invariant individual

effects. F_i is assumed to follow a normal distribution with a mean equal to 0 and a variance equal to σ_F, which is a parameter to be estimated by the model ($F_i \sim N(0, \sigma_F)$).

The joint probability of having a particular state path conditional on covariate values can be expressed as:

$$\begin{aligned} P(\mathbf{Y}_i = \mathbf{y}_i|\mathbf{Z}_i) &= \int \sum_{x_0=1}^{3} \sum_{x_1=1}^{3} ... \sum_{x_T=1}^{3} P(X_{i0} = x_0|\mathbf{Z}_{i1}, F_i) \\ &\quad \prod_{t=1}^{T} \left[P\left(X_{it} = x_t|X_{it-1} = x_{t-1},\, \mathbf{Z}_{it}, F_i\right)\right] \\ &\quad \prod_{t=0}^{T} P(Y_{it} = y_{it}|X_{it} = x_t) f(F_i) \mathrm{d}F_i \ , \end{aligned} \tag{5.4}$$

where $f(F_i)$ is the density function for the individual effects F_i.

We should stress here that our Mixed Latent Markov model still relies on the Markov assumption; that is, the state of an individual i at time point t, X_{it}, is independent of the state at time point t', $X_{it'}$, where $t' < t-1$, conditional on the state at $t-1$, X_{it-1}, but also on the individual's value of the covariates $\mathbf{Z}_{it}$ and the time-constant unobserved individual effects F_i.

Does the model really detect the true transitions?

Since our approach is not based on validation data, the question that emerges is how well the Mixed Latent Markov model can distinguish true transitions from spurious transitions. What the model actually does is derive from the longitudinal information for all individuals a pattern of 'regular transition behaviour' for individuals belonging to state x (Vermunt, 2004). A spurious transition results in a violation of the first-order Markov process. For example, let us assume that an individual being truly low paid from $t-1$ until $t+1$ reports mistakenly that he is in higher pay in t. This means that we observe a transition from low to higher pay from $t-1$ to t and another transition from higher to low pay from t to $t+1$. If patterns like this are common in the data, the state at $t-1$ will determine the state in $t+1$, which is a deviation from the first-order Markov model. Our model will, therefore, consider a large part of these transitions as spurious and filter them out as serially uncorrelated measurement error. Measurement error is the mechanism that most probably produces such transitions. However, can it also be the case that there is a true second-order Markov process determining low-pay transitions?

In the above-mentioned example, the individual may truly move from low to higher pay from $t-1$ to t and return to low pay from t to $t+1$. A possible reason for such a true but

unexpected transition could be a one-time bonus from his employer or just the fact that the position of the worker in the wage distribution in $t-1$ was so close to the low-pay threshold that a small overall change in the distribution moves him above this threshold in t. In this case, our model regards his transition from low pay to higher pay and back again to low pay as spurious.

The obvious result of this is that our model, as well as other similar models, may slightly overestimate the amount of measurement error, as it cannot distinguish between measurement error and true random transitions. From a policy perspective, however, this is not necessarily bad. Economic research is interested in distinguishing the permanent from the transitory component of income. Accordingly, our model does not only filter out measurement error but may also remove the transitory moves from the earnings states. Thus, the 'true' transitions we estimate are the transitions between the states x_j and x_k when accompanied by a change in transition 'behavior'; from the transition 'behaviour' corresponding to individuals in state x_j to the transition 'behaviour' of individuals in state x_k.

Parameter estimation

The estimates for the parameters of our model are obtained by means of maximum likelihood. Specifically, we use a variant of the well-known Expected Maximization (EM) algorithm (Dempster et al., 1977), which switches between an E step and a M step until it achieves convergence. The E-step of the EM algorithm involves computing the expected value of the complete data log-likelihood or, more intuitively, filling in the missing data (here the unobserved class memberships and the unobserved random effects) with their expected values given the current parameter values and the observed data. In the M step, standard estimation methods are used to update the model parameter such that the expected complete data log-likelihood is maximized. In our case the M step involves using the filled-in expected values as though these were observed data in logistic regression analysis. The E and M steps cycle until a certain converge criterion is reached.

The relevant variant of EM, which is called the forward-backward or Baum-Welch algorithm, is implemented in the recent syntax version of the statistical software LatentGOLD (Vermunt & Magidson, 2007). The standard EM algorithm cannot be applied for Latent Markov models for many time points T, as the time and storage needed for computation increases exponentially with T (Vermunt et al., 1999). The extended version of the forward-backward algorithm we applied supports multivariate analysis and control for unobserved heterogeneity, features that are required for our analysis. Details on this algorithm can be found in Vermunt et al. (2007).

5.4 Data and main concepts

The study uses data for the period 1991-2004 from three national panel datasets. For the UK, we use waves 1 to 14 of the British Household Panel Survey (BHPS) (Taylor et al., 2006), covering the years 1991-2004. For Germany, we make use of 14 waves of the German Socio-Economic Panel (GSOEP) (Wagner et al., 1993), which cover the period 1991-2004. For the Netherlands, our data come from the Socio-Economic Panel (SEP) (CBS, 1991). We make use of the last 12 waves of the panel, covering the years 1991-2002. The information from the three datasets has been made highly comparable for the purpose of this study[3].

In the light of the discussion in section 5.3, we compare these three countries with respect to the amount of 'permanent' low-pay transitions. In the liberal-unregulated labour market of the UK, individuals are supposed to experience a higher level of wage mobility than in both the semi-regulated Dutch labour market and the highly regulated German labour market. A model that does not control for measurement error may over- or underestimate cross-country differences due to possible differences in the amount and type of error between the three national datasets.

Since we focus on earnings transitions of employed individuals, our sample consists of prime age males (aged 25-55). We restrict our sample to males in order to avoid the problem of endogeneity of female labour supply. Our main economic variable is the earnings state of the individual, defined as the level of the hourly wage. Since there is no direct information available on an individual's hourly wage, this is computed by dividing the total gross annual earnings from paid employment by the total amount of the annual hours worked. As in the SEP and the GSOEP, only retrospective wage information is available, the wage in t is derived from wave $t+1$. We define two real earnings states, low paid and higher paid, as well as an 'other' (non-employment) state.

Only individuals reporting paid employment as their main employment status are classified in one of the two earnings states. The self-employed are clustered in the 'other' state (non-employment state). Individuals who are in education or in apprenticeship - especially relevant for Germany - are also classified as non-employed. This 'other' state is very heterogeneous implying that transitions to and from 'other' cannot be expected to have a clear interpretation. However, the inclusion of such a state in our dependent variable is important from both a substantial and methodological point of view. Several studies, such as Cappellari and Jenkins (2004a) and Stewart (2007) show that transitions to non-employment are common for low-paid workers. Moreover, ignoring the non-employment state would make it impossible to define a Latent Markov model as the latent states should not only be mutually

[3]The BHPS data were made available by the Data Archive at Essex University. The GSOEP was provided by the German Institute for Economic Research. The SEP was made accessible by Statistics Netherlands.

Table 5.1: Model comparison

	UK		Netherlands		Germany	
Model	Log Likelihood	BIC (log lik.)	Log Likelihood	BIC (log lik.)	Log Likelihood	BIC (log lik.)
1. Markov	**-25,139.7**	**50,351.1**	**-15,868.8**	**31,805.4**	**-24,133.0**	**48,338.6**
2. Latent Markov (LM)	**-23,979.7**	**48,085.0**	**-15,262.2**	**30,643.2**	**-23,327.2**	**46,781.5**
3. Markov with covariates	**-23,723.5**	**48,272.5**	**-15,501.4**	**31,630.4**	**-16,543.9**	**34,195.7**
4. LM with covariates	**-22,790.3**	**46,459.9**	**-14,968.0**	**30,614.3**	**-16,238.7**	**33,639.9**
5. Mixed Markov with covariates	**-23,040.8**	**46,943.0**	**-15,172.3**	**31,006.1**	**-16,272.5**	**33,689.3**
6. Mixed Latent Markov with covariates	**-22,528.9**	**45,973.1**	**-14,941.2**	**30,594.7**	**-16,055.9**	**33,310.6**

exclusive but also exhaustive.

Each individual is included in the analysis from the time point he first enters the survey. Using maximum likelihood estimation with missing data, we deal with the fact that at some occasions information for the earnings state of the individual may be missing, due to non-response or temporary attrition. This approach does not cause any bias as long as non-response is random conditionally on observed values, that is, as long as the missing data is missing at random (MAR). Missing values in covariates were imputed by interpolation when possible.[4] The remaining missing values were imputed by the mean of the relevant variable.

5.5 Measurement error and its effect

Descriptive part

In total, we applied six versions of the model described by equations (5.3) and (5.4); namely, a first-order Markov model, a Latent Markov model, a first-order Markov model with covariates, a Latent Markov model with covariates, a first-order Markov model with covariates controlling for unobservables (Mixed Markov model) and finally a Mixed Latent Markov model correcting for both measurement error and for observed and unobserved heterogeneity. The Log-Likelihood values and the BIC values for these models are reported in Table 5.1. This Table shows that Model 2 fits the data considerable better than Model 1, Model 4 better than Model 3 and Model 6 better than Model 5. This indicates that correcting for measurement error is important, regardless of whether we control for observed and unobserved heterogeneity. Also controlling for observed characteristics improves the fit of the

[4]For example if the individual reported 'higher education' in $t-1$ and $t+1$, and the value for education was missing for t we imputed the value for education in t as being 'higher education'.

Table 5.2: The size of the measurement error

UK

		Observed state: low	high	other
Latent state	**low**	**0.658**	**0.259**	**0.083**
		(0.013)	(0.012)	(0.008)
	higher	**0.013**	**0.972**	**0.016**
		(0.002)	(0.002)	(0.002)
	other	**0.009**	**0.007**	**0.984**
		(0.002)	(0.002)	(0.002)

Germany

	Observed state: low	higher	other
low	**0.694**	**0.272**	**0.034**
	(0.016)	(0.016)	(0.006)
higher	**0.004**	**0.995**	**0.001**
	(0.001)	(0.001)	(0.000)
other	**0.000**	**0.004**	**0.996**
	(0.000)	(0.001)	(0.001)

Netherlands

		Observed state: low	higher	other
Latent state	**low**	**0.619**	**0.246**	**0.135**
		(0.025)	(0.020)	(0.024)
	higher	**0.007**	**0.944**	**0.049**
		(0.001)	(0.003)	(0.003)
	other	**0.009**	**0.006**	**0.985**
		(0.005)	(0.003)	(0.006)

model, as can be seen by comparing the fit of either Models 1 and 3 or Models 2 and 4. Correcting for unobservables improves further the fit of the model (comparison of Models 3 and 5, and Models 4 and 6), but there is one exception. When correction for measurement error is applied, the introduction of a random effects term for the unobservables no longer improves substantially the fit of the model for the Netherlands (comparison of Models 4 and 6). This means that whereas correction for measurement error explains a large part of the effect of the unobserved factors on earnings mobility, such as ability and effort, the term for the unobservables is unable to capture the full effect of measurement error.

A question we wish to answer is how much classification error exists in earnings states. The amount of measurement error can be derived from the estimated values the probabilities $P(Y_{it} = y_{it}|X_{it} = x_t)$ that are presented in Table 5.2. These estimates indicate that there is a large amount of classification error for the low-paid workers in all three countries. In the Netherlands, 38.1% of the low-paid workers are misclassified into another state, while in the UK this figure is 34.2%, and in Germany 30.6%. In all three countries, the misclassification of low-paid workers is more likely to be into the higher earnings state than into the other (non-employment) state, which shows that many workers that are truly low paid are observed to have earnings above the low-pay threshold.

Measurement error for workers who are truly in the higher-paid and non-employment states is considerably lower than in the low-paid state. In the three countries under scrutiny, it ranges between 0.5% and 5.6% for the higher paid and between 0.4% and 1.6% for the non-employed.

Table 5.3: Observed and latent transitions

		Observed transitions				**Latent transitions**		
		United Kingdom						
		State in t				**State in t**		
		low	higher	other		low	higher	other
	low	**0.499**	**0.371**	**0.130**	low	**0.793**	**0.152**	**0.055**
		(0.009)	(0.009)	(0.006)		(0.010)	(0.009)	(0.005)
State	higher	**0.046**	**0.883**	**0.071**	higher	**0.010**	**0.964**	**0.026**
in $t-1$		(0.002)	(0.002)	(0.002)		(0.001)	(0.002)	(0.001)
	other	**0.052**	**0.116**	**0.832**	other	**0.042**	**0.031**	**0.928**
		(0.002)	(0.003)	(0.004)		(0.003)	(0.003)	(0.003)
		Netherlands						
		State in t				**State in t**		
		low	higher	other		low	higher	other
	low	**0.413**	**0.375**	**0.212**	low	**0.798**	**0.142**	**0.060**
		(0.014)	(0.013)	(0.011)		(0.015)	(0.013)	(0.009)
State	higher	**0.022**	**0.868**	**0.110**	higher	**0.005**	**0.984**	**0.012**
in $t-1$		(0.001)	(0.003)	(0.002)		(0.001)	(0.001)	(0.001)
	other	**0.048**	**0.139**	**0.813**	other	**0.044**	**0.027**	**0.930**
		(0.004)	(0.006)	(0.006)		(0.005)	(0.004)	(0.006)
		Germany						
		State in t				**State in t**		
		low	higher	other		low	higher	other
	low	**0.427**	**0.407**	**0.166**	low	**0.751**	**0.168**	**0.081**
		(0.010)	(0.010)	(0.007)		(0.012)	(0.010)	(0.008)
State	higher	**0.026**	**0.933**	**0.041**	higher	**0.008**	**0.967**	**0.025**
in $t-1$		(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
	other	**0.067**	**0.110**	**0.824**	other	**0.059**	**0.043**	**0.898**
		(0.003)	(0.003)	(0.004)		(0.004)	(0.003)	(0.004)

Note: The observed transitions are estimated with the first-order Markov model. The latent transitions are estimated with the MLM model. The reference person in the MLM model is a person having the 'average' characteristics. The covariates included in the MLM model are calendar time, age, education, labour market experience (not available in the Netherlands) and the Gini coefficient.

The implication of controlling for possible classification errors on the estimates of the transition probabilities between earnings states is illustrated in Table 5.3. The left panel of the table shows the observed transitions while the right panel shows the true (i.e. latent) transitions. Observed transitions represent the estimated transitions from the simple first-order Markov model (Model 1), and latent transitions denote the estimated transitions from the Latent Markov model without covariates (Model 2). The former are thus transitions that are 'contaminated' by measurement error while the latter are 'error-free'. Verifying the findings of previous research, we find that low-pay transitions are considerably less than originally thought. More specifically, we find that observed transitions from low to higher pay are overestimated by a factor of 2.4 - 2.6. Without controlling for measurement error, 37.1% of British low-paid workers increase their earnings above the low-pay threshold in

a one-year period. This fraction of year-to-year movers drops to 15.2% when we control for measurement error. Results for the other two countries are similar. The 'true' amount of transitions from low to higher pay in Germany is 16.8% and not 40.7% as the 'error-contaminated' model suggests. In the Netherlands, the true low-to-high pay transitions are even less frequent: 14.2% compared to 37.5% as estimated by the first-order Markov model.

In all three countries, the transitions from higher to low pay are also severely overestimated. Although the transition probabilities are much lower than those from low pay, the fraction of spurious transitions is larger. More specifically, in the UK, these transitions are overestimated by a factor of 4.6, in the Netherlands by 4.4, and in Germany by 3.6.

Interesting cross-country differences emerge from Table 5.3. In accordance with Pavlopoulos and Fouarge (2006), the smallest low-to-higher pay transition probability among the three countries under scrutiny is found for the Netherlands. Although, this country is the most egalitarian in terms of wage inequality, it presents the largest persistence in low pay. The highest transition probability from low to higher pay is found in Germany.

A sensitivity analysis

The analysis we performed until now was based on a low-pay threshold equal to two-thirds of the median wage. However, the OECD (1996) suggests that both the incidence of low pay within a country and the ranking of countries with respect to low-pay incidence are sensitive to the choice of the low-pay threshold. To check whether our results are also sensitive to this choice, we repeated the same analysis with different low-pay thresholds. We restrict our tests to relative measures of low pay as these are more appropriate for cross-country comparisons than absolute measures (Förster, 1994). More specifically, instead of two-thirds of the median wage as low-pay thresholds, we use 50% and 40% of the median hourly wage as well as the 25th percentile of the hourly wage distribution. The 50% of the median is a measure used often by EUROSTAT, while the 40% of the median is a level close to the UK poverty line derived from the Supplementary Benefit scale. The 25th percentile of the wage distribution provides a purely relative threshold assuming that the fraction of low-paid workers is constant across time points. Figure 5.1 shows that moving the low-pay threshold from two-thirds of the median to the 50% of the median results in a considerable reduction in the proportion of the low paid in all three countries. The elasticity of the proportion of low paid with respect to the percentage of the median at which the low-paid threshold is set equals 1.095 in the UK, 0.845 in Germany and 0.595 in the Netherlands.[5] This means that the percentage of low-paid workers is most sensitive to the low-pay threshold in the UK, and

[5]These elasticities are calculated for values close to 66% of the median.

least sensitive in the Netherlands.

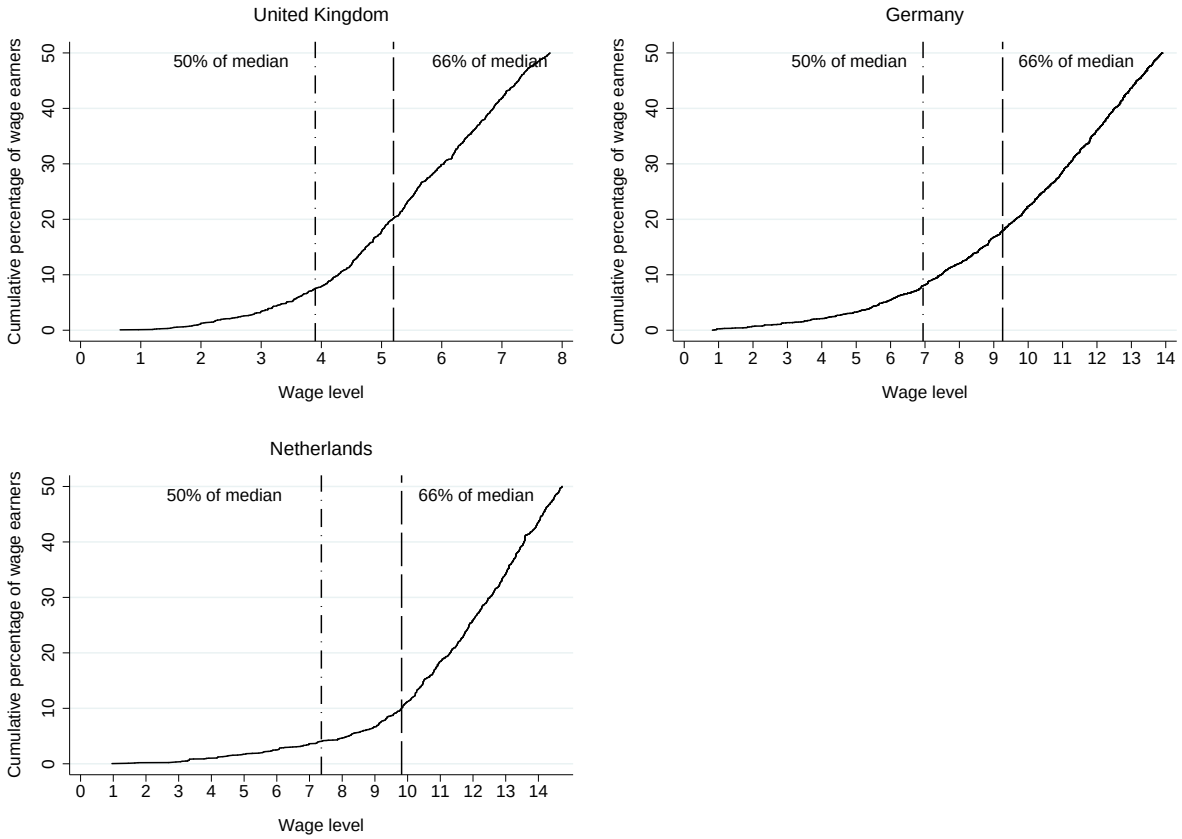

Figure 5.1: Distribution of the hourly wage for male workers aged 16-55 and for the year 2000.

Table 5.4 presents the main findings from the analysis using each of these alternative definitions of low pay, where we concentrate on transitions from low pay. As can be seen, the lower the percentage of the median at which the threshold is set, the higher the transition rate out of low pay. The ranking of countries with respect to the low-pay transition probability remains unchanged when we consider the aggregate transition probability from low pay. However, if we focus on transitions from low to higher pay, the transition probability is the highest in the UK when we apply the thresholds of 40% or 50% of the median, whereas it is highest for Germany with the higher threshold. It seems, therefore, that the liberal British labour market ensures slightly higher mobility rates to workers that are at the very low end of the wage distribution than is the case for the highly regulated German labour market. Since the wage distribution of the UK is more left-skewed than the German distribution, the average distance from the low-pay threshold is much larger in the UK than in Germany, which makes crossing the threshold much more difficult for the British low-paid workers

Table 5.4: Sensitivity of low-pay transitions to the low-pay threshold

	UK			**Netherlands**			**Germany**		
	low	higher	other	low	higher	other	low	higher	other
2/3 of the	**0.793**	**0.152**	**0.055**	**0.798**	**0.142**	**0.060**	**0.751**	**0.168**	**0.081**
median	(0.010)	(0.009)	(0.005)	(0.015)	(0.013)	(0.009)	(0.012)	(0.010)	(0.008)
50% of the	**0.728**	**0.203**	**0.069**	**0.776**	**0.159**	**0.065**	**0.714**	**0.190**	**0.096**
median	(0.016)	(0.014)	(0.008)	(0.031)	(0.027)	(0.016)	(0.016)	(0.013)	(0.012)
40% of the	**0.704**	**0.208**	**0.088**	**0.749**	**0.176**	**0.075**	**0.689**	**0.199**	**0.112**
median	(0.023)	(0.019)	(0.016)	(0.045)	(0.042)	(0.022)	(0.023)	(0.020)	(0.017)
25th	**0.857**	**0.100**	**0.043**	**0.868**	**0.104**	**0.028**	**0.844**	**0.100**	**0.056**
percentile	(0.006)	(0.005)	(0.003)	(0.007)	(0.006)	(0.003)	(0.005)	(0.004)	(0.003)

Note: These transition probabilities are estimated using separate Latent Markov models, each time by using a different low pay threshold. Here we only present the transition probabilities from low pay.

than for the German ones. When we apply a lower threshold, the average distance from the threshold in the UK is decreased and low-pay transition probabilities increase considerably. Again, the lowest low-pay transition probabilities are found in the Netherlands.

Analytical part

As a next step in our analysis we assess the impact of classification errors in the earnings state on the estimated covariate effects of our panel-regression model. For this purpose, we compare the estimates from Model 5 and Model 6. The main variables of interest are labour market events that can potentially account for a considerable wage change, and can therefore cause a transition from low to higher pay or vice versa. These event variables are a change of employer, an occurrence of formal training, a transition from a temporary employment contract to a permanent one, or vice versa, and a transition from part-time employment to full-time employment, or vice versa. We also investigate the effect of the life events of marriage and divorce. Our control variables are calendar time, age, education, and labour market experience. To make cross-country comparisons in low-pay transition probabilities possible, we need to account for the different structure of the wage distribution in different countries. This is accounted for by using the Gini coefficient for wage inequality as a control variable.

One commonly-used specification is to allow covariates to affect the probability of being in a certain state at a time point t. We use another more flexible specification in which

covariates have an effect on making a particular type of transition. For example, our model estimates the effect of a job change on making a transition from low pay to higher pay rather than 'just' estimating the effect of this covariate on being in low pay. The statistical significance of the difference between the estimate of each covariate effect in the 'error-contaminated' model (Model 5) and the 'error-free' model (Model 6) is assessed using a Hausman test.

We first discuss the estimates from Model 6, the 'error-free' model. Table 5.5 shows that different events account for low-pay transitions in different countries. Job-related training has a positive effect on the probability of a low-to-higher pay transition in the UK and in the Netherlands, while it has no effect in Germany.[6] In the UK, a job change increases the probability for a low-to-higher pay transition. However, this is not the case in Germany. The latter finding for Germany seems to contradict the findings of Pavlopoulos et al. (2007) that show that a job change can produce significant wage gains for low-paid workers. These differences may be due to two factors: firstly, in the two studies wage mobility is modelled in a different way. Pavlopoulos et al. model absolute wage growth, while in this study we model the probability of moving from low pay to high pay and vice versa. Secondly, the samples in the two studies are different. Pavlopoulos et al. consider only full-time workers, while here, we include in our sample both full-time and part-time workers. Furthermore, in both the UK and Germany, a job change increases the probability of moving from higher to low pay.

Changes in the employment contract type do not account for low-pay transitions in the UK or the Netherlands. The only significant finding is that a shift from permanent to temporary employment increases the probability of a higher-to-low pay transition in the UK. The findings for these two countries are not surprising, as in neither of them is a temporary contract a characteristic of a 'bad' job. Since in the British labour market employment protection for both permanent and temporary workers is low, both types of employment have the same status with respect to job quality. The Dutch labour market is also featured with a high level of flexibility, which in turn produces a high level of occupational mobility (Muffels & Luijkx, 2006). We should stress here, however, that in the Netherlands, changes of the employment contract and shifts from part-time to full-time employment, or vice versa, may also have captured the effects of a job change, as in this country we did not include a relevant variable due to data artifacts.

The picture for Germany differs considerably from the UK and the Netherlands. A shift from temporary to permanent employment increases the probability of a low-paid to

[6]Our variable for training does not include apprenticeship. In Germany, apprenticeship is included as a control variable. Our results show that having apprenticeship qualifications increases the probability of a low-paid to higher-paid transition. Since our focus is on events, we do not present these results here.

Table 5.5: Results from the Mixed Latent Markov model

			The UK			**The Netherlands**			**Germany**		
	Origin state	Destination state	no ME correction	with ME correction	Difference	no ME correction	with ME correction	Difference	no ME correction	with ME correction	Difference
Marriage	Low	Higher	**0.229**	**0.349**		**-0.047**	**0.252**		**0.093**	**0.384**	
	Low	Other	**-0.648**	**-0.864**		**0.059**	**0.430**		**-0.382**	**-0.067**	
	Higher	Low	**-0.245**	**-1.384**		**0.054**	**1.357***		**-0.199**	**-0.068**	
Divorce	Low	Higher	**-0.454**	**-1.486**		**-0.703**	**0.144**		**0.771**	**0.698**	
	Low	Other	**0.347**	**0.529**		**-4.583**	**-4.258**		**-1.457**	**-2.282**	
	Higher	Low	**0.186**	**0.041**		**0.493**	**-1.806**		**-0.692**	**-4.497**	
Training	Low	Higher	**0.184**	**0.387****	**52.3%*****	**0.579****	**0.909*****	**36.3%*****	**-1.332*****	**-0.801**	**-66.3%*****
	Low	Other	**-0.327****	**-0.544****	**40.0%*****	**-0.075**	**-0.300**		**0.580**	**4.210*****	**86.2%****
	Higher	Low	**-0.296*****	**-0.414****	**28.5%*****	**-0.107**	**-0.300**		**1.336*****	**1.236*****	-8.1%
Job change	Low	Higher	**-0.058**	**0.255****	**122.9%*****				**0.232**	**0.075**	
	Low	Other	**-**	**-**					**-**	-	
	Higher	Low	**0.811*****	**1.545*****	**47.5%*****				**0.383*****	**0.683*****	**43.9%*****
Temporary to permanent contract	Low	Higher	**0.136**	**-0.406**		**-0.390**	**0.178**		**0.457***	**0.644****	**29.1%*****
	Low	Other	**-**	**-**		**-**	**-**			**-**	
	Higher	Low	**0.461**	**-0.027**		**-0.037**	**-3.514**		**-0.430***	**-1.222*****	**64.8%*****
Permanent to temporary contract	Low	Higher	**-0.014**	**0.348**		**0.827*****	**0.401**	**-106.5%*****	**-0.592****	**-0.293**	**-102.1%*****
	Low	Other	**-**	**-**		**-**	**-**		**-**	**-**	
	Higher	Low	**0.569***	**1.548*****	**63.3%*****	**-0.343**	**-0.830**		**0.861*****	**1.357*****	**36.5%*****
Full to part time work	Low	Higher	**-0.337**	**-0.976**		**-0.026**	**-0.075**		**-0.301**	**-0.770**	
	Low	Other	**-**	**-**		**-**	**-**			**-**	
	Higher	Low	**0.493**	**2.290*****	**78.5%*****	**0.944*****	**2.877*****	**67.2%*****	**0.647*****	**1.148*****	**43.7%*****
Part to full time work	Low	Higher	**-0.322**	**0.063**		**0.037**	**0.606**		**-0.203**	**0.085**	
	Low	Other	**-**	**-**		**-**	**-**		**-**	**-**	
	Higher	Low	**1.107*****	**2.509*****	**55.9%*****	**0.767****	**2.934*****	**73.8%*****	**1.321*****	**2.287*****	**42.2%*****
Unobserved heterogeneity		Higher	**1.605*****	**-1.953*****	**182.2%*****	**-1.723*****	**-0.219**	**-687.3%*****	**-1.508*****	**-0.570*****	**-164.8%*****
		Other	**-0.401*****	**-0.098**	**-308.7%*****	**-0.384*****	**1.371*****	**128.0%*****	**-0.373*****	**-2.580*****	**85.5%*****

* significant at 10%; ** significant at 5%; *** significant at 1%

The dependent variable is the earnings state. It takes three values: low pay, higher pay and other. Transitions between all states are modelled. However, here we only present the estimates on the transitions from low to higher pay, from low to the 'other' state and from higher to low pay. The control variables are calendar time, age, education, labour market experience and the Gini coefficient.

higher-pay transition and decreases the probability of a higher-paid to low-paid transition. The reverse shift from permanent to temporary employment increases the probability of a higher-paid to low-paid transition. Again, this is not surprising, as temporary employment in Germany holds a much lower status than in the UK and the Netherlands. The German labour market is a typical 'insiders' labour market, where workers in the primary segment enjoy a high level of employment protection and higher wages, while their colleagues in the secondary segment are much less protected and much more exposed to low pay (Blossfeld, 2001). A shift from temporary to permanent employment is likely to represent a move from the secondary segment to the primary segment of the labour market.

A shift from full-time to part-time employment or vice versa is also an important determinant of low-pay transitions. A common finding for all three countries emerges: there is no significant effect on transitions from low to higher pay from a change from full-time to part-time employment. Moreover, in all three countries, such a shift increases the probability of a transition from higher to low pay. This results is plausible, as a shift from full-time to part-time employment may be accompanied by a demotion or a shift to a job that is less important for the firm. We would expect this effect to be stronger in countries such as Germany, where part-time employment is uncommon and therefore holds a low status, than in countries such as the UK and the Netherlands, where part-time employment is widespread. Nevertheless, the estimated effects are large and significant in all three countries.

The reverse shift, from part-time to full-time employment also increases the probability of a transition from higher to low pay. This result is definitely counter-intuitive. In countries where part-time work holds a considerably low status, such as Germany, we would expect shifts from part-time to full-time employment to have a positive effect on the low-to-higher pay transition probability. On the contrary, in countries where part-time employment is not an indicator of job quality, such as the UK and the Netherlands, we would expect to find smaller effects than in Germany. However, these expectations are not supported by our findings. An explanation for this could be a possible correlation between the error in the dependent variable and the relevant covariate. Working hours is used both for the construction of our dependent variable (i.e. the earnings state) and for the definition of a dummy for a full-time to part-time shift as well as for a part-time to full-time shift. Therefore, any error in the measurement of the number of working hours affects both variables.

As far as the expected impact of correcting for measurement error is concerned, the findings in Table 5.5 are in accordance with our expectations. Comparing the estimates of Models 5 and 6 shows that many covariate effects are attenuated when not controlling for measurement error. For example, the effect of job change on the transition from higher to low paid in the UK is underestimated by 47.5%. The effect of training on the transition from

low to higher pay in the Netherlands is underestimated by 36.3%. However, in some cases covariate effects are overestimated when measurement error is not controlled for. The effect of training on the transition from low to higher pay in Germany in overestimated by 66.3%. We should remember here that the difference in the sizes of the covariate effects between Models 5 and 6 may also represent processes other than just correction for measurement error in the dependent variable. If there is error in the measurement of the covariates, then this error might be correlated with the error in the dependent variable. In this case, what is being measured is a combination of two processes: the attenuation of the effect of the covariate due to the classification error in the earnings state, and the ambiguous effect of the correlation of the errors in the dependent and the independent variable.

In most cases, however, the effect of the covariates is strengthened when correcting for measurement error. Therefore, controlling for classification error in the earnings state is necessary in order to obtain correct (or at least more correct) estimates of the covariates.

5.6 Conclusions

In this study, we investigated the effect of measurement error on observed low-pay transitions in survey data. Compared to previous approaches, the advantage of our method is that it does not require the use of validation or re-interview data. It is instead based on longitudinal information on a single measure of income - the hourly wage. As in all relevant studies without validation data, correction for measurement error requires making certain assumptions. Classification error was assumed to be serially uncorrelated as well as independent of the covariates. Although these assumptions might sound daring, no clear evidence against their validity exists. While our approach cannot distinguish between measurement error and certain other forms of randomness in earnings transitions, it is quite powerful when one is interested in investigating the 'permanent transition behavior' of individuals, which is what is of main interest from a policy perspective.

Our Mixed Latent Markov model was applied to survey data from the UK, Germany and the Netherlands. Controlling for measurement error is found to be necessary in order to produce robust estimates of low-pay transitions. Low-wage mobility is considerably lower than originally thought. Whereas descriptive statistics from household surveys show that at least one third of low-paid workers increase their earnings above the low-pay threshold within one year, our study indicates that the true year-to-year upward mobility for the low paid is no greater than 17%.

Correcting for measurement error also allowed us to estimate the 'true' cross-country differences in low-pay mobility. In all three countries, a considerable amount of low-pay

persistence emerges. Furthermore, the ranking of countries with respect to this persistence is rather surprising. Probably the most unexpected finding concerns the position of the Netherlands. In this country, we found the lowest proportion of low-paid workers among all three countries. However, in the Netherlands the low-paid workers have the lowest probability of improving their earnings status of all three countries. It is evident, therefore, that although low pay is less common in the Netherlands than in the UK and in Germany, the combination of job security with flexibility that characterizes the Dutch labour market does not ensure good prospects for the low-paid workers. The liberal labour market of the UK performs somewhat better with respect to low-pay transition probabilities than the Dutch labour market. However, it seems that the high levels of job mobility in the UK do not ensure sufficient upward mobility opportunities for the workers in the lowest part of the distribution. According to the most commonly-used low-pay threshold (i.e. two-thirds of the median wage) the highest low-pay mobility levels are found in the regulated labour market of Germany. Mobility rates in the UK and in Germany become similar (although slightly higher in the UK) if we move the threshold further towards the lower end of the wage distribution.

Moreover, we investigated the amount of bias that classification error may cause in the estimates of a panel-regression model for low-pay transitions. Our main finding was that most of the effects of labour market events - job change, training, shift from temporary to permanent employment, from part-time to full-time employment and vice versa - are considerably attenuated due to measurement error. These events can indeed account for low-pay transitions. However, their effect varies between countries.

An extension of this study may concern relaxing the first-order Markov assumption. Several studies, such as Shorrocks (1976) and Lillard and Willis (1978), suggest that higher order processes determine income mobility. According to these studies, the higher order processes are caused by heterogeneity and unobserved serial correlation. Measurement error is another source for such higher order processes. Most of these problems of the first-order Markov model were tackled in this paper. Nevertheless, investigating the existence of further higher order dependencies may be useful in explaining wage mobility.

The applicability of the method described is not restricted to earnings dynamics. The study of employment transitions is the first obvious candidate for such an approach. Furthermore, the effect of measurement error on low-pay mobility has not been fully explored in this study. More specifically, we were not able to distinguish spurious transitions from certain forms of random - but true - transitions. Combining data sources for earnings - panel survey and administrative sources - may help us identify measurement error. Another interesting challenge for further research is to combine the correction method for measurement error provided by this paper with the correction for the endogeneity of initial conditions, non-

response and attrition suggested by other studies on income dynamics (Stewart & Swaffield, 1999; Cappellari & Jenkins, 2004b).

Appendix: Description of the variables

Calendar time: We use dummies for every year. For the UK, this varies between 1991 and 2004, for Germany between 1991 and 2004 and for the Netherlands between 1991 and 2002.
Gini coefficient: This is the Gini coefficient for the male hourly wages. It is calculated on a yearly basis.
Education: This is the highest educational level completed by the individual. It can take three values, lower than high school, high school and higher education.
Training: It takes the value 1 when the individual received formal training during the year prior to the survey and 0 in all other cases.
Labour market experience: Measured in months. This is available only for the UK and for Germany. It is constructed by combining data from the yearly files and the employment history files of BHPS and GSOEP.
Age: Measured in years.
Marriage: It takes the value 1 when the individual became legally married during the year prior to the survey and 0 in all other cases.
Divorce: It takes the value 1 when the individual got a divorce during the year prior to the survey and 0 in all other cases.
Job change: It takes the value 1 when the individual changed an employer during the year prior to the survey and 0 in all other cases. It also takes the value 0 when the individual moves from or to non-employment as well as when he remains in non-employment. This variable was not included for the Netherlands.
Temporary to permanent: It takes the value 1 when the individual reported being employed with a temporary contract in $t-1$ and being employed with a permanent contract in t and 0 in all other cases. It also takes the value 0 when the individual moves from or to non-employment as well as when he remains in non-employment.
Permanent to temporary: It takes the value 1 when the individual reported being employed with a permanent contract in $t-1$ and being employed with a temporary contract in t and 0 in all other cases. It also takes the value 0 when the individual moves from or to non-employment as well as when he remains in non-employment.
Part-time to full-time: It takes the value 1 when the individual reported being employed part-time in $t-1$ and being employed full-time in t and 0 in all other cases. It also takes the

value 0 when the individual moves from or to non-employment as well as when he remains in non-employment.

Full-time to part-time: It takes the value 1 when the individual reported being employed part-time in $t-1$ and being employed full-time in t and 0 in all other cases. It also takes the value 0 when the individual moves from or to non-employment as well as when he remains in non-employment.

Chapter 6

Wage Mobility: Summary and Discussion

The aim of this thesis was to investigate wage mobility at the micro level and at the macro- or cross-country level. At the micro level we examined the extent to which people move between the different parts of the wage distribution and the factors that determine these moves. In addition, we studied whether the factors that determine wage mobility are different across the various parts of the wage distribution. Special attention was paid to the wage mobility patterns of individuals at the lowest part of the distribution. At the macro level, our aim was to investigate the effect of labour market institutions on wage mobility. As our focus was on wage mobility at the micro and macro levels we applied a multilevel approach. In addition to exploring individual and cross-country differences in wage dynamics, we studied whether the determinants of wage mobility at the individual level vary across countries having different institutional characteristics. In other words, we investigated whether and how individual and institutional characteristics interact in the way they affect wage dynamics.

More specifically, in Chapter 1, we raised five research questions that we tackled in this thesis:

> Research question 1: *Is wage mobility different for the various parts of the wage distribution?*

This question was tackled in Chapters 2, 4 and 5. In Chapter 2, we modelled the full set of origin states - deciles - in the wage distribution using a flexible multinomial logit model that applied restrictions that are common in log-linear analysis. Our study contributes to our knowledge on the effect of the origin state on wage mobility, as previous studies were mostly descriptive and did not provide a formal test of the differences in the wage dynamics

between the various parts of the distribution. Wage mobility was defined here by the year-to-year changes in the decile position in the wage distribution. In Chapter 2 we established that year-to-year positional mobility varies considerably across the different parts of the wage distribution. We found low mobility levels in both the bottom and the top of the distribution, and somewhat higher mobility levels in the middle of the distribution. This result is in accordance with the descriptive findings of previous research. In Chapters 4 and 5, we investigated whether the returns to certain labour market events are different across the various parts of the wage distribution. Chapter 4 examined the relationship between wage mobility and job change, and distinguished between low-paid, medium-paid and high-paid workers. In this chapter, it was shown that the low-paid worker gains a higher increase of his wage from a job change - as a percentage of his initial wage - than the high-paid worker. On average, the low-paid external mover (in the UK) enjoys a 6.7% higher wage growth than the low-paid stayer, or (in Germany) a 6.3% higher wage growth than the low-paid stayer. The wage growth of the high-paid external mover is, on average, the same (in Germany) or even lower (in the UK) than the wage growth of the high-paid stayer. Chapter 5 investigated the wage returns of several labour market events: a job change, an employment contract change and a shift from part-time to full-time employment and vice versa. In this chapter, we distinguished between low-paid and higher-paid workers, and we modelled the transition probability between these two states, while controlling for transitions to non-employment. As far as the event of a job change is concerned, the main results of Chapter 4 and Chapter 5 are similar. In both chapters, we find that the wage returns of a job change are different for the low-paid and for the high-paid worker. On average, the low-paid worker benefits relatively more from a job change than the high-paid worker. Furthermore, in Chapter 5, we found that in most cases a shift from a permanent to a temporary contract as well as a shift from part-time to full-time employment, or vice versa have a different effect for the low-paid worker and the higher-paid worker.[1] A 'negative' event - i.e. a shift from a permanent to a temporary contract, and a shift from full-time to part-time employment - has a negative effect on the wage mobility of the higher-paid workers only. The relevant 'positive' effect - i.e. a shift from a temporary to a permanent contract and a shift from part-time to full-time employment does not always have a positive effect on the wage mobility of the low-paid workers. These findings suggest that the pay-off from these labour market events is conditional to the pay level. Differences in labour market behaviour and in the availability of jobs for the low-paid and the high-paid worker seem to determine whether they benefit

[1]By 'different effect' we do not mean that the coefficient has a different sign for the low-paid and higher-paid worker. By contrast, a similar effect would mean that, for example, a shift from a temporary to a permanent contract increases the probability of a low-to-higher pay transition and decreases the probability for a higher-to-low pay transition.

from these events.

> Research question 2: *Do European countries differ with respect to wage mobility, and which factors explain these cross-country differences?*

This question was tackled in all four essays of this thesis. The reason for studying cross-country differences in wage mobility was that we wanted to investigate the effect of labour market institutions in shaping patterns of wage dynamics. This was done by following a two-pronged approach. Firstly, in Chapter 2, we followed a direct approach and examined whether specific measures for labour market institutions can account for the cross-country differences in wage mobility in 12 European countries. We used two types of measures for labour market institutions - direct measures of wage-setting institutions, namely trade union density, collective bargaining coverage, and the Employment Protection Legislation (EPL) index as well as a classification of countries into regime types according to the characteristics of their labour market. This classification resembles the classification of Esping-Andersen (1990). Secondly, in Chapters 3-5, we used an indirect approach and investigated whether the microeconomic mechanisms that determine wage dynamics differ across countries with very different institutional characteristics. In these chapters, we were not able to formally employ a multilevel approach that would allow us to test the impact of institutions. However, by comparing two or three countries, inferences were able to be made about the possible role of institutions. These inferences are based on plausible reasoning and not on a formal test.

In Chapter 2, we established that the above-mentioned institutions account for cross-country differences in wage dynamics. This chapter finds evidence against the assumption that workers attain higher levels of wage mobility in countries with a liberal-unregulated labour market than in countries with a highly regulated labour market. The highest mobility levels were found in countries that combine flexibility in the labour market with a high level of income and employment security, namely Denmark and the Netherlands. The lowest levels of mobility were found in two countries with very different labour market institutions; in the UK, which is supposed to achieve efficiency through increased labour market mobility, and in Portugal, which has a high level of employment protection (European Commission, 2006). The rest of the Southern European countries were found to differ considerably from Portugal: Greece, Italy and Spain have higher levels of wage mobility. This finding is rather surprising, as we expected the strong employment protection regulation of these countries to result in low levels of wage mobility. A possible explanation for this unexpected finding 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. The only assumption that was clearly verified was that the countries of continental Europe - France, Germany and Austria - have lower levels of wage mobility than most of the other countries. In Chapter 2, it was also shown that the issue of wage mobility is complex and cannot be explained by a single measure of institutions. Our direct measures for labour market institutions were able to explain jointly 52.1% of the overall variation in wage mobility. The best performing measure was the EPL, which explained 34% of the overall variance. The indirect measure of institutions, the classification of countries by regime type, performed worse than the direct measures, as it explained 29.9% of the overall variance.[2] The lesson to be learnt from these findings is that direct measures of labour market institutions are better in explaining cross-country differences in wage dynamics than regime typologies. Nevertheless, the significant part of the country variance that is explained by the regime types indicates that the way in which flexibility on the one hand and income and work security on the other hand is balanced plays a role in explaining country differences even after controlling for a number of important macroeconomic indicators.

In Chapter 3, we showed that a worker who enters the labour market with a low-paid job has better chances of escaping low pay when the labour market is highly regulated and closely linked to the vocational training system than when government intervention in the labour market is low and the labour market is loosely linked to the education system (see also discussion for research question 2). This is indicated by the better performance of the German labour market compared to the British labour market with respect to the low-pay transition probabilities. In Germany, the estimated low-pay transition probability of the average worker is .40 while in the UK it is .32. The surprising finding concerns the outcomes of the Netherlands, which is a country that combines a level of flexibility that is similar to the UK with an education system and an employment protection regulation that are similar to Germany. In this country, we found that the low-paid labour market entrants have the lowest probability of escaping low pay of all three countries (.24).

The findings of Chapter 3 for the ranking of countries with respect to low-pay transition probabilities are in line with the findings of Chapter 2 for the UK and for Germany but not for the Netherlands. Taken together, these findings are surprising. Although a strong low-pay persistence and increased mobility between low pay and non-employment is also found in other studies (Sloane & Theodossiou, 1998; Stewart, 2007), the dominant view in

[2]We should remind the reader here that these are not the outcomes of the analysis of the individual-level data. In Chapter 2, we first estimated a restricted multinomial logit regression model on individual-level data. The estimates of this model were analyzed further with ANOVA models. The variances reported here were estimated with separate ANOVA models (see chapter 2).

the economic debate suggests that wage mobility levels are higher in the liberal-unregulated labour market of the UK than in the highly-regulated German labour market. Our descriptive statistics in Chapter 4 are in accordance with this expectation; the average relative wage growth is higher in the UK than in Germany. Combining the findings of Chapters 2, 3 and 4, we can conclude that although absolute wage mobility is higher in the UK than in Germany, this does not result in higher positional changes in the wage distribution. In the UK, the economic upturn of the 1990s led to a considerable wage growth. However, this wage growth was not accompanied by a large amount of positional changes in the wage distribution. Chapter 5 corrects for measurement error and suggests that the ranking of the UK and Germany with respect to low-pay transition probabilities is sensitive to the choice of the low-pay threshold. When we apply the same threshold as in Chapter 3 - the two-thirds of the median wage - the 'true' low-pay transition probability is higher in Germany than in the UK. However, when we use a lower threshold (50% or 40% of the median wage) the UK comes first. It seems, therefore, that the liberal British labour market ensures slightly higher mobility rates to workers that are at the very low end of the wage distribution than is the case for the highly regulated German labour market. Since the wage distribution of the UK is more left-skewed than the German distribution. Therefore, the average distance from the low-pay threshold is much larger in the UK than in Germany, which makes the crossing of the threshold much more difficult for the British low-paid workers than for the German low-paid workers. When we apply a lower threshold the average distance from the threshold in the UK is decreased and low-pay transition probabilities increase considerably.

As mentioned before, probably the most surprising finding concerns the Netherlands. Chapter 2 suggests that workers in the Netherlands enjoy a higher positional mobility than in the UK or Germany. In Chapters 3 and 5, we found that the proportion of the low-paid workers in the Netherlands is much lower than in the UK and in Germany. Chapters 3 and 5, however, suggest also that Dutch workers at the lowest part of the distribution have the lowest mobility levels among the three countries. It becomes apparent, therefore, that the Dutch labour market is successful in keeping at low levels the proportion of workers that earn low wages and in ensuring high levels of wage mobility to workers in the middle and the top of the distribution. However, it is not particularly successful in providing mobility opportunities to workers at the bottom of the distribution. The functional classification system of jobs in the Netherlands may provide an explanation for this finding. This system classifies wages assigned to jobs according to skills and education level and creates barriers for wage increases. Consequently, this may hamper flexibility. It may, therefore, be the case that this classification system works as a sort of glass ceiling for the low-skilled workers in the Netherlands.

Research question 3: *Which type of human capital determines whether a low pay spell at the beginning of the working career is a stepping-stone to better earnings or a trap that young workers cannot easily escape from?*

This question was tackled in Chapter 3. In this chapter, we tested the predictions of the school-to-work transition theory with respect to the wage and employment perspectives of the low-paid labour market entrants. The school-to-work transition theory (see, for example, Ryan, 2001) suggests that wage levels at the beginning of the working career are affected considerably by the link between the education system and the labour market. If the job requirements correspond to specific educational or vocational training qualifications, the screening of workers takes place at the moment of hiring, and the employer can immediately pay the worker a wage that is close to his marginal productivity. However, when no such correspondence exists, the employer has little information on the productivity of the worker. In this case, the education of the worker serves as a signal for his productivity, and the screening takes place during the initial period after hiring. After this period, the employer has more information on the productivity of the worker and the wage can increase.

All previous research has focused on studying the consequences of entering the labour market with a flexible or low-level job. Our contribution is that we investigated the consequences of entering the labour market with a low-paid job. Our aim was pursued with a competing-risks duration model. The competing risks correspond to the possible pathways out of low pay: higher pay, unemployment, self-employment and inactivity. Unobserved heterogeneity was controlled for with the non-parametric approach of Heckman and Singer (1984). This non-parametric approach is much more flexible than the parametric approach to control for unobserved heterogeneity that is typically applied in duration models. Our findings were largely in accordance with the predictions of the school-to-work transition theory. We found that when the link between the education system and the labour market is strong, general skills that are provided either by education or by vocational training are rewarded. If this link is weak, skills acquired on-the-job weigh more in determining low-pay exits. As mentioned above, we found that the country that performs best in terms of ensuring upward mobility opportunities to the low-paid labour market entrants is Germany. The German apprenticeship system may explain this finding. The majority of young Germans go through a 2-3 year period of apprenticeship before formally entering the labour market. Notwithstanding the criticism that has been made of the quality of some of the apprenticeship training tracks (Acemoglou & Pischke, 1998; Kiiver & Muysken, 2005), apprenticeships ensure a smooth transition from education to the labour market for the majority of young Germans.

Research question 4: *What is the relationship between wage mobility and a job change with another employer or within the firm, and to what extent does it differ between the low-paid and the high-paid workers?*

This question was tackled in Chapter 4 and also partly in Chapter 5. The job-search theoretical approach was adopted in Chapter 4. In this chapter, we focused particularly on a property of the on-the-job search model (Mortensen, 1986) that has been neglected by the literature despite the fact that the relationship of job mobility and wage mobility has been extensively investigated. This property suggests that both the probability of changing a job and the difference between the current wage and the reservation wage are higher for the low-paid worker than for the high-paid worker (van den Berg, 1992). Another novel aspect of this study is that we investigated whether the relationship between wage mobility and job change varies across external and in-firm job changes. This issue has also received little attention in economic research. Moreover, the available empirical evidence is contradictory as some studies find a positive effect of within-firm job changes on wage growth, while other studies find a negative effect. The endogeneity of wage growth with respect to job change was tackled with a two-step estimation of the Heckman type. Our findings were not always consistent with the theoretical model. The probability of changing jobs was found to be higher for the low-paid worker than for the high-paid worker in only one of the countries (the UK). The relative wage return of an employer change was always found to be higher for the low-paid than for the high paid worker. This finding pertained to job changes within the same firm, but only in the UK. In Germany, within-firm job changes do not produce, on average, any wage gains either for the low-paid worker or for the high-paid worker. Individual behaviour seems therefore sometimes to be more complex than the simple job-search model suggests. This seems to be more the case for the high-paid workers. On average, these workers do not benefit a great deal from a job change. However, high-paid workers may benefit from other monetary or non-monetary types of compensation that are not captured by our analysis. More specifically, our dependent variable in Chapter 4 is the hourly wage. Some workers - usually high-paid workers - receive bonus payments that are paid on a yearly basis, or other forms of fringe benefits.

As mentioned above, the findings of Chapters 4 and 5 confirm that the effect of a job change on wage mobility is different for the low-paid workers compared to the high-paid workers. Nevertheless, some differences emerge in the findings of these two chapters. In Chapter 5 we find that, in Germany, a job change does not increase the probability of a transition from low pay to higher pay and that it increases the probability of a transition from higher pay to low pay. By contrast, in Chapter 4, we found that in Germany the low

paid worker changing employer enjoys a higher wage return than a colleague staying in the same job. Furthermore, in Chapter 4 we found that in Germany, no differences in wage returns emerge between the high-paid external movers and the high-paid stayers. These differences may be due to two factors: firstly, we model wage mobility in the two chapters in a different way. In Chapter 4, we model absolute wage growth, while in Chapter 5 we model the probability of moving from low pay to high pay and vice versa. Secondly, our samples in the two chapters are different. In Chapter 4, we consider only full-time workers, while in Chapter 5, we include both full-time and part-time workers in our sample.

> Research question 5: *What is the effect of measurement error on the number of low-pay transitions that we estimate in survey data and on the estimated covariate effects in a low-pay transition model?*

This question was tackled in Chapter 5, which investigated low-pay transition probabilities for prime-age male workers. Previous research has shown that measurement error may cause a considerable overestimation of earnings transitions. Studies have found that half the poverty transitions in the European Community Household Panel (ECHP) and in the German Socio-Economic Panel (GSOEP) are spurious. Despite these findings, most studies on earnings dynamics have ignored this phenomenon. In the studies that control for measurement error, the best suggested approach is the Latent Markov model of Rendtel et al. (1998). In Chapter 5, we advanced this approach. While Rendtel et al. controlled for measurement error in aggregate transition probabilities, we also corrected for observed and unobserved heterogeneity and worked with a much longer time series. Our econometric model was a random-effects multinomial logit model with a latent structure to correct for measurement error. By controlling for measurement error, we were able to estimate the error-free transition probabilities in the UK, Germany and the Netherlands. By controlling for heterogeneity we were able to investigate the effect of measurement error in the earnings state (low-paid, higher-paid, other) when used as a dependent variable in a panel regression model. In our multivariate model, we included covariates that can account for a considerable upward or downward change in the wage, and can therefore cause a worker to move from low pay to higher pay or vice versa. These covariates are labour market events; a job change, a change of employment contract type as well as a shift from part-time to full-time work or vice versa.

Because low-pay mobility was also investigated in chapters 2-4, it makes sense to compare our findings from these chapters with the findings of Chapter 5. The finding of Chapter 2 was that workers in the lower part of the distribution attain low levels of mobility. In Chapter

3, we found that the majority of the individuals that start their working career with a low-paid job have a high probability (.274 - .467) of increasing their earnings above the low-pay threshold within one year. The 'key' for the progression of their earnings is the education level, vocational training or firm-specific skills depending on the country in which they work (see discussion for research question 3). However, there is another smaller group of low-paid job starters that have few chances of improving their earnings (.019 - .083). Chapter 4 focused on prime-age workers and suggested that a voluntary employer change can be a good career move for the low-paid worker. In the UK, the low-paid worker can also improve his earnings by voluntarily changing jobs within the firm. Chapter 5, however, argues that we should be less optimistic about the upward wage mobility of the low-paid worker. In this chapter, we find that at least half of the low-pay mobility we observe is either due to measurement error or due to random and transitory moves out of low pay. More specifically, in Chapter 5, we found that the low-pay transition probability is no more than .17 instead of the .29 - .48 that is suggested by previous studies that do not control for measurement error.

Moreover, in Chapter 5, we found that classification error in the earnings states causes a considerable underestimation of much of the effect of the covariates of our panel regression model. More specifically, we found that the effect of a job change is underestimated by 43.9% - 102.9%. The effect of a change of contract type is underestimated by 29.1% - 63.3% and the effect of a shift from full-time to part-time employment and vice versa is underestimated by 42.2% - 78.8%. However, we should be cautious when drawing conclusions on the basis of these results alone. If error in the measurement of the covariates is present, then this error might be correlated with the error in the dependent variable. In this case, what is being measured is a combination of two processes: the attenuation of the effect of the covariate due to the classification error in the earnings state, and the ambiguous effect of the correlation of the errors in the dependent and independent variable. It is probably due to this that some of the covariate effects are larger in the model that does not correct for measurement error than in the error-free model.

The policy relevance of our findings

Our findings are particularly relevant from a policy perspective. It is apparent that institutions influence wage mobility. This is the finding of both our direct and indirect approach to studying the effect of institutions. In Chapter 2, we showed that measures for institutions account for a large part of cross-country differences. In chapters 3-5, we showed that the microeconomic mechanisms that determine wage dynamics vary when the institutions regulating the labour market are different. The findings of Chapter 3 suggest that initial

vocational training - e.g. through a period of apprenticeship - may help young individuals to increase their earnings at the beginning of their working career.

The main conclusion concerning policies is that a higher level of labour market flexibility does not always go hand-in-hand with more wage mobility opportunities for workers. By flexibility policies we mean measures that promote labour market mobility, such as the relaxation of stringent firing and hiring regulations and the stimulation of temporary employment and flexible working hours. On average, the highest levels of wage mobility were found in countries that combine a flexible labour market with a high level of income and work security, i.e. in the Netherlands and Denmark. However, adverse effects of flexibility policies seem to concern the low-paid workers that can improve living standards with an upward change in their wage. In both the UK and the Netherlands the labour market is characterized by a high level of flexibility. In the UK, the extent to which the state intervenes and the influence of trade unions are both small. A national minimum wage was introduced relatively late, in 1999 and firing and hiring regulations are weak for both permanent and temporary workers. Consequently, the levels of job and employment mobility are exceptionally high. In the Dutch labour market, labour market institutions are stronger than in the UK. There is a national minimum wage for those who are 21 years old or older with sub-minimum rates for workers up to 21 years of age. Collective bargaining regulates pay and employment conditions for the great majority of the Dutch workers. However, there is a lot of flexibility with respect to temporary contracts and working hours. Therefore, employers have more room to manoeuvre and to use these regulations in order to adjust to changing economic conditions, which in turn produces a high level of job turnover. Nevertheless, in neither of these two countries do low-paid workers benefit from the high level of labour market flexibility. Furthermore, in the UK, notwithstanding the high levels of wage growth, the position of all workers in the wage distribution does not change easily. More upward mobility opportunities for the low-paid workers emerge in Germany, where levels of temporary employment are moderate - with the exception of apprenticeships - and earnings progression is regulated extensively by collective bargaining. It becomes apparent, therefore, that there are winners and losers with respect to outcomes of the flexibility policies and that the low-paid workers usually belong to the losers group.

Issues open for further research

This thesis has tackled issues concerning wage mobility at the micro-level and macro-level. It extended our understanding of the role of the initial position in the wage distribution as well as of the role of labour market institutions in shaping wage mobility patterns at both levels. However, some issues remained unsolved. There are three players in the labour market: the

workers, the firms and the government, all affecting the levels of wage mobility: the state by setting the rules and the institutional conditions under which wage bargaining takes place; the firms through their human resource policies and strategies in particular their wage offers and the workers, collectively through trade unions and their wage demands and individually through their skills, effort and productivity. This thesis dealt extensively with one of these players, the workers, and we have also tried to investigate the role of another player - the government. The role of firm characteristics has been accounted for insofar as these could be linked to the worker. For example, in our analysis in Chapters 3 and 4 we controlled for the firm size and the business sector in which the worker is employed, but we could not control for the age or the economic performance of the firm or the sector. Moreover, the data that we used did not allow us to follow firms over time or to control for unobserved firm or sector characteristics that may be particularly relevant in determining the wages of the workers. Investigating jointly the effect of individual and firm characteristics may also prove informative regarding which of these two types of characteristics are more important in determining wage dynamics.

The issue of the effect of labour market institutions on wage mobility has also not been fully explored. As mentioned earlier, the available direct measures of these institutions are often a proxy for the levels of flexibility and not 'hard figures'. The indirect measures, such as the classification of countries into regime types, are also inadequate. For various reasons, when we find an effect of the regime type, it is unclear whether this represents the effect of the institutional set-up or the effect of other country-specific factors, such as culture, or the effect of differences in natural resources, inherited wealth or even differences in the environmental condition. The inadequacy of these measures led us to focus more on general cross-country differences rather than on formally testing the precise effect of institutions. The improvement in the way labour market institutions are measured can provide the tools in the future for improving research endeavours on explaining wage dynamics at the macro level.

Additionally, there are several ways to extend the research on the effect of labour market institutions on wage mobility. In Chapter 2 we investigated the effect of institutions on positional mobility. Looking also at other aspects of mobility, such as absolute mobility, will provide a more complete picture of the cross-country differences in wage dynamics and will further allow us to examine the effect of institutions. Another extension concerns the study of the interaction between institutions and the origin state in the wage distribution. In Chapter 2 we also investigated cross-country differences in wage mobility as well as mobility differences across the various parts of the wage distribution. These two variables - country and origin state - were not interacted as this would require the estimation of a model with

a huge number of parameters. Institutions, however, may not only affect the overall level of wage mobility in a country but also the differences in mobility levels between the various parts of the wage distribution. Such an analysis will hopefully be possible in the future with the availability of advanced statistical software tools.

Investigating the effect of the origin state on wage mobility raises, inevitably the issue of initial conditions. As many studies have pointed out, the sample of individuals being in a certain pay level (for example low pay) at a given point in time is not random. In our analysis, initial conditions were treated as exogenous since modelling their endogeneity would considerably complicate our analysis. This means that the findings of Chapter 4 - and also possibly of Chapter 3 - with respect to the origin state may be biased due to this endogeneity of initial conditions. Nevertheless, in Chapters 3 and 4 where the initial conditions may feature, we controlled for unobserved heterogeneity using rather long time series. Because of that, we were able possibly to partly capture the effect of initial conditions.

At the individual level, a possible extension concerns female wage dynamics, since we have only dealt with the wage mobility of male workers. The reason for this was that the labour supply behaviour and the working careers of male and female workers are very different. Especially in countries such as the Netherlands and Germany, part-time employment is very common among female workers. Female workers combine their employment with caring activities much more often than men. Women also interrupt their working career much more often than men in order to allocate more time to child care. Transition patterns are therefore, also very different. Consequently, including female workers would require accounting for these different choices or constraints that female workers experience. Such an extension may also provide more insight into the existence of gender differences in labour market mobility patterns. Labour market patterns of females tend to change over time. Recent research shows that younger generations of females are investing more in human capital and allocating more time to work than older generations. Research into the differential wage mobility patterns of different generations requires other kind of data (life-course data) and approaches.

Another possible extension at the individual level concerns household wage dynamics. Couples often make joint decisions on their labour supply, as they want to allocate their time between paid employment and household work. It is therefore particularly pertinent to investigate joint wage dynamics of couples.

Finally, in this thesis we explored specific methodological issues concerning low-pay mobility, such as measurement error. However, the effect of measurement error on low-pay mobility has not been fully explored. More specifically, we were not able to distinguish spurious transitions from certain forms of random (but true) transitions. Combining data sources for earnings - panel survey and administrative sources - may help us to identify measurement

error. Furthermore, previous research has shown that controlling for initial conditions and non-response is necessary in order to estimate true state dependence in wage mobility patterns. Combining the approach presented in Chapter 5 to control for measurement error with the approaches of other studies to control for initial conditions and non-response may provide a better estimate of the effect of the origin state on low-pay dynamics.

Samenvatting

Loonmobiliteit is een belangrijk onderwerp vanuit theoretisch, empirisch en beleids perspectief. Meer flexibiliteit op de arbeidsmarkt samen met een hoge mate van baanzekerheid is een van de belangrijkste doelen van de Europese Unie. Het bereiken van deze doelstelling moet van de Europese Unie '*de meest concurrerende en dynamische economie in de wereld*' maken.[3] Verschillende economische theorie?n, zoals de menselijk kapitaal theorie, de job-search theorie en de job-matching theorie, proberen loonmobiliteit op individueel en macroniveau te verklaren. Veel studies hebben deze theorien empirisch getoetst, maar studies die onderzoek naar loonmobiliteit op macro- en microniveau combineren zijn echter schaars. Bovendien is ook weinig onderzoek uitgevoerd naar het effect van de positie in de loonverdeling op loonmobiliteit.

In dit proefschrift onderzoeken we loonmobiliteit zowel op micro- als op macroniveau. Op microniveau bepalen de vaardigheiden, het talent en de prestatie van de werknemer het niveau en de mobiliteit van het loon. Op macroniveau kunnen instituties loonmobiliteit bevorderen of juist afremmen. Ten eerste zijn er instituties die direct invloed op loonmobiliteit hebben, zoals het minimumloon en vakbonden. De invloed van vakbonden wordt gewoonlijk gemeten door de vakbondsdichtheid en de dekkingsgraad van de collectieve arbeidsovereenkomst. Ten tweede zijn er andere instituties die een indirecte invloed op loonmobiliteit hebben, namelijk via baanmobiliteit. Het gemak om tijdelijke contracten te gebruiken, of om werknemers in dienst te nemen of te ontslaan zijn dergelijke instituties. Deze instituties be?nvloeden het landelijke niveau van baanmobiliteit. Aangezien loonmobiliteit tussen banen groter is dan loonmobiliteit binnen banen, hebben die instituties een sterke invloed op loonmobiliteit. De invloed van instituties hebben we onderzocht door landen met elkaar te vergelijken. Overigens richtten we ons in dit proefschrift alleen op mannelijke werknemers.

De volgende vijf vragen hebben we in het bijzonder aangepakt: (i) Zijn er verschillen in loonmobiliteit tussen de verschillende segmenten van de loonverdeling? (ii) Zijn er verschillen in loonmobiliteit tussen de Europese landen en welke factoren zijn verantwoordelijk voor die

[3]Strategische doel voor 2010, Lisbon European Council, March 2000.

verschillen? (iii) Welk type menselijk kapitaal bepaalt of een laagbetaalde periode aan het begin van de loopbaan een stepping-stone is naar een hoger loon of juist een val waar jonge werknemers niet eenvoudig uit kunnen ontsnappen? (iv) Wat is de relatie tussen loonmobiliteit en een baanverandering en is deze relatie anders bij interne (binnen hetzelfde bedrijf) of een externe baanverandering? Verschilt deze relatie tussen laagbetaalde en hoogbetaalde werknemers? (v) Wat is het effect van meetfouten op het aantal van low-pay transities in survey data en op de invloed van covariaten in een low-pay transitiemodel?

De eerste vraag is beantwoord in de Hoofdstukken 2, 4 en 5. In Hoofdstuk 2 hebben we de jaar-naar-jaar mobiliteit tussen de verschillende segmenten van de loonverdeling in 12 landen onderzocht. We hebben het European Community Household Panel gebruikt. We controleerden voor de complete reeks van herkomstposities - decielen - in de loonverdeling. Aan de onderkant en bovenkant van de verdeling bleek weinig mobiliteit te zijn, terwijl in het midden meer mobiliteit plaatsvond. In de Hoofdstukken 4 en 5 hebben we onderzocht of de loonmobiliteit van bepaalde arbeidsmarktgebeurtenissen verschilt tussen de segmenten van de loonverdeling. Hoofdstuk 4 gaat over de relatie tussen loonmobiliteit en baanverandering in twee landen: het Verenigd Koninkrijk (de UK) en Duitsland. We onderscheidden drie segmenten: laagbetaalde, middelhoogbetaalde en hoogbetaalde werknemers. We vonden dat een laagbetaalde werknemer die naar een ander bedrijf gaat een gemiddeld 6.7% (in de UK) of 6.3% (in Duitsland) hogere loongroei heeft dan zijn collega die in dezelfde baan blijft. De loongroei van een hoogbetaalde werknemer is doorgaans hetzelfde (in Duitsland) of lager (in de UK) dan die van zijn collega die in dezelfde baan blijft. In Hoofdstuk 5 hebben we de return van verschillende arbeidsmarktgebeurtenissen in drie landen (de UK, Duitsland en Nederland) onderzocht: een baanverandering, een wijziging van het arbeidscontract, een wijziging van deeltijd naar voltijd werk en vice versa. We vergeleken laagbetaalde met hoogbetaalde werknemers Onze afhankelijke variabele was de kans op een transitie van laag uurloon naar een hoger uurloon en vice versa. Bovendien controleerden we voor transities naar baanloosheid. In bijna alle gevallen heeft een wijziging van een vast naar een tijdelijk contract en een wijziging van voltijd naar deeltijd werk en vice versa een verschillend effect voor laagbetaalde en hoogbetaalde werknemers. Een 'negatieve' wijziging (van een vast naar een tijdelijk contract of van voltijd naar deeltijd werk) heeft alleen een negatieve invloed op de loonmobiliteit van hoogbetaalde werknemers. Een 'positieve' wijziging (van een tijdelijk naar een permanent contract of van deeltijd naar voltijd werk) heeft niet altijd een positief effect op de loonmobiliteit van laagbetaalde werknemers.

De tweede onderzoeksvraag werd in alle vier de hoofdstukken van het proefschrift beantwoord. We hebben crossnationale verschillen in loonmobiliteit onderzocht omdat we de invloed van instituties wilden onderzoeken. Dit hebben we op twee manieren aangepakt. Ten

eerste hebben we in Hoofdstuk 2 een directe aanpak gebruikt. We hebben instituties direct en indirect gemeten: direct, door de vakbondsdichtheid, de dekkingsgraad van de collectieve arbeidsovereenkomst en de Employment Protection Legislation (EPL) index; en indirect, via een classificatie van landen naar regimetypen, die op de classificatie van Esping-Andersen (1990) lijkt. Ten tweede hebben we in de Hoofdstukken 3-5 een indirecte aanpak gebruikt. In deze hoofdstukken zijn we nagegaan of de micro-economische factoren die loonmobiliteit be?nvloeden verschillen tussen landen met verschillende instituties. We vergeleken twee of drie landen, waaruit we de invloed van instituties konden afleiden (vanwege dit kleine aantal macro-eenheden konden we geen multilevel analyse doen).

In Hoofdstuk 2 vonden we aanwijzingen tegen onze verwachting dat de loonmobiliteit hoger zou zijn in landen met een liberale arbeidsmarkt dan in landen met een streng gereguleerde arbeidsmarkt. De meeste loonmobiliteit vonden we in landen die flexibiliteit op de arbeidsmarkt combineren met inkomens- en werkzekerheid: Denemarken en Nederland. De minste loonmobiliteit vonden we in twee landen met heel verschillende instituties: in de UK dat efficiency wil bereiken door veel arbeidsmarktmobiliteit en in Portugal dat een hoog niveau van werkzekerheid heeft (European Commission, 2006). In de andere Zuid-Europese landen - Griekenland, Itali? en Spanje - is de loonmobiliteit veel hoger dan in Portugal. In centraal Europa - Frankrijk, Duitsland en Oostenrijk - is de loonmobiliteit lager dan in de meeste andere landen. Bovendien werd in Hoofdstuk 2 gevonden dat het thema loonmobiliteit complex is en niet door een enkele maat van instituties verklaard kan worden. Onze direct maten van instituties verklaarden samen 52.1% van de totale variantie in loonmobiliteit. De beste maat is de EPL index die 34% van de totale variantie verklaarde. De indirecte maat - de classificatie van landen naar regimetypen - presteerde slechter dan de directe maten. Deze maat verklaarde 29.9% van de totale variantie.

In Hoofdstuk 3 vonden we dat jonge werknemers die hun loopbaan met een laagbetaalde baan beginnen meer kansen hebben om de lage loongrens te passeren in Duitsland dan in de UK. In Duitsland is de geschatte transitiekans .40, terwijl die in de UK .32 is. Het resultaat voor Nederland is verassend: Nederlandse jonge werknemers hebben de laagste kansen op opwaartse mobiliteit (.24).

In Hoofdstuk 4 hebben we de absolute loonmobiliteit in Duitsland en de UK onderzocht. Hier vonden we dat de gemiddelde loongroei als percentage van het vorig loon hoger is in de UK dan in Duitsland. Als we de bevindingen van de Hoofdstukken 2, 3 en 4 combineren kunnen we concluderen dat de hogere absolute loonmobiliteit in de UK vergeleken met Duitsland niet resulteert in een hogere relatieve loonmobiliteit.

In Hoofdstuk 5 corrigeerden we low-pay transitiekansen voor meetfouten. De rangschikking van de UK en Duitsland wat betreft de low-pay transitiekansen blijkt afhankelijk te zijn van

de lage loongrens. Als we dezelfde grens als in Hoofdstuk 3 gebruiken - tweederde van het mediane uurloon - is de 'echte' low-pay transitiekans (zonder meetfouten) - groter in Duitsland dan in de UK. Maar bij gebruik van een lagere grens - 50% of 40% van het mediane uurloon - is de volgorde andersom. Deze bevindingen lijken erop te wijzen dat de liberale arbeidsmarkt van de UK de loonmobiliteit van werknemers helemaal onderaan de loonverdeling meer vergemakkelijkt dan de gereguleerde Duitse arbeidsmarkt.

De derde onderzoeksvraag werd in Hoofdstuk 3 beantwoord. Eerder onderzoek heeft vooral de consequenties van intrede op de arbeidsmarkt met een flexibele of lage status baan bestudeerd. Onze bijdrage is dat we de gevolgen van arbeidsmarktintrede met een laagbetaalde baan onderzoeken. We gebruikten een competing-risk duration model, waarbij de competing risks de mogelijke routes uit low pay zijn: hoger loon, werkloos, zelfstandig en inactief. We controleerden voor niet-geobserveerde heterogeniteit met de nonparametrische methode van Heckman and Singer (1984). De voornaamste bevinding was dat als de aansluiting tussen het onderwijssysteem en de arbeidsmarkt goed is (zoals in Duitsland), de vaardigheiden die door onderwijs of beroepsonderwijs worden gegeven zijn, het belangrijkst zijn. Terwijl als de aansluiting minder goed is (zoals in de UK), de vaardigheiden die binnen het bedrijf worden verkregen er het meest toe doen. In Duitsland hebben jonge laagbetaalde werknemers meer kansen op opwaartse loonmobiliteit dan in de UK. Het Duitse systeem met stageplaatsen kan een verklaring voor onze bevinding zijn. De meerderheid van de Duitse jonge werknemers doen een stage van twee ? drie jaar voordat ze zich formeel op de arbeidsmarkt begeven. Ondanks de kritiek op het Duitse systeem met stageplaatsen (Acemoglou & Pischke, 1998; Kiiver & Muysken, 2005), blijkt dat dit systeem voor jonge Duitsers een geleidelijke transitie van onderwijs naar de arbeidsmarkt bewerkstelligt.

De vierde onderzoeksvraag werd in Hoofdstuk 4 en ook deels in Hoofdstuk 5 beantwoord. In Hoofdstuk 4 werd de job-search theoretie gebruikt. In dit Hoofdstuk richtten we ons op een uitkomst van het on-the-job search model (Mortensen, 1986) waaraan in de literatuur weinig aandacht wordt besteed (ondanks het feit dat de relatie tussen loonmobiliteit en baanmobiliteit een populair onderwerp is). Deze uitkomst houdt in dat zowel de kans voor een baanverandering als het verschil tussen het huidige loon een het reserveringsloon hoger zijn voor de laagbetaalde dan voor de hoogbetaalde werknemer (van den Berg, 1992). Bovendien zijn er verschillen tussen baanveranderingen binnen en buiten het bedrijf. Het probleem van endogeniteit van loongroei met de baanverandering werd met een tweestaps schatting van het Heckman model opgelost. Onze bevindingen waren niet altijd in overeenstemming met het theoretische model. Alleen in de UK is de kans op een baanverandering groter voor laagbetaalde werknemers dan voor hoogbetaalde werknemers. In zowel de UK als in Duitsland is de loongroei als gevolg van een baanverandering buiten het bedrijf als percentage van het

vorig loon groter voor laagbetaalde werknemers dan voor hoogbetaalde werknemers. In de UK is deze bevinding ook geldig voor een baanverandering binnen het bedrijf, terwijl dit in Duitsland geen effect heeft.

De vijfde onderzoeksvraag werd in Hoofdstuk 5 beantwoord. In dit Hoofdstuk hebben we low-pay transitiekansen van werknemers in de UK, Duitsland en Nederland onderzocht. Onderzoek tot nu heeft aangetoond dat transities tussen loonniveaus sterk worden overschat door meetfouten. Wij hebben vooruitgang geboekt op het model van Rendtel et al. (1998) voor meetfoutencorrectie. Terwijl Rendtel et al controleerde voor meetfouten in totale transitiekansen, hebben wij ook voor geobserveerde en niet-geobserveerde heterogeniteit gecorrigeerd, en bovendien met een langere tijdreeks gewerkt. Ons econometrisch model was een random-effects multinomiaal logistisch model met een latente structuur voor meetfoutcorrectie. De bevindingen van onze studie suggereren dat de helft van de geobserveerde low-pay mobiliteit in survey data niet echt of random zijn. Concreet hebben we gevonden dat de low-pay transitiekans maximaal .17 is in plaats van de .29 tot .48 die door andere studies die niet voor meetfout corrigeerden werd gevonden. Tot slot vonden we dat meetfouten in loonniveaus een sterke onderschatting van de invloed van covariaten in een panel regressie model veroorzaakt: Het effect van een baanverandering op de low-pay transitiekans wordt 43.9% - 102.9% onderschat; het effect van een verandering van het werkcontract type wordt 29.1% - 63.3% onderschat; en het effect van een wisseling van deeltijd naar voltijd werk en vice versa wordt 42.2% - 78.8% onderschat.

De bevindingen van dit proefschrift zijn belangrijk voor het beleid. Ten eerste varieert loonmobiliteit tussen landen met verschillende arbeidsmarkt instituties; instituties als het minimuloon, baanzekerheid, en vakbondsdichtheid beinvloeden de loonmobiliteit. Ten tweede is de voornaamste conclusie voor beleidsmakers dat een hoger niveau van arbeidsmarktflexibiliteit niet altijd samen gaat met grotere loonmobiliteitskansen. Met de term 'flexibiliteit' bedoelen we maatregelen die tot meer baanmobiliteit leiden. Afzwakking van de strikte regels om werknemers in dienst te nemen of te ontslaan, de bevordering van tijdelijke banen en flexibele arbeidsuren zijn voorbeelden van dergelijke maatregelen. Uit onze bevindingen blijkt dat de meeste (totale) loonmobiliteit in Denemarken en Nederland voorkomt, landen die flexibiliteit op de arbeidsmarkt met inkomens- en werkzekerheid combineren. Laagbetaalde werknemers profiteren echter niet van de voordelen van flexibiliteitsbeleid: Opwaartse loonmobiliteitskansen voor laagbetaalde werknemers zijn groter in de streng gereguleerde arbeidsmarkt van Duitsland dan in de liberale arbeidsmarkt van de UK en de semi-flexibele arbeidsmarkt van Nederland. Concluderend: er zijn winnaars en verliezers van het flexibiliteitsbeleid en de laagbetaalde werknemers behoren tot de verliezers.

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