Cohort Wage Effects and Job Mobility

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PRELIMINARY

Abstract

Economic conditions at the time of entering the labour market can induce wage differentials between entry cohorts. While there exists much empirical evidence on the existence and persistence of these cohort effects, little is known about their impact on employees' mobility behaviour. Using a large data set derived from German administrative data, this paper analyzes the determinants of job mobility, emphasizing the effect of cohort wage differences in this context. The analysis suggests that cohort effects play an important role in explaining job transitions. Labour market entrants affected by unfavourable conditions and earning less than the average starting wage tend to be more mobile. Moreover, our empirical analysis shows that labour market transitions reduce the cohort effects in earnings, implying that job mobility operates as an adjustment mechanism that reverses the initial wage differences between entry cohorts.

JEL codes: *E24, J31, J62, J64*
Keywords: *job-to-job, mobility, wage differentials, cohort effects.*

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1 Introduction

It is a well-known fact that each individual's career is affected by labour market shocks - and that young workers are most affected (cf. Freeman, 1975, and Katz and Autor, 1999). Existing studies suggest that economic conditions prevailing at the time workers enter the labour market significantly affect their earnings (e.g. Bloom and Freeman, 1986, and Welch, 1979). Whether these wage effects are long-run in nature has been a widely studied question yielding ambiguous results. The competitive model of the labour market, for example, implies that the latter operates as a spot market, where wages are solely determined by labour demand and labour supply and thus are equal to the individual's marginal productivity. In such a model, labour market shocks at the beginning of a worker's career are temporary and do not lead to long-lasting wage effects. However, alternative economic theories suggest that differences in initial labour market conditions - arising, for example, from variations in the cohort size or fluctuations in the business cycle - can induce persistent wage differentials between entry cohorts (e.g. Harris and Holmstrom, 1982). While there exists a large body of literature that theoretically and empirically shows the existence as well as the persistence of such cohort effects in wages, research on how these cohort wage differentials are related to workers' job mobility remains relatively scarce. Oreopoulos, Heisz, and von Wachter (2006) provide one of the few studies analyzing the impact of job-starting conditions on workers' early career. Using a large sample of Canadian college graduates, the authors document that the unemployment rate at job entry, diminishing the worker's wage, significantly raises the probability of job separation. This increased job mobility, in turn, positively affects wages, and therefore is able to partly reverse the earnings losses experienced through less favourable career starting conditions.

In our paper, we conduct a similar analysis for the German labour market. We also aim at studying the relationship between cohort effects and early job mobility and thereby address two questions: Do cohort-induced wage differentials significantly affect the individual's mobility decision? And can job mobility accelerate the reduction of these initial wage gaps? We contribute to the existing literature in several ways: First, we use a wider sample of the German labour market covering individuals of all skill groups. Second, due to the different reasons a job separation might have, we distinguish between various destination states.

The analysis is based on a large administrative data set provided by the Institute for Employment Research (IAB) containing detailed information on workers in the German labour market for the time period 1975-2004. We first provide a detailed analysis of the mobility patterns of cohorts entering the labour market at different points in time. In a second step, we examine the determinants of individual job mobility, emphasizing the effect of cohort wage differences in this context. For that purpose, the probability of different separation transitions is modeled as a function of worker and establishment characteristics, as well as the cohort wage effect, which is proxied by the deviation of the cohort starting wage from the mean starting wage. Finally, we examine the question to what extent worker mobility can contribute to a reduction of the initial wage gaps between different entry cohorts, whereby we take into account the possible endogenous nature of job mobility. Throughout the empirical analysis, we mainly focus on employer-to-employer transitions. Similarly to other studies (e.g. Perez and Sanz, 2005), we consider direct employer changes and employer changes with an intervening unemployment spell of less than one month, which are both likely to occur voluntarily. In addition, we also consider employer-to-employer transitions intervened by an unemployment spell longer than one month, which in all likelihood can be can be seen as involuntary moves. The results suggest that cohort-induced wage differentials play an important role in explaining job transitions. Entry cohorts affected by unfavourable conditions and earning less than the average cohort starting wage show an increased mobility compared to cohorts with average or higher-than-average earnings. Moreover, our empirical analysis shows that labour market transitions reduce the cohort effects in earnings, implying that job mobility operates as an adjustment process that reverses the initial wage differences between entry cohorts.

The remainder of this paper is organized as follows. The next section contains a review of the literature on cohort effects and early job mobility. Section 3 presents a description of the data set, particularly addressing the identification of job transitions. In Section 4 we introduce the methodology used in this paper. Descriptive statistics and estimation results are discussed in Section 5. Section 6 summarizes our analysis.

2 Theory and Empirical Findings

The analysis conducted in this paper builds on two strands of the literature. These are on the one hand the cohort effects literature, studying the impact of initial labour market shocks on earnings, and on the other hand the job mobility literature, analyzing the determinants and wage effects of individual job transitions. In this section, we provide a brief survey of the existing theoretical and empirical studies for both strands. Although the subsequent empirical analysis in our paper will focus on the relationship between cohort effects and the individual mobility behaviour and does not differentiate between the causes of cohort-induced wage discrepancies, for the sake of completeness our overview also covers studies providing various explanations for differences in wages between entry cohorts.

2.1 Cohort Wage Effects

The economic literature points to several theories that explain why initial labour market conditions might lead to wage differentials between entry cohorts, creating cohort wage effects. One factor on the supply side consists in variations in the size of entry cohorts. Studies examining the impact of the demographic cycle on earnings find that an important increase in supply - emanating, for example, from the entry of baby boomers into the job market - adversely affects entry wages (Bloom and Freeman, 1986, Berger, 1985, Freeman, 1979, Welch, 1979, and Wright, 1991). The analysis whether these wage disadvantages experienced by large cohorts at a young age remain throughout their career has created contention among researchers (Berger, 1989, Bloom, Freeman, and Korenman, 1987, Freeman, 1979, Klevmarken, 1993, and Murphy, Plant, and Welch, 1988). In particular, Bloom, Freeman, and Korenman (1987) track the progress of different U.S. cohorts for the time period 1969-1984 and suggest that large cohorts are able to at least partly catch up in earnings within a decade after labour market entry. Welch (1979) finds similar results for the period 1967-1975 and confirms that wage disadvantages do not persist as the cohort ages. However, Berger (1989) using almost identical data but less restrictive estimation models does not find any catch-up in wages.[1]

[1] Bloom, Freeman, and Korenman (1987) and Klevmarken (1993) review studies on the effects of cohort size on labour market outcomes and age-earnings profiles, respectively.

Not only supply shocks, but also shocks on the demand side of the labour market have the potential to generate wage differentials between entry cohorts. These can be due to technological progress or business cycle fluctuations. There is evidence that individuals hired during economic recessions experience lower entry wages than individuals hired in economic upturns (e.g. Bils, 1985, Devereux and Hart, 2006, Shin, 1994, and Solon, Barsky, and Parker, 1994). This adverse effect is found to last for some period, suggesting persistent cohort effects in wages (e.g. Devereux, 2004, Oreopoulos, Heisz, and von Wachter, 2006, Oyer, 2006, and von Wachter and Bender, 2007). There exist several theories on wage determination that explain this long-term impact of poor initial economic conditions. Models of implicit contracts, developed for example by Azariadis (1975) as well as Harris and Holmstrom (1982) and empirically tested by Beaudry and DiNardo (1991), and Baker, Gibbs, and Holmstrom (1994), suggest that due to missing or insufficient wage adjustments, business cycle conditions at the time of signing the contract affect the individuals' long-term wages. The second class of models focuses on cyclical variations in hiring and promotion standards, which might lead to differences in workers' productivity and hence to differences in current and future earnings (Okun, 1973, and Reder, 1955). Another prevalent explanation for persistent cohort effects is based on the neoclassical human capital model. There, the initial economic situation affects workers' opportunity to accumulate skills and thus has a sustained impact on individual labour market performance (Gibbons and Waldman, 2004).

2.2 Early Job Mobility

The empirical literature on job mobility, examining the determinants of job transitions early in the career, suggest that the wage level plays an important role for the individual's mobility decision. Topel and Ward (1992), for example, analyze the mobility patterns of young men and find a lower job stability for lower-paid jobs. This corresponds to a similar result found by Oreopoulos, Heisz, and von Wachter (2006), who use exogenous business cycle variations and show that economic downturns, diminishing workers starting wage, significantly raise the rate of job change. This implies that individuals affected by poor initial labour market conditions might have the opportunity to advance in their careers through job changes, prohibiting persistent earnings disadvantages and yielding a convergence between cohort and market wages. Likewise, firms can eventually lay-off workers who experience relatively high wages through favourable starting conditions. This kind of separation might lead to a loss of

initial wage advantages and therefore to a reduction of cohort effects. However, job mobility as a mechanism to adjust inside and outside wage is not taken into account by the theories of cohort effects mentioned above.

It is a common phenomenon that young workers go through a period of increased job mobility that often results in higher quality job matches. This period thereby is characterized by a collective search process: Workers search for firms that value their skills most highly, while firms search for the most productive workers. So more precisely, workers who start their career are not able to immediately find firms that offer them the most productive jobs, particularly in times of unfavourable economic conditions. Learning about their own ability, the quality of the current job and outside offers, the workers might feel underpaid and thus tend to search for a better employment relationship. Similarly, firms get new information on the workers' productivity and might decide to lay-off those workers who are overpaid. Thus, job changes can be seen as the outcome of a process matching the abilities of workers with the requirements of firms (Jovanovic, 1979). While researchers agree that the increased job mobility in young workers' careers leads to more stable employment relationships, its effect on wage and career development is a very controversial issue. The first model dealing with this question was the mover-stayer model developed by Blumen, Kogan, and McCarthy (1955), which assumes that some workers are inherently less productive, have a higher propensity to switch employers and therefore end up in lower wages. Alternative models also predict a negative effect of job mobility. According to the human capital theory, for example, investments in job specific skills create a higher earnings potential, making job mobility less profitable (Becker, 1975). Similarly, the model of seniority wages (Lazear, 1981) as well as segmentation hypotheses (Doeringer and Piore, 1971) suggest that workers who change employers have to 'start over' at the new job and thus experience a wage cut. Contrary to these theories, the literature based on job search (Burdett, 1979) and job matching approaches (Jovanovic, 1979) postulates that job-to-job transitions can help enhancing young workers wages and therefore point to beneficial job mobility. More precisely, workers in employment relationships where they do not experience robust productivity increases tend to search for better jobs that offer higher wages as well as a higher match quality. The two classes of approaches, predicting adverse and beneficial job mobility respectively, address two different types of separation transitions. That is, on the one

hand the human capital as well as the segmentation model predominantly deal with wage losses of laid-off workers and therefore with involuntary job transitions. Empirical studies confirm this adverse effect of lay-offs on workers' earnings. Kletzer and Fairlie (2003) and von Wachter and Bender (2006) point to the fact that job displacements in workers' early careers lead to sizeable and persistent wage losses. Consistent with that, von Wachter and Bender (2007) show that initial wage advantages, obtained from favourable labour market conditions, are reduced when worker lose their job. On the other hand the models of job search and job matching focus on wage gains of quitters and thus deal with job changes due to voluntary reasons. There also exists empirical evidence that voluntary job changes during the early stages of peoples' working lives have beneficial wage effects. For example Antel (1986), Bartel and Borjas (1978), and Topel and Ward (1992) find mobility-induced wage premiums that range between 8% and 20%. Similarly, the analysis by Oreopoulos, Heisz, and von Wachter (2006) indicates that wage disadvantages, experienced by workers graduating in a recession, are partly reversed through job changes, such that the catch-up process can be accelerated.

With the exception of, for example, Keith and McWilliams (1999), Moore, Viscusi, and Zeckhauser (1998), and Perticara (2004), few empirical papers analyze voluntary and involuntary job changes simultaneously and thus allow for both beneficial as well as adverse mobility. The one most closely resembling our study is an investigation by Perticara (2004), who analyzes US panel data and finds that workers earning less than the customary wage rate are more likely to initiate a job change, which leads to a post-separation wage gain. On the contrary, workers earning more than the average wage have a higher probability of being laid off and often experience wage losses after separation. To sum up, there exists empirical evidence that voluntary job-to-job transitions result in higher wage growth than staying at the same employer or involuntarily changing jobs. This result could be explained by the asymmetric information regarding the likelihood of future separations (Mincer, 1986). Workers that move for voluntary reasons previously know that they are changing jobs and thus are able to engage in employed job search. Involuntary movers, in contrast, have no pre-knowledge on the impending job change and are forced to search after the separation has taken place. Due to the resulting differences in reservation wages, quits are likely to result in higher wage growth than lay-offs.

In the present paper we combine both strands of literature and analyze the interaction of cohort wage effects and workers' early job mobility. To the best of our knowledge, this has not been done before. Given the evidence on the relation between job transitions and wages we expect from our analysis that wage differentials, induced by variations in initial labour market conditions, significantly affects the worker's mobility decision. Furthermore, cohort wage effects presumably can be reduced through job mobility.

3 Data

3.1 The data source

The following analysis uses a data set provided by the Institute for Employment Research (IAB), the IAB Employment Sample (IABS). The basis of this data set is the *Employment Statistics Register*, an administrative panel data set of the employment history of all individuals in Germany who worked in an employment covered by social security between 1975 and 2004.[2] For 1995, this data source contains theemployee history of nearly 79.4% of all employed persons in Western Germany, and 86.2% of all employed persons in Eastern Germany. The basis of the employee history is the integrated notification procedure for health insurance, the statutory pension scheme, and unemployment insurance. At the beginning and at the end of any employment spell, employers have to notify the social security agencies. This information is exact to the day. For spells spanning more than one calendar year, an annual report for each employee registered within the social insurance system is compulsory, and provides an update on, for example, the qualification and the current occupation of the employee. Further worker characteristics included are the employees' year of birth, sex, education, nationality, marital status and daily gross earnings.[3]

The IAB Employment Sample (IABS) is a 2% representative sample of the Employment Statistics Register for the time period 1975-2004, supplemented with information on all unemployment spells of the workers covered. To meet the problem of inconsistent and missing information on the individual's education, we use an education variable corrected

[2]This data base has been used, among others, by von Wachter and Bender (2006) and Dustmann and Meghir (2005).

[3]A detailed description of the Employment Statistics Register and the notification procedure is given by Bender, Haas, and Klose (2000). Note that civil servants and self-employed workers are not included in the data.

according to an imputation procedure provided by Fitzenberger, Osikumino, and Völter (2006). Particularly, we use the imputation procedure 2B, where education reports are extrapolated and only for individuals having inconsistencies in their education reports, the extrapolation is restricted to degrees that are reported at least three times. We restrict our sample to West-German individuals whose labour market entry we can observe in the data. In particular, we only choose workers who started their career between 1980 and 1999, such that we are able to follow their career paths for the first five years on the labour market. Since labour market entrants have not accumulated any work experience and are particularly affected by economic conditions at the beginning of their career, they can be easily compared and are therefore an ideal group to study the relationship between cohort wage effects and job mobility. Moreover, studying labor market entrants has the advantage that the starting date of the first job spell is well known, such that the analysis is not affected by the 'initial conditions problem'. For a better comparison of wages, we exclude part-time workers, homeworkers, apprentices, trainees, and persons who are unemployed at the time of entry.[4] Finally we drop individuals with parallel employment spells and with missing values for the variables used in the empirical analysis. Using these selection criteria our final sample comprises a total of about 800,000 observations.

The IABS data are representative regarding employment covered by the social security system but not regarding unemployment. Only those unemployed who are entitled to transfer payments are covered. In both data sets, we can derive three labour market states at each moment in time: employment (E) covered by social security, unemployment (U), if the worker is receiving transfer payments, and non-participation (N).[5] Since the latter state cannot be directly observed, we define non-participants as individuals out of sample. These individuals are not recorded in the data sets, which implies that it is not possible to differentiate them from civil servants, self-employed, retired and marginally employed workers. Regarding these labour market states, there might exist measurement errors. Because of

[4]Other studies based on administrative individual data are usually concerned with the problem that wages are censored at the social contribution ceiling (only the ceiling is reported in the data set and not the true earnings). But due to the fact that we only consider individuals entering the labour market for the first time, these data problems barely affect our analysis.

[5]In the IABS data, the record on unemployment benefit recipients are unreliably measured before 1980. As we can therefore not use the worker flows to unemployment for the time period 1975-1979, we start our analysis in 1980.

the way the data are collected, both firms' reports of a new employee and individuals' notifications of moving into or out of unemployment are not exactly consistent with the actual change of labour market state. The latter potential measurement error can be corrected in the following way: If the time lag between two employment or unemployment notifications does not exceed 30 days, it is defined as a direct transition between the two states recorded. We count it as an intervening spell of non-participation if the time interval between the two records is larger than 30 days.

3.2 Measuring Job Separations

Since the IABS data set contains daily information on the employment and unemployment history of every individual in the sample, it is possible to calculate separation flows taking into account every change of the labour market state that occurs within a certain time period. Using the three mentioned states E, U and N, as well as the establishment identification number provided in the data set, we are able to identify three different separation flows. These are the transitions from employment to nonparticipation (EN), from employment to unemployment (EU) and from employment to another employment (EE). Adding up these three flows yields the total separations for the aggregate economy, $S_t = EN_t + EU_t + EE_t$. Throughout the empirical analysis, we mainly focus on EE flows. In this context, recent research has pointed out that a distinction between voluntary and involuntary job changes proves to be important (Perticara, 2004). Since the IABS data do not designate any reason for a job separation, we are not able to directly differentiate between voluntary and involuntary moves. As an alternative, we examine direct employer-to-employer transitions and those with an intervening unemployment spell of less than 1 month (EE_d) on the one hand and employer-to-employer transitions with an intervening unemployment spell that is larger than 1 month on the other hand (EE_U). Corresponding to the notion in the job mobility literature, the first type of separation is with a high probability initiated by the worker and can usually be seen as a voluntary move. The latter one, however, results in all likelihood from a lay-off and can be considered as an involuntary move. It should be noted here that our definition of a job is based on the establishment level and not on the firm level. Therefore a transition from one establishment to another one within the same firm will also be identified as an employer-to-employer flow. According to Davis and Haltiwanger (1999), we calculate the corresponding rates of each flow by using the average of current and

past employment $(E_t - E_{t-1})/2$ as the denominator. The Table A.1 provides definitions as well as summary statistics of all the worker and establishment characteristics used in the empirical analysis.

4 Econometric Framework

In the first part of the empirical analysis, we approach the individuals' job mobility from the event history perspective, i.e. we estimate the probability of experiencing a certain job separation by using a hazard rate model. Since the IABS data set contains daily information a continuous-time framework is used. The hazard rate then is assumed to take the following proportional hazard form:

$$\lambda(t, X(t)) = \lambda_0(t) exp(X(t)\beta). \tag{1}$$

The component λ_0 denotes the baseline hazard function, which measures the effect of the elapsed employment duration on the separation rate of a certain reference group. The term X refers to a set of possibly time-varying explanatory variables, and β is a vector of coefficients to be estimated. According to Lancaster (1990), duration analysis produces biased estimation results if unobserved heterogeneity is not taken into account. For this reason, we additionally include the term α, which is assumed to have a multiplicative effect on the individual hazard and thus leads to a mixed proportional hazard model:

$$\lambda(t, X(t), \alpha) = \alpha \lambda_0(t) exp(X(t)\beta). \tag{2}$$

Regarding the functional form of the baseline hazard one can make different assumptions. The Cox proportional hazard model, for example, allows an unspecified form for the underlying baseline hazard. Compared to parametric approaches, this model has the advantage that one does not need a assumption about the shape of the hazard function, even though this implies that no explicit estimates of it can be identified. Because of this, we opt for an alternative strategy and parameterize the hazard function as a piecewise-constant exponential model. That is, we assume a baseline hazard rate which is constant within given time intervals, but is allowed to vary between them. Therefor, the basic duration is partitioned into k prespecified sub segments with cutpoints $0 = t_0 < t_1 < \ldots < t_k$. The baseline hazard

then can be expressed by the equation:

$$\lambda_0(t) = \left\{ \begin{array}{ll} \lambda_1, & t \in (0, \tau_1], \\ \lambda_2, & t \in (\tau_1, \tau_2], \\ \ldots & \\ \lambda_k, & t \in (\tau_{k-1}, \infty], \end{array} \right\}$$

where the k parameters $\lambda_1, \ldots, \lambda_k$ represent the separation probability for a certain reference group in one particular time interval. Thus, in contrast to the Cox proportional hazard model explicit estimates of the baseline hazard function can be obtained, enabling us to directly assess the effect of duration dependence. In the subsequent analysis we distinguish between seven sub-segments: 0-6 months, 7-12 months, 13-18 months, 19-24 months, 2-3 years, and more than 3 years of employment duration.

Using the piecewise constant exponential model, we estimate two different multiple destination models, also known as competing risk models. In order to get a general idea of young workers' mobility behaviour, we first distinguish between three possible separation destination states: individuals may transit from one employer to another one (EE), from employment to unemployment (EU), and from employment to non-participation (EN). In a second step, we focus on job-to-job transitions and estimate the competing hazards of changing employers directly (EE_d flows $\rightarrow$ EE flows and EE flows with an intervening unemployment spell < 1 month) and changing employers indirectly ($\text{EE}_U \rightarrow$ EE flows with an intervening unemployment spell ≥ 1 month). In the case of continuous time models with multiple destinations, the log-likelihood can be divided into the sum of multiple subcontributions. Given this separability property it is possible to estimate a competing-risk model by estimating a single-risk model for each destination. On the basis of the IABS data set we are now able to explain the probability of certain transitions by a set of individual and establishment characteristics. The explanatory variable of main interest is the cohort effect in wages at the beginning of the worker's career. In order to calculate these initial wage differentials as deviations from the mean starting wage, we employ the Restricted Least Squares procedure proposed by Haisken-DeNew and Schmidt (1997). For that purpose we estimate, in a first step, the following wage regression:

$$\ln w_{it} = \alpha_1 + \alpha_2 X_{it} + \alpha_3 Z_{et} + \sum_{j=2}^{J} \beta_j C_j + \epsilon_{it}, \tag{3}$$

where $\ln w_{it}$ refers to the real hourly log wage of individual i at the time of entering the

labour market (t=0), X_{it} is a vector of individual characteristics, Z_{et} is a vector of establishment characteristics, C_j denotes a set of $j-1$ cohort dummies indicating the year of entry, and α_1, α_2, α_3, and β_j are the coefficients to be estimated. In a second step, the coefficients of the cohort dummy variables, obtained from equation (3) by using an arbitrarily chosen reference cohort, are transformed to deviations from the mean starting wage.[6] These starting wage deviations, enter the hazard equation with one variable comprising values smaller than zero and a second one comprising values larger than zero, so that positive and negative deviations are allowed to have different effects on the transition probabilities.[7] Other variables, which we use to explain the probability of certain job separations, are sex, nationality, and skill level at the individual level, as well as establishment size, industry, and region at the establishment level. In order to account for differences in economic conditions at the time of separating, we also include monthly and yearly dummies.

In the second part of the empirical analysis, we aim at investigating the contribution of individuals' mobility behaviour to the adjustment of cohort and market wages. That is, we want to examine whether job mobility can significantly decrease the initial wage differential between job starting cohorts. To do so, we concentrate on individuals who stayed in their first job and those who transit from one employer to another one, and compare how the initial cohort effect has changed for both groups. The comparison model, on which the estimates in this paper are based on, is given by:

$$\ln w_{it} = \gamma_1 + \gamma_2 X_{it} + \gamma_3 Z_{et} + \sum_{j=2}^{J} \delta_j C_j + \sum_{j=2}^{J} \theta_j C_j M_{it} + \epsilon_{it}. \tag{4}$$

In contrast to the first model (equation 3), we now examine the workers' wages five years after entering the labour market. Moreover, equation (4) extends the previous one as it additionally includes a dummy variable M_{it}, indicating whether the worker has changed jobs, interacted with the cohort dummies C_j. When examining the impact of job mobility on the variation of earnings, we need to be concerned about two econometric issues. First, the problem of unobserved heterogeneity can be attributed to unmeasured variation across individuals in characteristics that influence both mobility and wage rates. Second, there is

[6] We thank John P. Haisken-DeNew for the Stata ado-file, implementing the restricted least squares procedure and calculating the correct standard errors.

[7] Since a predicted variable is included as a regressor, standard errors are corrected according to the calculation procedure proposed by Murphy and Topel, 1985.

the problem of possible endogeneity, which might arise due to the correlation between job mobility and unobservable wage determinants. Previous studies point out that the failure to control for the simultaneous determination of wage and mobility may result in biased and inconsistent estimators. Tackling this endogeneity problem in the wage equation is one of the most discussed issues in labour economics. Various solutions have been developed by previous studies. For example, Altonji and Shakotko (1987), and Topel (1991) estimate a single wage equation without explicitly determining the workers' mobility decision. In order to account for the endogenous nature of mobility the former one use an instrumental variable method, while the latter one introduces a two-step approach incorporating individual and job fixed effects. Pavlopoulos, Fouarge, and Muffels (2007) apply Heckman's two-step procedure, where they first determine the probability of job mobility by using a multinomial logit, and then estimate a wage regression including the endogeneity correction terms obtained from the first step. Similarly, Antel (1991) directly incorporates mobility choice dummies, obtained by a probit function, into a wage equation. More sophisticated approaches have been proposed by Lillard (1999), Abowd and Kang (2002), and Abowd, Kramarz, and Roux (2006). In all three studies the wage rate and job mobility are jointly determined by using simultaneous equation models. According to Antel (1991), we address the endogeneity problem in this paper by including mobility choice dummy in the wage equation. Therefore, we estimate a probit model for job mobility, where we only distinguish between job change and no job change. The predicted probability of moving is used instead of the dummy variable M_{it}. As exclusion variable, that is supposed to affect the mobility decision and not wages, we introduce the regional share of workers older than 40 years.

5 Descriptive Evidence and Estimation Results

Our objective in this two part empirical analysis is to study the relationship between cohort wage effects and job mobility, whereby both causal directions are contemplated. But before we turn towards analyzing the impact of initial cohort effects on workers' mobility behaviour and the role of mobility in reversing wage differentials respectively, we first examine some characteristics of the different entry cohorts. Figure B.1 plots the development of average log real daily wages for workers entering the labour market between 1980 and 1999. The bold solid line displays the mean starting wages, while the bold dashed line refers to mean

wages after gaining five years of labour market experience. It is obvious that the wage differences between entry cohorts are driven by variations in initial labour market conditions, clearly suggesting cohort wage effects. And although these wage differentials seem to persist in higher experience years, part of them appears to slowly fade over time. Since this figure purely describes the wage differences across cohorts and does not take into account individual characteristics, it might be the case that the observed variations in starting wages are not solely driven by differences in economic conditions but also by cohort composition effects. In Table A.2 we report summary statistics of cohort characteristics. One clearly see that the cohorts under consideration slightly differ according to the observable characteristics age, share of females, and share of skill groups. Thus, it might be the case that differences in starting wages to some part can be attributed to compositional effects. This issue is examined explicitly in Table A.3 that presents the cohort effects in starting wages obtained by estimating several specifications of wage equation (3).[8] Figure B.2 shows the variations in the estimated coefficients more illustrative, and simultaneously compares them with variations in the business cycle.[9] The first noteworthy fact is, that initial cohort effects seem to follow the gdp growth rate. One can clearly see differences in wage deviations at the time of labour market entry. Taking into account observable characteristics, reduces the estimated cohort wage effects only slightly. This implies that the initial wage differentials between cohorts only to some part result from variations in cohort composition.

5.1 Impact of Cohort Wage Effects on Job Mobility

To illustrate the job mobility behaviour of individuals affected by different starting conditions, we begin by presenting the separation transitions that occur within the first five years after labour market entry. Table A.4 displays the different separation transitions by labour market experience and deviation from the mean starting wage (in quintiles). It becomes apparent that all transition rates are decreasing with the individual's labour market experience. Furthermore, we see that, in general, workers of the lower quintiles tend to be more mobile at the beginning of their career. More precisely, one year after labour market entry

[8] In order to calculate these initial wage differentials as deviations from the mean starting wage, we employ the methodology proposed by Haisken-DeNew and Schmidt (1997).

[9] For all three time series we use a Hodrick-Prescott (HP) filter to isolate the cyclical from the structural component. Following Ravn and Uhlig (2002) we use a HP smoothing parameter value of 6.25 for our yearly data.

workers with starting wages below the average show employer-to-employer transition rates ranging between 21% and 24%. On the contrary, the first year EE flow rates of workers whose entry wage lies above the sample mean only reach about 18%. The transitions from employment to non-participation (EN) show a very similarly pattern, while for employment-to-unemployment transitions (EU) slightly different properties can be observed. Workers with strong deviations from the mean starting wage, irrespective whether positive or negative, show increased inflows to unemployment at the beginning of their career (about 4.5%), while workers with wages near the average seem to have the lowest transition rates. Since, in this paper we are mainly interested in employer-to-employer transitions, this table additionally displays the transition rates for direct (EE_d) and indirect employment changes (EE_U). Here we again can observe that direct EE flows are higher for workers of the lower quintiles. Moreover, EE flows with an intervening unemployment spell are less likely to occur for workers with starting wages near the sample mean. All together this table gives a first indication towards the impact of initial wage differentials on the worker's job mobility. Figure B.3 enlarges on this interrelation and displays the second year transition rates for direct and indirect employer changes by gender and skill level. From the descriptive evidence above, we can infer that individuals with a large negative cohort effect in wages tend to be more mobile than individuals with starting wages near the average.

To be more precise, we estimate the determinants of different separation transitions by using the hazard rate models described in the previous section, particularly emphasizing the impact of initial cohort wage effects. Table A.5 displays the estimation results for the hazards of the three separation flows EE, EN, and EU, obtained from a piecewise constant exponential hazard model without and with taking into account unobserved heterogeneity. A comparison of the results reveals that the consideration of unobserved heterogeneity only slightly changes the estimated hazard rates. The estimation results of all three transitions indicate that the hazard of experiencing a job separation falls with employment duration, implying that there exists negative duration dependence. Moreover, the relationship between separating from the job and the size of the establishment is decreasing, which means that larger establishments offer more stable employment relationships. And finally, separation transitions seem to be a more common phenomenon among less educated individuals. The probability of separating from employment to unemployment and from employment to non-

participation is negatively correlated with the skill level. This is not the case for the hazard of employment-to-employment transitions, which is higher for the high-skilled individuals. These general findings are consistent with the results of previous research on job mobility. The estimation results, we are most interested in, is the impact of the cohort wage effect on separation probabilities. The estimated hazard rates largely confirm the results from the descriptive analysis. The probability that an EE flow occurs is increasing with the negative cohort effect and decreasing with the positive cohort effect. This implies that workers with cohort wages below the sample mean, are more likely to move from one employment to another one. In contrast to this the likelihood of EN and EU transitions is increasing with the cohort effect, irrespective of whether it is positive or negative.

The coefficients obtained from estimating the competing hazards of direct and indirect job changing are shown in Table A.6. We can see, that very similar features emerge with respect to the duration dependence, the worker's skill level and the size of the establishments. And also for the cohort wage effect we find very similar results. The estimated coefficients indicate that the likelihood of direct EE flows is increasing with the negative cohort effect and decreasing with the positive cohort effect. This could be the result of on-the-job search. Workers with relatively large negative cohort effects might feel underpaid, search for a better job and therefore initiate this separation. For indirect job-to-job transitions we can see that they are more likely to occur the larger the cohort effect is, irrespective of whether it is positive or negative. One could argue here that, on the one hand, workers with positive cohort effects have to leave their job involuntarily, because firms might think that they are overpaid. Workers with cohort wages below the average, on the other hand, might feel underpaid and either leave the job voluntarily to search for a better job, or they shirk and are laid-off by the employer.

5.2 Adjustment of Cohort Wage Effects

Another question, we are looking at and which approaches the interaction between cohort wage effects and the individual mobility behaviour from a different angle, is to what extent does increased job mobility contribute to a reversion of initial wage differentials? By examining this issue we compare wage rates and wage growth between stayers, defined as workers who stay in their first job, and movers, defined as workers who change employers directly or indirectly. A first impression is given by Table A.7 which presents the average

wage growth by deviation from the mean starting wage (in quintiles) five years after labour market entry. We can see here that in general the wage growth is much higher for workers of the lower quintiles, irrespective whether they stay at their first employer, move directly or indirectly. While the wages of stayers with relatively low starting wages grow by almost 120%, the wages of those with high starting wages only grow by 17%. From this figure it also becomes apparent that wages grow much faster when workers in the lower quintiles directly change employers. For workers of the lowest quintile even indirect job changes lead to a higher wage growth than staying at the same employer. This implies that for cohorts unfavourable labour market conditions at the time of labour market entry result in inappropriate job matches, such that any kind of job change seems to be beneficial. In contrast to this, for workers in the higher quintiles directly changing employers leads to lower wage growth compared to staying, and indirectly changing employers even leads to a wage cut. These patterns of wage growth indicate that cohorts with wage disadvantages at the beginning of their career are able to at least partly catch up in earnings and close the initial wage gaps. Figure B.4 displays the average wage growth by gender and skill level. This interrelation can be further examined by comparing wage rates at the time of starting the career and after gaining five years of labour market experience. Table A.8 shows the average log real daily wages of entrants, stayers, and those who changed jobs directly and indirectly. At the time of entering the labour market the log real daily wages range from 3.1 in the first quintile to 4.4 in the fifth quintile, implying that there exist clear differences in wages when workers start their career. Looking at stayers we see that after gaining five years of labour market experience these wage differentials have decreased. Since workers of the lower quintiles experience a higher wage growth than workers of the higher quintiles, a convergence between wages can be observed. For movers the table shows that this wage convergence is even more pronounced. Given the results from the descriptive analysis we can conclude that job mobility leads to a higher reduction of initial wage differentials than staying at the same employer. In Figure B.5 these wage rates are shown for women and men as well as for different skill levels.

To empirically test this statement, we estimate Equation (4) as described in the previous section. Estimation results are shown in Table A.10. Here one can see that for cohorts with a negative wage effect, mobility positively affects wages. In contrast to this, job mobility leads to a wage reduction for cohorts with positive wage effects. There are surely exceptions

to this rule, although mostly with insignificant effects. Figure B.6 shows the results more illustrative. It displays the estimated cohort effects five years after labour market entry for stayers and movers compared to the initial cohort effects at the time of labour market entry. It becomes obvious that five years after entering the labor market the cohort effects for both groups, movers and non-movers, have decreased. But we also see that this reduction is much stronger, if people change their employer. Therefore one can conclude that mobility leads to a stronger wage convergence.

6 Conclusion

In this paper, we aim at investigating the relationship between cohort effects in wages and workers' mobility behaviour early in their career. Throughout the analysis we use a large administrative panel data set, which contains detailed information on workers on the German labour market and covers the time period 1975-2004. In the first step of this research, we model the probability of experiencing job transitions, where we mainly focus on direct and indirect employer-to-employer transitions. One of the explanatory variables, which is included in the regressions and is of particular interest, is the cohort wage effect, proxied by the deviation of the cohort starting wage from the mean starting wage. The estimation results suggest that wage differentials caused by variations in economic conditions at the time of entering the labour market are an important determinant of mobility decisions. As a general rule, workers with initial cohort wages below the average are more likely to separate from their job. In the second step, we estimate the change in the cohort wage effect that can be attributed to job mobility. To tackle the well-know endogeneity problem which emerges from the fact that mobility is likely to be correlated with unobserved individual and job characteristics affecting earnings, we include a mobility choice dummy in the wage regression. We find, that workers can strongly benefit from changing employers. Moreover, the estimation results show that the initial wage differentials between entry cohorts can be reduced by labour market transitions, which implies that job mobility operates as an adjustment process that reverses the initial cohort effects in wages.

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Appendix A Tables

Table A.1: Definition of characteristics

Variable	Mean	Std. Dev.	Definition
EE flows	0.0933	0.2908	Transitions from one employer to another one.
EU flows	0.0575	0.2329	Transitions from employment to unemployment.
EN flows	0.1719	0.3773	Transitions from employment to nonparticipation.
Separations	0.3229	0.4675	EE + EU + EN.
EE_d flows	0.0982	0.2976	Direct EE flows and EE flows with an intervening unemployment spell < 1 month.
EE_U flows	0.0212	0.1442	EE flows with an intervening unemployment spell ≥ 1 month.
Entry Wage	50.5334	25.3477	Real daily wage at the time of labour market entry.
Wage	85.3710	40.3278	Real daily wage.
Age	28.8228	7.1230	Age of individual.
Low-skilled	0.3658	0.4719	Dummy=1 if individual holds a lower secondary school diploma without a professional degree.
Medium-skilled	0.3714	0.4831	Dummy=1 if individual has a lower secondary school diploma and professional degree; or a high school diploma and without a professional degree; or a school diploma as well as a professional degree.
High-skilled	0.2054	0.4040	Dummy=1 if individual holds a university degree or university of applied sciences degree.
Establishment size	1575.8	3986.1	Size of the employing establishment; dummy variables for categories from 1=less than 5 to 10 = more than 1000 employees.
Industry Dummies	0.0157	0.1206	Agriculture, Mining and Energy
	0.2881	0.4480	Production
	0.0737	0.2254	Construction
	0.2275	0.3903	Trade, Transport
	0.2967	0.4522	Services
	0.0326	0.1776	State.

Table A.2: Cohort characteristics at labour market entry

	Mean	Std. Dev.	Min.	Max.
Establishment Size	1138.53	202.24	721.96	1400.23
Cohort Age	28.898	1.316	25.250	30.963
Cohort Fraction Female	0.405	0.018	0.366	0.440
Cohort Fraction Lowskilled	0.161	0.045	0.085	0.219
Cohort Fraction Mediumskilled	0.375	0.032	0.334	0.465
Cohort Fraction Highskilled	0.219	0.030	0.174	0.275
Cohort Starting Wage (log real daily)	3.797	0.148	3.605	4.013

Source: Authors' calculations, based on IABS 1975-2004.

Note: Average cohort characteristics are weighted by cohort size.

Table A.3: Estimation of cohort wage effects at labour market entry

	(1)		(2)		(3)	
	Coeff.	(S. D.)	Coeff.	(S. D.)	Coeff.	(S. D.)
1980	-0.139***	(0.010)	-0.050***	(0.008)	-0.060***	(0.007)
1981	-0.178***	(0.011)	-0.056***	(0.009)	-0.065***	(0.009)
1982	-0.221***	(0.013)	-0.143***	(0.010)	-0.134***	(0.010)
1983	-0.228***	(0.013)	-0.167***	(0.010)	-0.160***	(0.009)
1984	-0.229***	(0.013)	-0.136***	(0.010)	-0.141***	(0.010)
1985	-0.172***	(0.013)	-0.101***	(0.010)	-0.111***	(0.009)
1986	-0.099***	(0.013)	-0.054***	(0.010)	-0.061***	(0.009)
1987	-0.046***	(0.013)	-0.029***	(0.010)	-0.035***	(0.010)
1988	0.003	(0.013)	-0.008	(0.010)	-0.015	(0.010)
1989	0.059***	(0.013)	0.034**	(0.010)	0.022***	(0.009)
1990	0.113***	(0.011)	0.105***	(0.009)	0.095***	(0.009)
1991	0.161***	(0.013)	0.111***	(0.010)	0.103***	(0.009)
1992	0.195***	(0.012)	0.128***	(0.009)	0.132***	(0.009)
1993	0.163***	(0.015)	0.098***	(0.012)	0.121***	(0.011)
1994	0.162***	(0.015)	0.078***	(0.012)	0.096***	(0.011)
1995	0.186***	(0.015)	0.083***	(0.012)	0.092***	(0.011)
1996	0.192***	(0.015)	0.074***	(0.012)	0.090***	(0.012)
1997	0.140***	(0.015)	0.037***	(0.012)	0.047***	(0.011)
1998	0.146***	(0.014)	0.045***	(0.011)	0.056***	(0.011)
1999	0.153***	(0.015)	0.080***	(0.012)	0.091***	(0.011)
Demographics			X		X	
Firm controls					X	

Source: Authors' calculations, based on IABS 1975-2004.

Note: Dependent variable is the log real daily wage. Cohort effects are calculated as deviations from the mean starting wage by using the restricted least squares procedure proposed by Haisken-DeNew and Schmidt (1997). Demographic characteristics include age at labour market entry, as well as dummy variables indicating gender, skill level, and nationality. Firm controls include dummy variables for establishment size, industry, and region.

Table A.4: Mobility statistics by deviation from mean entry wage

Deviation from entry wage	Experience in years	Worker flow rates				
		EE	EN	EU	EE_d	EE_U
1st quintile	1 year	0.216	0.758	0.120	0.219	0.043
	2 years	0.182	0.290	0.162	0.204	0.059
	5 years	0.163	0.168	0.121	0.178	0.042
2nd quintile	1 year	0.240	0.736	0.136	0.236	0.047
	2 years	0.193	0.287	0.175	0.212	0.067
	5 years	0.146	0.169	0.130	0.164	0.047
3rd quintile	1 year	0.223	0.645	0.070	0.224	0.027
	2 years	0.179	0.249	0.079	0.190	0.031
	5 years	0.146	0.159	0.062	0.159	0.022
4th quintile	1 year	0.211	0.520	0.112	0.208	0.039
	2 years	0.178	0.218	0.127	0.188	0.047
	5 years	0.141	0.141	0.089	0.156	0.034
5th quintile	1 year	0.184	0.386	0.133	0.190	0.048
	2 years	0.163	0.180	0.143	0.174	0.052
	5 years	0.141	0.131	0.100	0.148	0.042

Source: Authors' calculations, based on IABS 1975-2004.

Note: EE: employer-to-employer flows, EU: employment- to-unemployment flows, EN: employment-to-nonparticipation flows, EE_d: direct employer-to-employer flows and those with an intervening unemployment spell < 1 month, EE_U: employer-to-employer flows with an intervening unemployment spell ≥ 1 month.

Table A.5: Estimation results from the piecewise constant exponential model I

	Without unobs. heterog.			With unobs. heterog.		
	EE	EU	EN	EE	EU	EN
Male	1.190***	1.364***	0.955***	1.199***	1.403***	0.941***
	(0.006)	(0.010)	(0.003)	(0.006)	(0.012)	(0.004)
Mediumskill	0.860***	0.638***	0.521***	0.836***	0.630***	0.427***
	(0.006)	(0.005)	(0.002)	(0.006)	(0.006)	(0.002)
Highskill	0.962***	0.266***	0.392***	0.930***	0.254***	0.264***
	(0.008)	(0.004)	(0.002)	(0.009)	(0.005)	(0.002)
20-99 empl.	0.670***	0.511***	0.769***	0.666***	0.537***	0.805***
	(0.005)	(0.006)	(0.003)	(0.005)	(0.006)	(0.004)
100-999 empl.	0.369***	0.299***	0.607***	0.368***	0.327***	0.671***
	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)
more than 1000 empl.	0.250***	0.183***	0.589***	0.248***	0.194***	0.649***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
pos. cohort effect	0.998***	1.004**	1.000*	0.996**	1.003**	1.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
neg. cohort effect	1.003***	1.009***	1.014**	1.004***	1.011**	1.018*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	Baseline Hazard					
	Reference Category: 0-6 months employment					
7-12 months	0.945***	0.722***	0.594***	0.931***	0.747***	0.577***
	(0.006)	(0.006)	(0.002)	(0.006)	(0.006)	(0.002)
13-18 months	0.785***	0.476***	0.435***	0.795***	0.530***	0.430***
	(0.006)	(0.005)	(0.003)	(0.006)	(0.006)	(0.003)
19-24 months	0.813***	0.409***	0.426***	0.826***	0.471***	0.428***
	(0.006)	(0.006)	(0.002)	(0.007)	(0.007)	(0.002)
25-36 months	0.714***	0.217***	0.376***	0.743***	0.262***	0.386***
	(0.005)	(0.003)	(0.002)	(0.006)	(0.004)	(0.002)
37-60 months	0.666***	0.152***	0.414***	0.715***	0.193***	0.440***
	(0.005)	(0.003)	(0.002)	(0.006)	(0.004)	(0.002)
No. of observations	5832206					

Source: Authors' calculations, based on IABS 1975-2004.

Note: Standard errors in parentheses. Significant levels: *: 10%, **: 5%, ***: 1%. Each regression includes region, year, and month dummies. EE: employer-to-employer flows, EU: employment- to-unemployment flows, EN: employment-to-nonparticipation flows.

Table A.6: Estimation results from the piecewise constant exponential model II

	Without unobs. heterog.		With unobs. heterog.	
	EE_d	EE_U	EE_d	EE_U
Male	1.227***	1.429***	1.252***	1.454***
	(0.005)	(0.015)	(0.006)	(0.017)
Mediumskill	0.850***	0.715***	0.820***	0.695***
	(0.005)	(0.009)	(0.005)	(0.010)
Highskill	0.829***	0.294***	0.803***	0.292***
	(0.007)	(0.007)	(0.007)	(0.008)
20-99 empl.	0.668***	0.459***	0.666***	0.473***
	(0.004)	(0.007)	(0.004)	(0.008)
100-999 empl.	0.373***	0.272***	0.373***	0.284***
	(0.002)	(0.004)	(0.002)	(0.004)
more than 1000 empl.	0.258***	0.170***	0.255***	0.174***
	(0.002)	(0.003)	(0.002)	(0.003)
pos. cohort effect	0.987**	1.005***	0.986**	1.005**
	(0.000)	(0.001)	(0.000)	(0.001)
neg. cohort effect	1.008***	1.006***	1.007***	1.005***
	(0.000)	(0.001)	(0.000)	(0.001)
	Baseline Hazard			
	Reference Category: 0-6 months employment			
7-12 months	1.036***	1.072***	1.028***	1.081***
	(0.005)	(0.012)	(0.005)	(0.013)
13-18 months	0.821***	0.800*	0.845***	0.852
	(0.005)	(0.012)	(0.005)	(0.013)
19-24 months	0.846***	0.787***	0.890***	0.863***
	(0.005)	(0.012)	(0.005)	(0.013)
25-36 months	0.735***	0.498***	0.797***	0.569***
	(0.005)	(0.012)	(0.005)	(0.013)
37-60 months	0.665***	0.348***	0.751***	0.415***
	(0.005)	(0.012)	(0.005)	(0.013)
No. of observations	5835344			

Source: Authors' calculations, based on IABS 1975-2004.

Note: Standard errors in parentheses. Significant levels: *: 10%, **: 5%, ***: 1%. Each regression includes region, year, and month dummies. EE_d: direct employer-to-employer flows and those with an intervening unemployment spell $<$ 1 month, EE_U: employer-to-employer flows with an intervening unemployment spell $\geq$ 1 month.

Table A.7: Wage growth by quintile

Deviation from	Average Wage growth		
entry wage	Stay	EE_d	EE_U
1st quintile	1.289	2.081	1.802
2nd quintile	0.507	0.513	0.440
3rd quintile	0.370	0.309	0.206
4th quintile	0.269	0.217	0.062
5th quintile	0.171	0.135	-0.052

Source: Authors' calculations, based on IABS 1975-2004.

Note: EE_d: direct employer-to-employer flows and those with an intervening unemployment spell $<$ 1 month, EE_U: employer-to-employer flows with an intervening unemployment spell $\geq$ 1 month.

Table A.8: Wage rates by quintile

Deviation from	Wage Changes			
entry wage	At entry	Stay	EE_d	EE_U
1st quintile	3.103	3.682	3.997	3.916
2nd quintile	3.627	3.977	4.028	3.837
3rd quintile	3.875	4.143	4.141	3.920
4th quintile	4.075	4.282	4.255	4.008
5th quintile	4.359	4.490	4.466	4.172

Source: Authors' calculations, based on IABS 1975-2004.

Note: See notes to Table A.7.

Table A.9: Change in wage deviations by quintile

Deviation from	Deviations from mean entry wage			
entry wage	At entry	Stay	EE_d	EE_U
1st quintile	-26.276	-11.628	-4.718	-8.693
2nd quintile	-9.273	-7.063	-2.490	-6.535
3rd quintile	-0.695	-1.409	1.219	-3.717
4th quintile	8.011	3.992	5.652	-0.422
5th quintile	25.510	16.101	15.385	7.768

Source: Authors' calculations, based on IABS 1975-2004.

Note: See notes to Table A.7.

Table A.10: Estimation of cohort wage effects five years after labour market entry

	Coeff.	(S. D.)		Coeff.	(S. D.)
1980	-0.120***	(0.010)	1980*mover	-0.008	(0.011)
1981	-0.092***	(0.011)	1981*mover	0.021**	(0.010)
1982	-0.080***	(0.013)	1982*mover	0.053***	(0.012)
1983	-0.069***	(0.013)	1983*mover	0.030**	(0.012)
1984	-0.042***	(0.013)	1984*mover	0.028**	(0.012)
1985	-0.046***	(0.013)	1985*mover	-0.023**	(0.012)
1986	0.013	(0.013)	1986*mover	0.000	(0.013)
1987	0.031**	(0.014)	1987*mover	-0.018	(0.013)
1988	0.043***	(0.014)	1988*mover	0.019	(0.013)
1989	0.063***	(0.013)	1989*mover	-0.027**	(0.012)
1990	0.039***	(0.011)	1990*mover	-0.030***	(0.010)
1991	0.051***	(0.013)	1991*mover	-0.037***	(0.012)
1992	0.031**	(0.012)	1992*mover	-0.020**	(0.012)
1993	0.052***	(0.015)	1993*mover	-0.027**	(0.010)
1994	0.061***	(0.015)	1994*mover	-0.045**	(0.011)
1995	0.029***	(0.015)	1995*mover	-0.021*	(0.010)
1996	0.055***	(0.015)	1996*mover	-0.045***	(0.012)
1997	0.040***	(0.016)	1997*mover	0.018	(0.012)
1998	0.052***	(0.014)	1998*mover	-0.028***	(0.010)
1999	0.030***	(0.015)	1999*mover	-0.037***	(0.012)

Source: Authors' calculations, based on IABS 1975-2004.

Note: Dependent variable is the log real daily wage. Cohort effects are calculated as deviations from the mean starting wage by using the restricted least squares procedure proposed by Haisken-DeNew and Schmidt (1997).

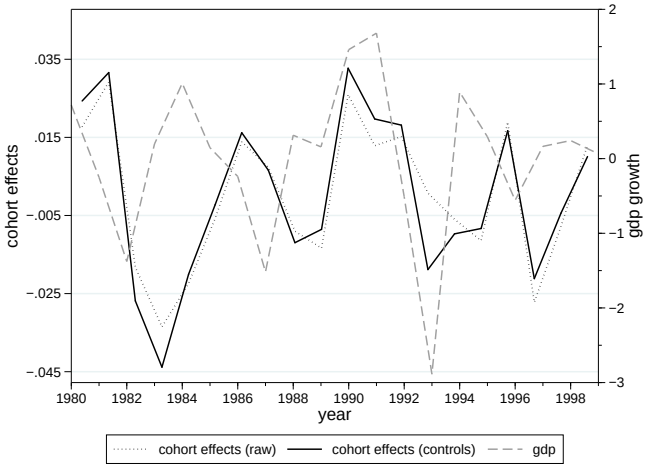
Appendix B Figures

Figure B.1: Wages by year of labour market entry

Source: Authors' calculations, based on IABS 1975-2004.

Note: This figure shows the average cohort wages for workers entering the labour market 1980 to 1999.

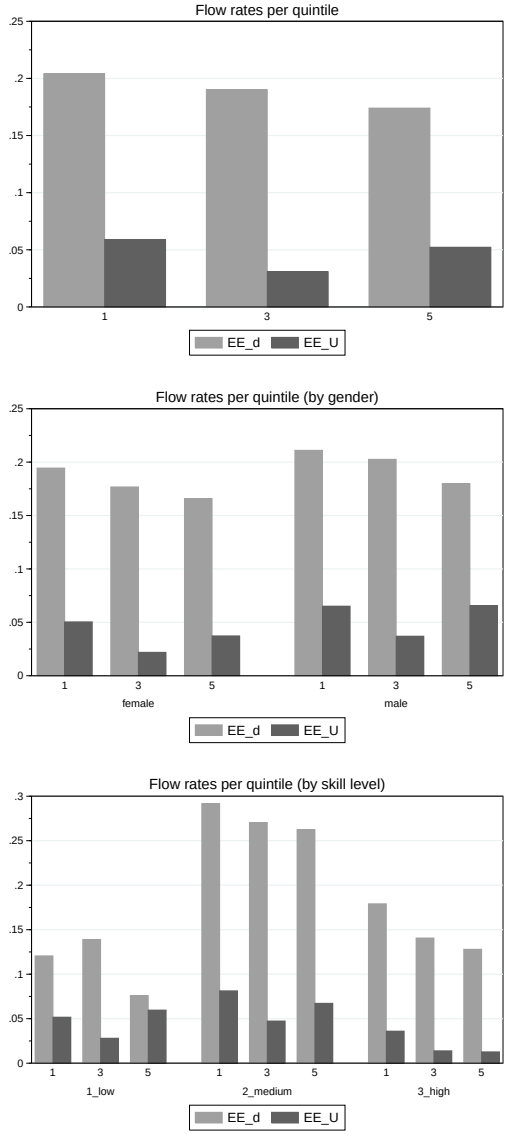
Figure B.2: Estimated cohort effects at labour market entry



Source: Authors' calculations, based on IABS 1975-2004.

Note: This figure shows the gdp growth rate as well as the estimated cohort effects at the time of labour market entry as described in section 4. All time series are detrended using a Hodrick-Prescott filter.

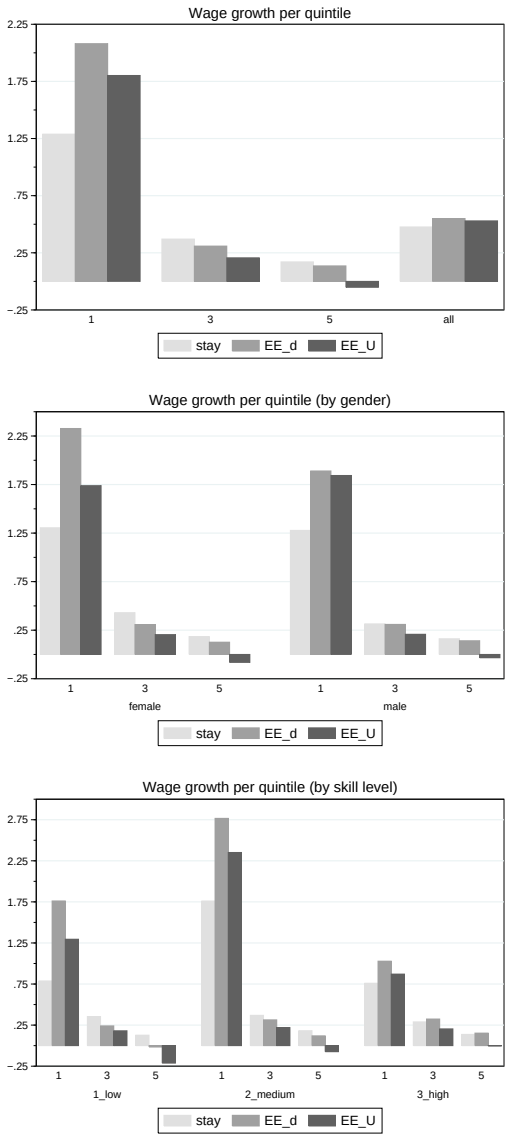
Figure B.3: Separation rates by quintile



Source: Authors' calculations, based on IABS 1975-2004.

Note: This figure shows separation two years after labour market entry by gender and skill level. EE_d: direct employer-to-employer flows and those with an intervening unemployment spell < 1 month, EE_U: employer-to-employer flows with an intervening unemployment spell ≥ 1 month.

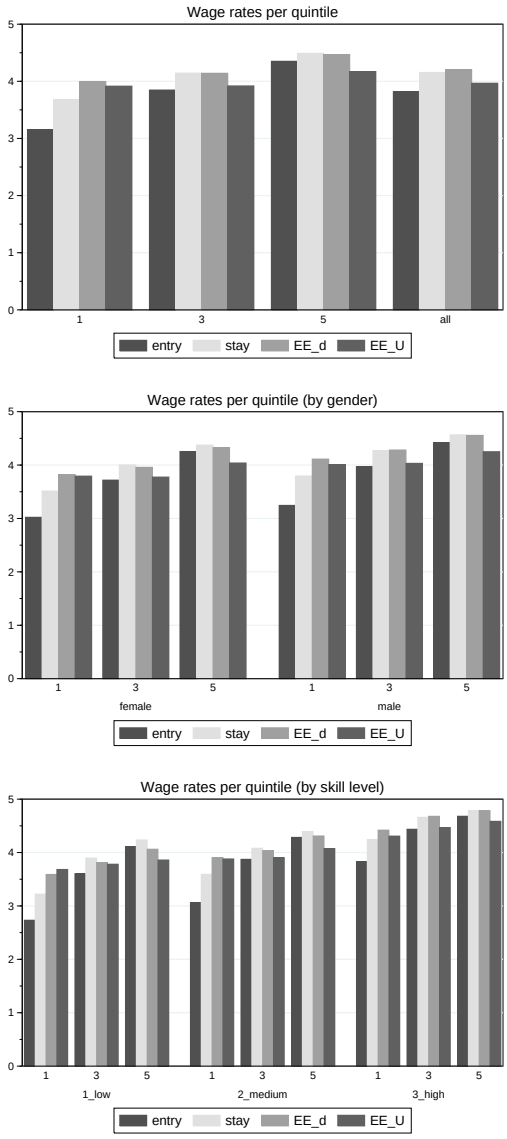
Figure B.4: Wage growth by quintile



Source: Authors' calculations, based on IABS 1975-2004.

Note: his figure shows wage growth five years after labour market entry by gender and skill level. EE_d: direct employer-to-employer flows and those with an intervening unemployment spell < 1 month, EE_U: employer-to-employer flows with an intervening unemployment spell ≥ 1 month.

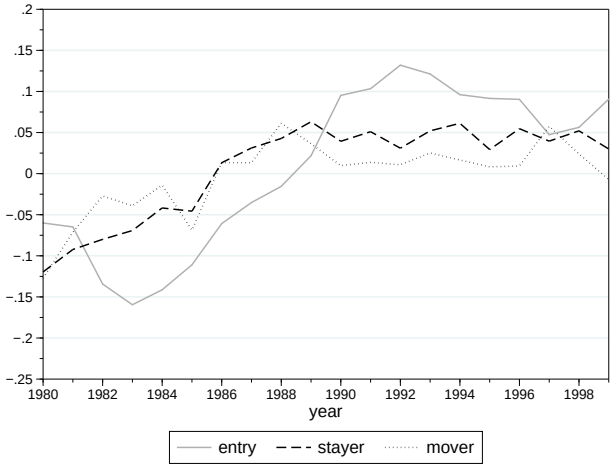
Figure B.5: Wage rates by quintile



Source: Authors' calculations, based on IABS 1975-2004.

Note: This figure shows wage rates five years after labour market entry by gender and skill level. See notes to figure B.4.

Figure B.6: Estimated cohort effects five years after labour market entry



Source: Authors' calculations, based on IABS 1975-2004.

Note: This figure shows the estimated cohort effects five years after labour market as described in section 4.