Low-wage jobs - stepping stones or just bad signals? *

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Abstract

This study investigates how the effects of low-wage employment and non-employment on wage prospects vary depending on qualification. We apply dynamic nonlinear models with random effects. We find that low-wage jobs are stepping stones for low-qualified workers. However, regarding workers with university degree, the picture becomes unclear. While they have a lower risk of not being employed when having a low-paid job instead of not being employed, their chances of getting a better-paid job are the same when being low-paid or not employed. Furthermore, our results suggest that for workers with university degree low-wage jobs are associated with negative signals.

Keywords: low-pay dynamics, state dependence, dynamic multinomial logit model, partial effect, nonlinear models, interaction term, unobserved heterogeneity

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1 Introduction

Recent studies have investigated the scarring effects of non-employment and low-wage employment in order to assess whether taking up a low-paid interim job improves the labor market prospects of not employed individuals (Buddelmeyer, Lee and Wooden, 2007; Cappellari and Jenkins, 2008; Mosthaf, Schank and Schnabel, 2009; Stewart, 2007; Uhlendorff, 2006).[1] So far, the heterogeneity of these effects has been given scant attention although it is clearly important to know if taking up a low-paid interim job is advisable for everyone or only for specific subgroups of the population. Using a rich German administrative dataset this study investigates how the effects of low-wage employment and non-employment on future labor market outcomes vary depending on qualification.

The current economic crisis in several OECD-countries lends a special interest to the question whether it is beneficial to take up a low-paid interim job. Ljungqvist and Sargent (1998) argue that European labor markets are more vulnerable to recessions than the US because generous unemployment benefits reduce incentives for laid-off workers to quickly accept jobs with lower wages than those of their previous jobs. In times of economic crisis the number of "good jobs" with high wages is limited and high reservation wages of laid-off workers lead to long-term unemployment, a factor producing a significant loss of human capital. By taking up a low-paid job instead of waiting for for a "good job", unemployed individuals could shorten unemployment duration and thereby averting scarring effects associated with unemployment. On the other hand Burdett (1979) and Marimon and Zilibotti (1999) point out that searching for the right job match during unemployment may be productive.

Since the German government reduced the generosity of the unemployment benefit system (Caliendo, 2009), there has been a lively political discussion about policy instruments such as unemployment benefits, minimum wages and employment subsidies. Given the growing low-wage sector there is the concern that individuals

[1] McCormick (1990, p. 300) focusses in his study on interim jobs and defines them as jobs which are *acceptable by certain workers as an interim position while searching on-the-job for a preferred, but costly to locate, job type.*

accepting "bad jobs" might become trapped in low-wage employment and in doing so might further increase their unemployment risk (so that that there is a low-pay-no-pay cycle).

Non-employment may lead to a loss of human capital (Phelps, 1972) or to negative signalling effects (Lockwood, 1991) and therefore enhance the probability of facing unemployment or low-wage employment in the future. In addition, job mobility will be hampered by transaction costs (like costs of job search) reducing the likelihood that workers will take up a new job (Burdett, 1978). The incidence of non-employment may also alter preferences. Individuals who experience an episode of non-employment in presence may ascribe a higher utility to leisure and a lower utility to wages and consumption than in the past. As a consequence, individuals could reduce labor supply and raise reservation wages (Hotz, Kydland and Sedlacek, 1988). As stated for instance by Layard, Nickell and Jackman (1991), signalling effects of low-wage jobs could be even worse than those of unemployment. It is a reasonable assumption that this may also be true for human capital depreciation and costs of job search.[2]

Thus, it appears that labor market history affects current labor market success, a phenomenon referred to as state dependence in the literature. Due to the effect of time-constant unobserved variables on labor market outcomes and by virtue of the fact that the individual's labor market history is often not observed from its beginning, difficulties in measuring state dependence arise from the separation of genuine state dependence from spurious state dependence as well as from the problem of initial conditions. These issues have been addressed in a number of papers (see e. g. Heckman (1981*a*); Heckman (1981*b*); Honoré and Kyriazidou (2000); Wooldridge (2005)).

To our knowledge, genuine state dependence of low-wage work and non-employment has been analyzed jointly before in studies for the UK, Australia and Germany. Cappellari and Jenkins (2008) investigate yearly transitions between low-

[2]The existence of human capital depreciation in low-wage employment is consistent with theories of labor market segmentation (Taubman and Wachter, 1986).

wage employment, high-wage employment and unemployment in the UK. The study finds strong evidence for a low-pay no-pay cycle. That is, being low-paid instead of being high-paid in period $t-1$ increases the probability to be unemployed in period t and vice versa. Stewart (2007) comes to similar conclusions. His results suggest that a low-paid job has the same negative effect on the probability to be employed in the future as an episode of unemployment. Stewart reasons that low-wage jobs are a conduit to repeat unemployment in the UK.

In a study for Australia, Buddelmeyer, Lee and Wooden (2007) find considerable differences in the effects between men and women. For men they show that the negative effect of a low-paid job on the employment probability is rather small. Low-wage work only leads to a higher unemployment risk when the preceding employment spell is an episode of unemployment. Women having a low-paid job, however, have in general a much larger probability of experiencing unemployment in future than women having a high-paid job.

Uhlendorff (2006) shows for German men that low-wage jobs reduce the probability to get a high-wage job and increase the risk of unemployment in the future but that employment prospects of low-wage earners are still better than the prospects of unemployed individuals. He concludes that low-wage jobs are stepping stones to better jobs. Mosthaf, Schank and Schnabel (2009) investigate labor market dynamics of western German women and conclude that future labor market success is better for low-paid women than for unemployed and inactive women, especially when having full-time jobs.

So far, there is some evidence, that the effect of low-wage work on future employment prospects is heterogenous. Measuring the heterogeneity of the effect of low-wage employment is important since taking up a low-wage job could be advantageous for one individual and inappropriate for another. In order to assess if low-paid jobs are stepping stones for everyone or rather for some subgroups of the population we test if the effect of low-wage employment and non-employment varies with respect to qualification.

We now discuss theoretically how state dependence in low-wage employment and non-employment may depend on qualification. On the one hand, state dependence in low-wage employment and non-employment could be lower for high-skilled individuals, because they should have a higher job offer arrival rate and therefore lower costs of job search. This point is supported by several studies that estimate the determinants of upward mobility of low-wage earners. Schank, Schnabel and Stephani (2009), Mosthaf, Schnabel and Stephani (2011) and Grün, Mahringer and Rhein (2011) show with German administrative datasets which stem from the same sources as our dataset that transitions from low-pay to high-pay are more likely for well-educated individuals. Cappellari (2007) investigates low-pay dynamics of Italian workers and finds a positive but insignificant effect of qualification on upward mobility. Pavlopoulus and Fourarge (2010) use the British BHPS and the German SOEP and come to the result that in Germany qualification has positive effects on the probability to get high-paid while in Great Britain qualification has postive effects only for those with unfavorable unobserved characteristics.

On the other hand, signalling effects may be stronger for high-qualified individuals. McCormick (1990) introduced the idea that taking up an interim job is associated with negative signalling effects, as employers may interpret the job search behavior of workers as signal for their future productivity. In his model high-productive individuals are able to move faster from job to job and it is only profitable for low-productive individuals to take up an interim job and hence taking up such a job incurs negative signals. We argue that negative signalling effects of low-paid jobs are likely to be stronger for high-qualified individuals than for medium- and low-qualified individuals, as episodes of low-wage employment are uncommon for high-qualified individuals and hence employers might assume that high-qualified individuals with low-wage jobs represent an adverse selection with respect to unobserved characteristics. Accordingly, state dependence in low-wage employment should be higher for well-educated workers. These arguments could also be true for episodes of non-employment. However, episodes of non-employment are not as

rare for high-qualified individuals as episodes of low-wage employment. Another argument for stronger state dependence for well-qualified workers is that human capital depreciation should be higher as technological change is more important in occupations which are associated with complex tasks.

Until now the literature could not confirm that signalling effects indeed play a role for state dependence of low-wage work. With respect to state dependence of unemployment Biewen and Steffes (2010) found some evidence for the existence of negative signals.

The rest of this paper is organized as follows: section 2 introduces the empirical specification and section 3 describes the data. Section 4 shows descriptive statistics. The results are presented in section 5 and section 6 concludes.

2 Empirical specification

We are interested in a model for the propensity of individual i to be in state j (high-wage employment, low-wage employment, non-employment or absorbing state) in time period $t = s, \ldots, T$. We therefore specify the following conditional density of y_{ijt}:

$$\prod_{t=s}^{T} f(y_{ijt}|\mathbf{y}_{it-1}, \mathbf{x}_{it}, \alpha_{ij}) \tag{1}$$

where $i = 1, \ldots, N$; $j = 1, \ldots, 4$. $\mathbf{y}_{it-1}$ is a vector of dummy variables representing the lagged employment state. Its inclusion allows to measure state dependence. $\mathbf{x}$ is a vector of observed independent variables and α_{ij} are person specific random effects.

The estimation of dynamic models with lagged dependent variables goes along with the initial conditions problem (Heckman, 1981*a*). Typically, the first observed employment state of an individual is not random, but determined by the individuals prior labor market history and by his observed and unobserved characteristics.

$$f(y_{ijs}|\mathbf{y}_{i1}\ldots\mathbf{y}_{is-1},\mathbf{x}_{i1}\ldots\mathbf{x}_{is},\alpha_{ij}) \tag{2}$$

The latter violates the standard assumption of random effects models, namely the assumption that there is no correlation between the random effects ($\boldsymbol{\alpha}$) and the independent variables ($\mathbf{y}_{is}$, $\mathbf{x}$). Wooldridge (2005) proposes to account for the correlation of $\boldsymbol{\alpha}$ with $\mathbf{y}_{is}$ and $\mathbf{x}$ by explicitly modelling the following distribution:

$$f(\alpha_{ij}|\mathbf{y}_{is},\bar{\mathbf{x}}_i,\eta_{ij}) \tag{3}$$

where $\bar{x_i}$ are individual specific means of $\mathbf{x}$over time. η_{ij} are random effects, which are orthogonal to other independent variables of the model.

Equation 2 shows the dependence of the outcome variable and the individuals pre-sample labor market history. Our administrative dataset allows us to control for the labor market history of all sampled individuals. We therefore specify the density of y_{ijt} conditional on h_i - a vector of variables representing the individuals prior labor market history.[3] This is especially helpful in the context of our analysis. High-qualified workers could have a higher probability to be in the state of low-wage employment or non-employment because of the occurrence of events of low-wage employment or non-employment in the past.[4] In addition, high qualified workers who are in one of both sectors in our analyzed period could be an adverse selection with respect to time-invariant variables not observed in the data. In this case h_i could catch up these unobserved characteristics.

In this study we want to measure how state dependence varies with respect to qualification. For this purpose, we include interaction terms of y_{it-1} and x_{it-1}. As

[3] h_i is a vector of variables representing the number of spells of non-employment and low-wage employment in the period between 1995 and 2000 broken down by the duration of these episodes. Additionally, it contains the cumulated duration of episodes of non-employment and episodes of low-wage employment in the period between 1998 and 2000. See table 1 for an overview over these variables.

[4] For a definition of occurrence dependence see Heckman and Borjas 1980

suggested by Wooldridge (2005), possible correlation of $y_{is} * x_{is}$ is accounted for by an additional term $y_{is} * x_{is}$.

$$\prod_{t=s}^{T} f(y_{ijt}|\mathbf{y}_{it-1}, y_{it-1} * x_{it-1}, \mathbf{x}_{it}, h_i, \bar{\mathbf{x}}_i, y_{is} * x_{is}, \eta_{ij}) \tag{4}$$

We assume that the function in 4 has a Type I extreme value distribution. We obtain a multinomial logit model with random effects for the probability to be high-wage employed, low-wage employed, not employed, where high-wage employment serves as reference category.

The random effects have to be integrated out. Here, we compare two specification for their distribution. First we examine models with normally distributed random effects, which can be maximized by applying adaptive quadrature (maximum likelihood estimator). Second we estimate models with a discrete distribution of the random effects with an a priori unknown number of support points (nonparametric maximum likelihood estimator) (Heckman and Singer, 1984).

3 Data

We use data from the German Integrated Employment Biographies Sample (IEBS). The administrative dataset includes information on employment, unemployment benefits, job search, and participation in active labor market programs on a daily basis. It is available at the Research Data Center of the German Federal Employment Agency (FEA) at the Institute for Employment Research (IAB) (see Jacobebbinghaus and Seth (2007)).

We restrict our analysis to western Germany, as labor market conditions still vary considerably between western and eastern Germany. For instance, the low-wage thresholds are remarkably lower in eastern Germany. Similarly, we exclude women from our analyzes. In our dataset, we cannot observe the search intensity of not employed individuals. As women are much more often inactive on the labor

market than men, one should apply different definitions of non-employment for both sexes.

For our study, we build a panel dataset with yearly observations at the reference day June 30 for the period from 2000 until 2006. We analyze yearly transitions between three mutually exclusive states: high-wage employment, low-wage employment and non-employment. An individual is in the state of non-employment, if he is not employed in a job liable to social security and (a) is registered as unemployed, (b) participates in a program of active labor market policy or (c) if he is in a period between two employment periods and is registered as unemployed or participating in a program of active labor market policy for at least one day. Since information on employment stems from notifications to social security bodies, we cannot rule out that individuals defined as not employed are working as as civil servants or are self-employed.

We follow a large part of the literature on low-wage employment and define an individual as low-paid, if he earns less than two thirds of the median gross wage of all full-time employed individuals in western Germany liable to social security.

Although part-time jobs could be an important alternative for individuals searching for an interim job, we only consider full-time jobs here. First, working hours are only crudely measured in our dataset and it would be impossible to assess if part-time workers are low-paid or high-paid. Second, including part-time work would force us to define more employment states, which would require a huge computational effort.

The econometric models applied in this study are computationally very intensive. Therefore we run our estimations on a random sample of 15 000 individuals of the IEBS who are full-time employed or in the non-employment state in the year 2000. We define an absorbing state for individuals leaving the panel. Individuals enter the absorbing state, when they are working part-time at the reference day, when they cannot be classified as low-paid, high-paid or not employed or when there is a missing

value in one of the variables needed in the econometric analysis.[5] Afterwards, they are not considered anymore.

When there is a gap between two episodes of employment at the same establishment that is equal or shorter than 32 days, we combine both job spells. Job spells shorter than two weeks are not considered in our analysis. This is because we want to avoid to include single payments. In our econometric analysis we will use information of the prior labor market history between 1995 until 2000. We suppose that individuals who had no full-time job in this period have been out of the labor force and do not consider them in our analysis. In order to omit transitions from education to work and from work to retirement, we focus on individuals older than 30 in 2000 and younger than 59 in 2006. Moreover, we exclude individuals, who during the observation period work as trainees, interns, working students, are in partial retirement, live outside western Germany and individuals who are handicapped.

4 Descriptive Statistics

Table 1 shows some descriptive statistics. 85 percent of the observations in the pooled sample are high-paid, 4 percent are low-paid and 9 percent are in the state of non-employment. 2 percent enter the absorbing state in one of the years between 2001 and 2005 and fall out of the panel.

There is a very low share of individuals without apprenticeship in the high-wage sector, while their share under the low-paid is high. In contrast, the share of individuals with university or technical college degree is extremely small under the low-paid. Moreover, they have a relatively low probability to be not employed. We do not observe, that the probability to enter the absorbing state follows a strong systematic pattern with respect to qualification. Germans are less often low-paid or not employed than foreigners and the mean unemployment rate is lower for high-paid individuals than for the low-paid or not employed.

[5]Missing values are rare in our administrative dataset. One exception is the variable on education. For this variable, we applied the IPI imputation rule by Fitzenberger, Osikominu and Rober Völter (2006).

We now turn to the variables describing the prior labor market history of the individuals in our sample. Sample means of these variables indicate that individuals who have experienced episodes of low-wage employment or non-employment in the past are more likely to be in one of these employment states in the observation period. For instance, the mean cumulated duration of episodes of non-employment between 1998 and 2000 is highest among the not working individuals (228 days) and lowest among the high-paid individuals. Similarly, the mean cumulated duration of episodes of low-wage employment is highest among the low-paid and smallest among the high-paid. What is more, individuals who enter the absorbing-state on average have a higher number of episodes of non-employment and episodes of low-wage employment between 1995 and 2000.

The interrelation between past labor market experience and current labor market outcomes is also highlighted in table 2. Only 13.77 percent of the individuals who were low-paid in period $t-1$ in our sample achieved to get a high-paid job in the following period. 64.19 percent of them remained low-paid. 16.81 percent lost their job, while 5.23 entered the absorbing-state. In contrast, most individuals who where high-paid in $t-1$ also were high-paid in t (95.46 percent). Only a minor part changed to low-wage employment, non-employment or to the absorbing-state. Like low-wage workers, individuals who were not working in period $t-1$ were more likely to be not employed or low-paid than previously high-paid individuals. This pattern is in line with results by (Uhlendorff, 2006) with data of the GSOEP. The probability of entering the absorbing state is largest for low-paid individuals and smallest for the high-paid.

However, aggregate transition probabilities vary by education. Transition rates to high-wage employment typically are larger for individuals with better qualifications. For instance 15.57 percent of the low-paid individuals with university or technical college degree obtained a high-paid job in the following period, while only 9.05 percent of the low-wage workers without apprenticeship or tertiary education moved up the job ladder. The same applies to individuals in the non-employment state.

23.50 percent of the best qualified workers reach the high-wage sector and only 4.94 percent of the individuals with the lowest qualification get a high-paid job in the next year.

With respect to the average values of our descriptive transition matrix, low-paid workers seem to be better off than those without a job. While the average transition rate to high-wage employment is around 14 percent for both employment states, the transition rate to non-employment is clearly lower for low-wage workers (16.81 percent) than for the non-employed (74.59 percent). Breaking down the transition rates by qualification we get a more differentiated picture. For low-wage workers without apprenticeship and college degree, the transition rate is higher, when being low-paid and hence, low-wage jobs seem to be stepping stones out of non-employment. For the best-qualified, however, the transition rate from non-employment to high-wage employment is higher than the transition rate from low-pay to high-pay. This suggests that for individuals with college degree, low-wage jobs are rather dead-ends regarding future wage prospects.

The statistics presented in this chapter are descriptive and do not allow us to draw conclusions about state dependence in low-pay-no-pay dynamics. In order to identify genuine state dependence we apply the econometric model presented in chapter 2.

5 Results

We first consider the distribution of unobserved heterogeneity. Table 3 shows the estimated coefficients of a dynamic multinomial logit model which models dynamics between three employment states: high-pay, low-pay and non-employment.[6] Concerning the dependent variables, high-pay serves as reference category. The

[6]By estimating the employment dynamics jointly with the transition into the absorbing state, we could control for possible endogeneity of panel retention. Estimating nonlinear models with trivariate distributions of random effects, however, is computationally very intensive. We started to estimate a model with a trivariate normal distribution which additionally considers the absorbing state. Until now the likelihood function did not converge. Results will be presented in future versions of this paper.

random effects are assumed to follow a bivariate discrete distribution with five mass points. The Akaike information criterion (AIC) has a value of 34211.5. We also tried to estimate a model with six mass points. The estimation was stopped at iteration 23. Until then the AIC did not improve considerably. Table 4 shows the model estimated with the assumption of normally distributed random effects. The AIC is lower (34184.5) which points to the better fit of the normal random effects specification. In the further analysis we will rely on the assumption of normally distributed unobserved heterogeneity.

We now turn to the estimated coefficients of the variance-covariance matrix of the model presented in table 4. The variances (η_2 and η_3) of the variance-covariance matrix are clearly significant at the one percent level, as well as the covariance η_{23}. Accordingly, it was indeed important to control for unobserved heterogeneity and to estimate the probability to be high-paid, low-paid or not employed jointly.

The coefficients of the labor market states in the year 2000 are highly significant with respect to probabilities to be low-paid or not employed, respectively, versus the probability to have a high-paid job. This indicates that initial conditions are endogenous and controlling for the initial conditions problem is indispensable. The labor market experience before the year 2000 is highly correlated with the propensity of being in one of the three labor market states in the years between 2001 and 2006. The higher the number of episodes of non-employment between 1995 and 2000 and the cumulated durations of non-employment and low-wage employment between 1998 and 2000, the higher is the propensity to be low-paid or not employed in the period between 2001 and 2006. Yet, our model does not allow us to conclude if these correlations stem from true occurrence or duration dependence or if these variables rather serve as proxies for unobserved heterogeneity (Heckman and Borjas, 1980).

The coefficients representing the qualification of the individuals in our sample indicate that better qualification leads to a lower probability of being low-paid or not employed in comparison with the probability to be high-paid. One has to note, however, that these coefficients are likely to be correlated with unobserved

heterogeneity and hence cannot be interpreted as causal effects.[7] We cannot identify large statistical effects of age with our model. Only the coefficients of the dummy variables Age: 35-39 and Age: 55-59 are statistically different from the reference category Age: 30-34. Though, there is a high multicolinearity with the individual specific means over time of the age variables. While Turkish nationality does not seem to be associated with a higher probability of being low-paid or not-employed, individuals with nationalities other than German and Turkish are both more often low-paid or not-employed in our sample. Furthermore, the higher the local unemployment rate, the higher is the probability of being not employed in comparison with the probability of being high-paid.

We now turn to the coefficients representing genuine state dependence. The coefficient of low-pay in $t-1$ is statistically different from the reference category high-pay in $t-1$ at the one percent level on the probability to be low-paid. That is, individuals who experienced an episode of low-wage employment in the prior period have a higher probability to be low paid again rather to get a high-paid job. The same applies to individuals who were not employed in $t-1$. Regarding the probability to be not employed in comparison to be high-paid in period t, the coefficients indicate that both, the occurrence of low-wage employment and of non-employment in the foregoing period enhance the probability to be not employed.

Table 5 presents the results of the central model in our paper where we interacted the lagged endogenous variables with the variables concerning qualification. The coefficients of the control variables as well as the coefficients representing the labor market states in 2000 and the prior labor market history largely remained unchanged. As a matter of course, the variables concerning state dependence and qualification changed. Again, high-wage employment in period t is the reference category of the dependent variables. High-wage in period $t-1$ serves as the reference category for the variables low-pay, $t-1$ and non-employment, $t-1$. These variables in turn

[7] The Wooldridge-method is only able to measure causal effects of time-varying variables. This is a minor problem as the time-invariant variables representing qualification are not central in our analysis.

serve as reference category for the corresponding interactions with qualification and hence have to be interpreted with respect to individuals without apprenticeship and without tertiary education.

That is, the dummy low-pay, t-1 on the probability to be low-paid indicates that the worst-educated who experienced an episode of low-pay in the preceding period have a higher probability to be low-paid again rather than being high-paid in period t. For formerly low-paid individuals with an apprenticeship and no abitur, the probability to be low-paid is lower than for those without apprenticeship or tertiary education. The coefficient of the interaction of the lagged labor market state with apprenticeship and abitur is not statistically different from zero at the ten percent level. However, individuals who experienced an episode of low-pay in $t-1$ and who have a college degree have a higher probability to be repeatedly low-paid than those without vocational training.

Non-employment in $t-1$ also leads to a higher probability of low-pay in period t in comparison with the probability of high-pay in period t. This effect, however, declines with better education. All interaction terms of non-employment, $t-1$ are are negative in sign, although the coefficient of non-employment$*$university-degree is not statistically different from zero.

With respect to the probability of non-employment in t the coefficients of the lagged endogenous variables without interactions point to the same direction like those of the model without interactions. Although not statistically different from zero in every case, the results indicate that better educated individuals have a higher probability to be high-paid instead of not-employed. This pattern is most pronounced regarding the transitions out of non-employment.

To sum up, both the experience of low-wage employment and non-employment in the past enhances the probability of being low-paid or not-paid in presence. While state dependence of non-employment diminishes with better qualification the same is only true for low-wage employment regarding the probability to be not employed in comparison with the probability to be high-paid. Regarding the

probability to be low-paid rather than high-paid this pattern applies for those with apprenticeship without abitur and (although the effect is not statistically different from zero) for individuals with apprenticeship and abitur. Formerly low-paid workers with technical college or university degree face higher state dependence than those without vocational training and especially than those with apprenticeship and without abitur. This suggests that low-wage jobs incur negative signals for individuals with technical college or university degree.

Human capital accumulation cannot explain this pattern as human capital accumulation is very likely to be lower when being not employed than when being low-paid. Similarly, there is no explanation why transaction costs like costs of job search should be higher for individuals with university degree than for individuals with worse qualification. Last but not least we do not believe that changes in preferences like habit formation concerning preferences between consumption and leisure should be higher when being low-paid instead of not employed (Hotz, Kydland and Sedlacek, 1988).

As coefficients of multinomial logit models are difficult to interpret in an economical sense, we calculated average transition probabilities. The tables seven until ten show average transition probabilities for those individuals who were not employed in the year 2000. As we are interested in the stepping stone effect out of non-employment, we regard the transition matrices for those initially not employed as the most interesting for labor market policy. Transition matrices calculated for other subgroups in our sample are presented in the Appendix. In order to determine how transition probabilities vary with respect to qualification, we simulated the predicted probabilities to be in the examined labor market states by varying the values of the variables representing the lagged labor market states, the qualification levels and the interactions of both variables. We did not calculate the average partial effects of the interaction terms as their interpretation is not straightforward (Ai and Norton, 2003; Greene, 2010) which is especially problematic when one is interested

in genuine state dependence.[8]

The conclusion by Uhlendorff (2006) that low-wage employment goes along with a higher probability to change to high-wage employment and to a lower probability to get not employed than non-employment is clearly confirmed for those with the worst qualification in our sample (table 7). The probability to be high-paid is 0.137 for those who were low-paid in $t-1$. This estimate is not in the 5 percent confidence intervals of the probability to be high-paid for those who were not employed in $t-1$ (0.037 and 0.092 respectively). Also the risk of being not employed in t is lower when being low-paid. The point estimates of the probability to be not-employed in t are 0.537 for those who are low-paid and 0.851 for those not employed in $t-1$. The confidence intervals do not overlap.

The same pattern applies for those who have an apprenticeship but do not have abitur. However, looking at the probabilities of those with apprenticeship and abitur, the picture becomes unclear. The point estimates of the probability to be high-paid for those who were low-paid in $t-1$ lies in the confidence interval of the probability for those who were not employed in the preceding period. Yet, their risk of being not employed is still lower.

We now turn to the transition probabilities of individuals with technical college or university degree. Those with the best qualification have the highest probability to be high-paid and the lowest probability to be not employed. However, with respect to the probability of being high paid, the probability of those who were low-paid is almost the same in comparison with those who were not paid in $t-1$. State dependence of low-wage work regarding the probability to be high paid is 34.7 percent points (0.637-0.290) while state dependence of those without vocational training is 31.5 and state dependence of those with apprenticeship and without abitur is 23.6. Again concerning the risk of non-employment low-wage workers are still better off than the not employed.

In sum, our results suggest that low-wage work incurs negative signals for workers

[8]This will be pointed out in a future version of this paper.

with technical college or university degree. While those with low qualification have better labor market prospects when being low-paid instead of being not employed, for individuals with the best qualification, this is only true when one considers the risk of non-employment. Regarding the chances to get a high-paid job, low-wage jobs go along with the same transition probabilities.

6 Conclusions

In this paper, we examined transitions between high-wage employment, low-wage employment and non-employment using dynamic multinomial logit models which control for unobserved heterogeneity and the problem of initial conditions. Using a rich German administrative dataset, we focussed on the heterogeneity of state dependence of both low-wage employment and non-employment with respect to qualification.

We showed that results of earlier studies that low-wage jobs serve as stepping stones to better-paid jobs still hold for individuals without vocational training and for individuals with apprenticeship and without abitur. However, for individuals with technical college or university degree state dependence of low-wage employment with respect to the probability to get a high-paid job has about the same size like state dependence of non-employment. Looking at the risk of non-employment low-wage workers are better of than those not employed regardless of the qualification.

Furthermore, our results can be interpreted as evidence that low-wage jobs indeed go along with negative signals for highly qualified workers. State dependence of low-wage employment regarding the transition to high-wage employment is strongest for those with the highest qualification level. For sure, it is very probable that human capital accumulation, transaction costs or changes in preferences also play a role for state dependence of low-wage work.

This result is important for labor market policy. If only low human capital accumulation would be an important source of state dependence of low-wage work, high-qualified low-wage workers could prevent scarring effects by participating in

further training measures. This, however, would not lead to lower state dependence, if signalling effects were the main origin of state dependence. Further research should investigate the distinct sources of state dependence and determine their impacts.

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Table 1: Variable means by labor market state

	High-pay	Low-pay	Non-employment	Absorbing-state
No apprenticeship (dummy)	0.09	0.18	0.15	0.12
Apprenticeship, no Abitur (dummy)	0.68	0.74	0.71	0.66
Apprenticeship, Abitur (dummy)	0.06	0.05	0.06	0.07
University degree (dummy)	0.17	0.04	0.08	0.16
Age: 30-34 (dummy)	0.08	0.10	0.09	0.10
Age: 35-39 (dummy)	0.25	0.28	0.25	0.27
Age: 40-44 (dummy)	0.26	0.23	0.23	0.25
Age: 45-49 (dummy)	0.21	0.19	0.21	0.20
Age: 50-54 (dummy)	0.15	0.15	0.15	0.14
Age: 55-59 (dummy)	0.05	0.06	0.07	0.04
Nationality: German (dummy)	0.93	0.81	0.84	0.87
Nationality: Turkish (dummy)	0.02	0.05	0.06	0.04
Nationality: other (dummy)	0.04	0.13	0.10	0.10
Local unemployment rate	8.23	8.94	9.24	7.90
Number of low-pay episodes with tenure $>$ 0 / $<=$ 180 days	0.07	0.61	0.53	0.29
Number of low-pay episodes with tenure $>$ 180 / $<=$ 365 days	0.03	0.31	0.19	0.11
Number of low-pay episodes with tenure $>$ 365 / $<=$ 545 days	0.01	0.11	0.06	0.04
Number of low-pay episodes with tenure $>$ 545 / $<=$ 730 days	0.01	0.10	0.03	0.03
Number of low-pay episodes with tenure $>$ 730	0.02	0.31	0.06	0.06
Number of non-employment episodes with duration $>$ 0 / $<=$ 180 days	0.34	0.94	0.87	0.56
Number of non-employment episodes with duration $>$ 180 / $<=$ 365 days	0.09	0.29	0.30	0.17
Number of non-employment episodes with duration $>$ 365 / $<=$ 545 days	0.02	0.13	0.13	0.05
Number of non-employment episodes with duration $>$ 545 / $<=$ 730 days	0.01	0.07	0.10	0.04
Number of non-employment episodes with duration $>$ 730	0.03	0.11	0.19	0.08
Cumulated duration of low-wage employment between 1998 and 2000	18.58	304.48	82.98	71.20
Cumulated duration of non-employment between 1998 and 2000	34.44	161.56	228.05	101.95
Share of observations	0.85	0.04	0.09	0.02
Number of observations	71962.00	3367.00	7862.00	1666.00
Number of individuals	15140.00	2926.00	4539.00	1666.00

Table 2: Descriptive transition matrix by qualification

	High-pay	Low-pay	Non-employment	Absorbing-state	Total
High-pay, t-1	95.46	0.67	2.24	1.63	100
Low-pay, t-1 * no apprenticeship	9.05	68.49	17.32	5.15	100
Low-pay, t-1 * apprenticeship, no Abitur	14.77	63.58	16.87	4.78	100
Low-pay, t-1 * apprenticeship, Abitur	14.86	59.43	16.57	9.14	100
Low-pay, t-1 * university degree	15.75	61.42	13.39	9.45	100
Low-pay, t-1 (dummy)	13.77	64.19	16.81	5.23	100
Non-employment, t-1 * no apprenticeship	4.94	8.11	83.69	3.26	100
Non-employment, t-1 * apprenticeship, no Abitur	13.66	8.82	74.15	3.36	100
Non-employment, t-1 * apprenticeship, Abitur	18.39	6.13	69.98	5.50	100
Non-employment, t-1 * university degree	23.50	3.79	66.40	6.31	100
Non-employment, t-1 (dummy)	13.55	8.13	74.59	3.73	100

Source: Source: IEBS (2000-2006); pooled unbalanced sample; Transitions between periods t - 1 and t; figures indicate row percentages

Table 3: Multinomial logit model with random effects (discrete distribution, five mass points), model without absorbing-state, no interactions

	Low-pay b/se	Non-employment b/se
Low-pay, t-1 (dummy)	3.251***	1.736***
	(0.114)	(0.108)
Non-employment, t-1 (dummy)	2.530***	3.073***
	(0.102)	(0.075)
Apprenticeship, no Abitur (dummy)	-0.376***	-0.259**
	(0.127)	(0.101)
Apprenticeship, Abitur (dummy)	-0.723***	-0.298*
	(0.214)	(0.153)
University degree (dummy)	-1.699***	-0.750***
	(0.202)	(0.128)
Age: 35-39 (dummy)	0.085	-0.234**
	(0.153)	(0.114)
Age: 40-44 (dummy)	0.086	-0.259
	(0.240)	(0.177)
Age: 45-49 (dummy)	0.293	-0.125
	(0.328)	(0.240)
Age: 50-54 (dummy)	0.482	0.174
	(0.419)	(0.303)
Age: 55-59 (dummy)	0.921*	0.746**
	(0.519)	(0.372)
Nationality: Turkish (dummy)	0.231	0.289*
	(0.207)	(0.166)
Nationality: other (dummy)	0.403***	0.399***
	(0.144)	(0.122)
Local unemployment rate	-0.006	0.062**
	(0.034)	(0.025)
year2003	0.108	0.209***
	(0.099)	(0.072)
year2004	0.236**	0.446***
	(0.108)	(0.077)

year2005	0.294**	0.320***
	(0.145)	(0.106)
year2006	0.366***	0.251**
	(0.139)	(0.103)
Age: 35-39	-0.553	-0.129
	(0.351)	(0.274)
Age: 40-44	-0.550*	-0.131
	(0.323)	(0.246)
Age: 45-49	-0.633	0.067
	(0.432)	(0.325)
Age: 50-54	-0.878*	-0.246
	(0.509)	(0.375)
Age: 55-59	-0.977	-0.487
	(0.681)	(0.494)
Individual average of local unemployment rate	0.044	-0.003
	(0.036)	(0.027)
Low-pay, t=1 (dummy)	3.738***	2.923***
	(0.217)	(0.210)
Non-employment, t=1 (dummy)	2.863***	3.944***
	(0.228)	(0.182)
Number of low-pay episodes with tenure > 0 / <= 180 days	-0.006	0.117**
	(0.062)	(0.055)
Number of low-pay episodes with tenure > 180 / <= 365 days	-0.027	-0.060
	(0.097)	(0.097)
Number of low-pay episodes with tenure > 365 / <= 545 days	0.045	-0.076
	(0.188)	(0.177)
Number of low-pay episodes with tenure > 545 / <= 730 days	0.039	-0.377
	(0.235)	(0.238)
Number of low-pay episodes with tenure > 730	0.710***	0.183
	(0.239)	(0.239)
Number of non-employment episodes with duration > 0 / <= 180 days	0.323***	0.349***
	(0.040)	(0.032)
Number of non-employment episodes with duration > 180 / <= 365 days	0.412***	0.306***
	(0.094)	(0.078)
Number of non-employment episodes with duration > 365 / <= 545 days	0.859***	0.821***

	(0.152)	(0.131)
Number of non-employment episodes with duration > 545 / <= 730 days	1.026***	0.990***
	(0.202)	(0.169)
Number of non-employment episodes with duration > 730	1.012***	1.296***
	(0.207)	(0.173)
Cumulated duration of low-wage employment between 1998 and 2000	0.003***	0.001***
	(0.000)	(0.000)
Cumulated duration of non-employment between 1998 and 2000	0.001***	0.001**
	(0.000)	(0.000)
Constant	-6.875***	-5.893***
	(0.304)	(0.236)
Observations	249573	
AIC	34211.5	
Log Likelihood	-1.7e+04	
Wald-Test-Chi^2	130.73	
Prob > Chi^2	0.00	

Standard errors in parantheses
starlevels(*
0.10
**
0.05
***
0.01)
$^*p < 0.10$. $^{**}p < 0.05$. $^{***}p < 0.01$.

Table 4: Multinomial logit model with random effects (normal distribution), model without absorbing-state, no interactions

	Low-pay b/se	Non-employment b/se
Low-pay, t-1 (dummy)	3.217***	1.706***
	(0.115)	(0.109)
Non-employment, t-1 (dummy)	2.509***	2.966***
	(0.107)	(0.076)
Apprenticeship, no Abitur (dummy)	-0.335**	-0.343***
	(0.140)	(0.116)
Apprenticeship, Abitur (dummy)	-0.617***	-0.326*
	(0.221)	(0.172)
University degree (dummy)	-1.748***	-0.964***
	(0.210)	(0.150)
Age: 35-39 (dummy)	0.062	-0.265**
	(0.154)	(0.116)
Age: 40-44 (dummy)	0.068	-0.292
	(0.243)	(0.180)
Age: 45-49 (dummy)	0.290	-0.148
	(0.331)	(0.243)
Age: 50-54 (dummy)	0.455	0.174
	(0.424)	(0.308)
Age: 55-59 (dummy)	0.906*	0.765**
	(0.524)	(0.377)
Nationality: Turkish (dummy)	0.204	0.278
	(0.229)	(0.193)
Nationality: other (dummy)	0.535***	0.420***
	(0.158)	(0.135)
Local unemployment rate	-0.009	0.065**
	(0.034)	(0.026)
year2003	0.130	0.248***
	(0.100)	(0.073)
year2004	0.270**	0.512***
	(0.108)	(0.079)
year2005	0.340**	0.400***

	(0.146)	(0.108)
year2006	0.415***	0.339***
	(0.140)	(0.105)
Age: 35-39	-0.614*	-0.159
	(0.364)	(0.296)
Age: 40-44	-0.575*	-0.074
	(0.332)	(0.258)
Age: 45-49	-0.696	0.074
	(0.443)	(0.341)
Age: 50-54	-0.811	-0.214
	(0.521)	(0.391)
Age: 55-59	-1.006	-0.529
	(0.704)	(0.519)
Individual average of local unemployment rate	0.048	0.001
	(0.037)	(0.028)
Low-pay, t=1 (dummy)	3.810***	3.164***
	(0.213)	(0.195)
Non-employment, t=1 (dummy)	2.960***	4.111***
	(0.201)	(0.180)
Number of low-pay episodes with tenure > 0 / <= 180 days	0.130*	0.265***
	(0.070)	(0.062)
Number of low-pay episodes with tenure > 180 / <= 365 days	0.021	-0.025
	(0.114)	(0.110)
Number of low-pay episodes with tenure > 365 / <= 545 days	0.143	0.238
	(0.222)	(0.203)
Number of low-pay episodes with tenure > 545 / <= 730 days	0.127	-0.361
	(0.278)	(0.266)
Number of low-pay episodes with tenure > 730	0.810***	0.100
	(0.245)	(0.237)
Number of non-employment episodes with duration > 0 / <= 180 days	0.363***	0.377***
	(0.042)	(0.033)
Number of non-employment episodes with duration > 180 / <= 365 days	0.409***	0.344***
	(0.106)	(0.091)
Number of non-employment episodes with duration > 365 / <= 545 days	0.893***	0.913***
	(0.160)	(0.141)

Number of non-employment episodes with duration > 545 / <= 730 days	0.872***	0.962***
	(0.214)	(0.185)
Number of non-employment episodes with duration > 730	1.053***	1.451***
	(0.219)	(0.182)
Cumulated duration of low-wage employment between 1998 and 2000	0.003***	0.001**
	(0.000)	(0.000)
Cumulated duration of non-employment between 1998 and 2000	0.001**	-0.000
	(0.000)	(0.000)
Constant	-6.968***	-5.945***
	(0.313)	(0.251)
Variance η_2	4.6924552***	
	(0.30549537)	
Variance η_3	4.7152102***	
	(0.27880291)	
Covariance η_{23}	3.5835403***	
	(0.25562962)	
Correlation η_{23}	0.76183637	
Observations	249573	
AIC	34184.5	.
Log Likelihood	-1.7e+04	
Wald-Test-Chi^2		
Prob > Chi^2		

Standard errors in parantheses
starlevels(*
0.10
**
0.05
***
0.01)
$^{*}p < 0.10$. $^{**}p < 0.05$. $^{***}p < 0.01$.

Table 5: Multinomial logit model with random effects (normal distribution), model without absorbing-state, with interactions

	Low-pay b/se	Non-employment b/se
Low-pay, t-1 (dummy)	3.664***	2.483***
	(0.322)	(0.311)
Low-pay, t-1 * apprenticeship, no Abitur	-0.567*	-0.904***
	(0.334)	(0.330)
Low-pay, t-1 * apprenticeship, Abitur	-0.661	-0.722
	(0.541)	(0.541)
Low-pay, t-1 * university degree	1.010*	-0.286
	(0.612)	(0.608)
Non-employment, t-1 (dummy)	3.269***	4.405***
	(0.306)	(0.244)
Non-employment, t-1 * apprenticeship, no Abitur	-0.798**	-1.533***
	(0.324)	(0.252)
Non-employment, t-1 * apprenticeship, Abitur	-1.430***	-1.811***
	(0.501)	(0.334)
Non-employment, t-1 * university degree	-0.418	-1.626***
	(0.512)	(0.306)
Apprenticeship, no Abitur (dummy)	-0.378*	0.125
	(0.195)	(0.145)
Apprenticeship, Abitur (dummy)	-0.714**	0.326
	(0.310)	(0.204)
University degree (dummy)	-2.340***	-0.393**
	(0.330)	(0.176)
Age: 35-39 (dummy)	0.060	-0.263**
	(0.154)	(0.116)
Age: 40-44 (dummy)	0.065	-0.286
	(0.243)	(0.181)
Age: 45-49 (dummy)	0.285	-0.149
	(0.332)	(0.244)
Age: 50-54 (dummy)	0.462	0.168
	(0.424)	(0.309)
Age: 55-59 (dummy)	0.920*	0.768**

	(0.524)	(0.378)
Nationality: Turkish (dummy)	0.218	0.264
	(0.231)	(0.196)
Nationality: other (dummy)	0.530***	0.441***
	(0.159)	(0.136)
Local unemployment rate	-0.007	0.064**
	(0.034)	(0.026)
year2003	0.134	0.251***
	(0.100)	(0.073)
year2004	0.270**	0.510***
	(0.108)	(0.079)
year2005	0.335**	0.393***
	(0.146)	(0.108)
year2006	0.412***	0.327***
	(0.140)	(0.105)
Age: 35-39	-0.591	-0.147
	(0.365)	(0.297)
Age: 40-44	-0.578*	-0.061
	(0.330)	(0.259)
Age: 45-49	-0.656	0.110
	(0.444)	(0.341)
Age: 50-54	-0.798	-0.154
	(0.521)	(0.392)
Age: 55-59	-1.039	-0.523
	(0.705)	(0.522)
Individual average of local unemployment rate	0.047	0.002
	(0.037)	(0.028)
Low-pay, t=1 (dummy)	3.693***	3.423***
	(0.442)	(0.411)
Low-pay, t=1 * apprenticeship, no Abitur	0.094	-0.267
	(0.432)	(0.414)
Low-pay, t=1 * apprenticeship, Abitur	0.791	-0.518
	(0.717)	(0.680)
Low-pay, t=1 * university degree	0.104	-1.857**
	(0.844)	(0.942)

Non-employment, t=1 (dummy)	3.158***	4.355***
	(0.441)	(0.386)
Non-employment, t=1 * apprenticeship, no Abitur	-0.208	-0.245
	(0.440)	(0.378)
Non-employment, t=1 * apprenticeship, Abitur	-0.095	-0.943*
	(0.690)	(0.550)
Non-employment, t=1 * university degree	-0.386	-0.795*
	(0.642)	(0.478)
Number of low-pay episodes with tenure > 0 / <= 180 days	0.134*	0.262***
	(0.070)	(0.062)
Number of low-pay episodes with tenure > 180 / <= 365 days	0.018	-0.030
	(0.115)	(0.111)
Number of low-pay episodes with tenure > 365 / <= 545 days	0.160	0.211
	(0.222)	(0.205)
Number of low-pay episodes with tenure > 545 / <= 730 days	0.126	-0.368
	(0.275)	(0.261)
Number of low-pay episodes with tenure > 730	0.791***	0.062
	(0.244)	(0.238)
Number of non-employment episodes with duration > 0 / <= 180 days	0.371***	0.385***
	(0.041)	(0.033)
Number of non-employment episodes with duration > 180 / <= 365 days	0.419***	0.354***
	(0.106)	(0.091)
Number of non-employment episodes with duration > 365 / <= 545 days	0.892***	0.921***
	(0.163)	(0.142)
Number of non-employment episodes with duration > 545 / <= 730 days	0.859***	0.945***
	(0.216)	(0.187)
Number of non-employment episodes with duration > 730	1.046***	1.421***
	(0.220)	(0.182)
Cumulated duration of low-wage employment between 1998 and 2000	0.002***	0.001**
	(0.000)	(0.000)
Cumulated duration of non-employment between 1998 and 2000	0.001**	0.000
	(0.000)	(0.000)
Constant	-6.921***	-6.417***
	(0.339)	(0.267)
Observations	249573	

AIC	34126.1	.
Log Likelihood	-1.7e+04	
Wald-Test-Chi^2		
Prob > Chi^2		

Standard errors in parantheses
starlevels(*
0.10
**
0.05
***
0.01)
$^{*}p < 0.10$. $^{**}p < 0.05$. $^{***}p < 0.01$.

Estimated transition matrices: initially non-employed

Table 6: Estimated transition matrix: no apprenticeship

	High-pay, t			Low-pay, t			Non-employment, t		
High-pay, t-1	0.452	(0.348)	(0.555)	0.106	(0.061)	(0.170)	0.443	(0.341)	(0.545)
Low-pay, t-1	0.137	(0.084)	(0.211)	0.326	(0.230)	(0.435)	0.537	(0.422)	(0.640)
Non-employment, t-1	0.060	(0.037)	(0.092)	0.089	(0.057)	(0.134)	0.851	(0.794)	(0.895)

Source: IEBS (2000-2006); all variables representing qualification (and interactions) are set to zero; average predicted transition probabilities; five percent confidence intervals in parantheses

Table 7: Estimated transition matrix: apprenticeship, no abitur

	High-pay, t			Low-pay, t			Non-employment, t		
High-pay, t-1	0.447	(0.344)	(0.557)	0.076	(0.041)	(0.127)	0.477	(0.371)	(0.575)
Low-pay, t-1	0.211	(0.140)	(0.300)	0.275	(0.180)	(0.386)	0.514	(0.403)	(0.620)
Non-employment, t-1	0.138	(0.086)	(0.210)	0.095	(0.054)	(0.157)	0.768	(0.675)	(0.836)

Source: IEBS (2000-2006); apprenticeship, no abitur (also in interaction terms) is set to one, other variables concerning qualification are set to zero; average predicted transition probabilities; five percent confidence intervals in parantheses

Table 8: Estimated transition matrix: apprenticeship, abitur

	High-pay, t			Low-pay, t			Non-employment, t		
High-pay, t-1	0.430	(0.321)	(0.545)	0.053	(0.024)	(0.100)	0.518	(0.401)	(0.627)
Low-pay, t-1	0.198	(0.108)	(0.318)	0.182	(0.091)	(0.327)	0.621	(0.445)	(0.756)
Non-employment, t-1	0.150	(0.088)	(0.234)	0.047	(0.020)	(0.102)	0.803	(0.704)	(0.876)

Source: IEBS (2000-2006); apprenticeship, abitur (also in interaction terms) is set to one, other variables concerning qualification are set to zero; average predicted transition probabilities; five percent confidence intervals in parantheses

Table 9: Estimated transition matrix: University or technical college degree

	High-pay, t			Low-pay, t			Non-employment, t		
High-pay, t-1	0.637	(0.535)	(0.726)	0.020	(0.008)	(0.048)	0.343	(0.255)	(0.440)
Low-pay, t-1	0.290	(0.175)	(0.431)	0.238	(0.123)	(0.391)	0.472	(0.308)	(0.628)
Non-employment, t-1	0.277	(0.205)	(0.355)	0.050	(0.026	(0.090)	0.674	(0.589)	(0.748)

Source: IEBS (2000-2006); University or technical college degree (also in interaction terms) is set to one, other variables concerning qualification are set to zero; average predicted transition probabilities; five percent confidence intervals in parantheses

Appendix

Estimated transition matrices: all individuals in the sample, simulated for different levels of qualification

Table 1: Estimated transition matrix: no vocational training

	High-pay, t			Low-pay, t			Non-employment, t		
High-pay, t-1	0.86	(0.83 -	0.89)	0.05	(0.03 -	0.07)	0.09	(0.07 -	0.11)
Low-pay, t-1	0.64	(0.55 -	0.71)	0.20	(0.14 -	0.28)	0.16	(0.12 -	0.22)
Non-employment, t-1	0.51	(0.43 -	0.58)	0.09	(0.06 -	0.13)	0.40	(0.33 -	0.48)

Source: IEBS (2000-2006); pooled unbalanced sample; average predictions conditional on lagged labor market state, 95 % confidence intervals in parentheses

Table 2: Estimated transition matrix: no abitur, vocational training

	High-pay, t			Low-pay, t			Non-employment, t		
High-pay, t-1	0.90	(0.89 -	0.92)	0.03	(0.02 -	0.03)	0.07	(0.06 -	0.08)
Low-pay, t-1	0.78	(0.74 -	0.81)	0.12	(0.09 -	0.15)	0.11	(0.09 -	0.13)
Non-employment, t-1	0.72	(0.68 -	0.75)	0.06	(0.04 -	0.07)	0.23	(0.20 -	0.26)

Source: IEBS (2000-2006); pooled unbalanced sample; Transitions between periods t - 1 and t; figures indicate row percentages

Table 3: Estimated transition matrix: abitur, vocational training

	High-pay, t			Low-pay, t			Non-employment, t		
High-pay, t-1	0.91	(0.88 -	0.93)	0.02	(0.01 -	0.04)	0.07	(0.05 -	0.09)
Low-pay, t-1	0.78	(0.69 -	0.84)	0.09	(0.06 -	0.15)	0.13	(0.08 -	0.21)
Non-employment, t-1	0.74	(0.68 -	0.80)	0.04	(0.02 -	0.06)	0.22	(0.17 -	0.29)

Source: IEBS (2000-2006); pooled unbalanced sample; average predictions conditional on lagged labor market state, 95 % confidence intervals in parentheses

Table 4: Estimated transition matrix: univerity- or technical college degree

	High-pay, t			Low-pay, t			Non-employment, t		
High-pay, t-1	0.964	(0.952 -	0.973)	0.003	(0.001 -	0.007)	0.033	(0.024 -	0.043)
Low-pay, t-1	0.837	(0.745 -	0.901)	0.068	(0.034 -	0.121)	0.095	(0.049 -	0.170)
Non-employment, t-1	0.834	(0.788 -	0.873)	0.015	(0.008 -	0.028)	0.151	(0.113 -	0.195)

Source: IEBS (2000-2006); pooled unbalanced sample; average predictions conditional on lagged labor market state, 95 % confidence intervals in parentheses

Estimated transition matrices: initially low-paid

Table 5: Estimated transition matrix: no apprenticeship

	High-pay, t			Low-pay, t			Non-employment, t		
High-pay, t-1	0.463	0.356	0.574	0.293	0.201	0.396	0.244	0.164	0.338
Low-pay, t-1	0.119	0.078	0.178	0.641	0.549	0.723	0.240	0.172	0.318
Non-employment, t-1	0.078	0.046	0.131	0.321	0.231	0.420	0.601	0.497	0.694

Table 6: Estimated transition matrix: apprenticeship, no abitur

	High-pay, t			Low-pay, t			Non-employment, t		
High-pay, t-1	0.479	0.367	0.588	0.237	0.152	0.338	0.284	0.197	0.379
Low-pay, t-1	0.189	0.120	0.282	0.573	0.446	0.681	0.238	0.156	0.338
Non-employment, t-1	0.165	0.102	0.249	0.321	0.217	0.434	0.514	0.396	0.626

Table 7: Estimated transition matrix: apprenticeship, abitur

	High-pay, t			Low-pay, t			Non-employment, t		
High-pay, t-1	0.481	0.359	0.599	0.186	0.104	0.297	0.332	0.229	0.446
Low-pay, t-1	0.200	0.111	0.323	0.460	0.298	0.625	0.340	0.195	0.502
Non-employment, t-1	0.199	0.119	0.304	0.199	0.105	0.330	0.602	0.456	0.725

Table 8: Estimated transition matrix: University or technical college degree

	High-pay, t			Low-pay, t			Non-employment, t		
High-pay, t-1	0.747	0.551	0.879	0.139	0.048	0.293	0.114	0.037	0.262
Low-pay, t-1	0.251	0.136	0.402	0.662	0.482	0.797	0.087	0.026	0.225
Non-employment, t-1	0.387	0.215	0.581	0.343	0.161	0.550	0.270	0.100	0.493

Estimated transition matrices: initially high-paid

Table 9: Estimated transition matrix: no apprenticeship

	High-pay, t			Low-pay, t			Non-employment, t		
High-pay, t-1	0.961	0.948	0.970	0.013	0.008	0.019	0.026	0.020	0.036
Low-pay, t-1	0.768	0.674	0.837	0.129	0.080	0.201	0.103	0.067	0.150
Non-employment, t-1	0.630	0.550	0.699	0.060	0.037	0.096	0.310	0.248	0.380

Table 10: Estimated transition matrix: apprenticeship, no abitur

	High-pay, t			Low-pay, t			Non-employment, t		
High-pay, t-1	0.960	0.951	0.968	0.009	0.007	0.013	0.031	0.025	0.038
Low-pay, t-1	0.849	0.816	0.876	0.078	0.059	0.104	0.072	0.057	0.091
Non-employment, t-1	0.789	0.754	0.820	0.038	0.028	0.051	0.173	0.145	0.204

Table 11: Estimated transition matrix: apprenticeship, abitur

	High-pay, t			Low-pay, t			Non-employment, t		
High-pay, t-1	0.957	0.944	0.968	0.007	0.004	0.011	0.036	0.027	0.048
Low-pay, t-1	0.846	0.762	0.903	0.055	0.029	0.098	0.099	0.055	0.167
Non-employment, t-1	0.808	0.752	0.855	0.017	0.009	0.034	0.174	0.130	0.227

Table 12: Estimated transition matrix: University or technical college degree

	High-pay, t			Low-pay, t			Non-employment, t		
High-pay, t-1	0.976	0.969	0.982	0.002	0.001	0.003	0.022	0.017	0.029
Low-pay, t-1	0.859	0.766	0.921	0.059	0.030	0.108	0.082	0.038	0.152
Non-employment, t-1	0.855	0.811	0.890	0.012	0.006	0.023	0.133	0.099	0.175