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Low-Wage Jobs – Stepping Stone or Poverty Trap?

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Low-Wage Jobs – Stepping Stone or Poverty Trap?

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Abstract We examine whether low-paid jobs have an effect on the occupational advancement probability of unemployed persons to obtain better-paid jobs in the future (stepping-stone effect). We make use of data from the German Socio-Economic Panel (SOEP) and apply a dynamic random-effects probit model. Our results suggest that low-wage jobs can act as stepping stones to better-paid work. The improvement of the chance to obtain a high-wage job by accepting low-paid work is particularly large for less-skilled persons and for individuals with longer unemployment experiences. Low-paid work is less beneficial if the job is also associated with a low social status.

Keywords: low pay dynamics, unemployment dynamics, dynamic random effects models, state dependence

JEL Classification Numbers: J64, J62, J31

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1 Introduction

Being unemployed is one of the major poverty risks in industrialized countries (OECD, 2009, Chapter 3). To be employed, however, is not a sufficient condition for escaping poverty. Many jobs only pay a meager income, so that low-paid workers still face a higher poverty risk than workers in higher-paid jobs (see OECD (2009) and Goebel et al. (2005)). Nevertheless, the benefits for an unemployed person of taking up a low-wage job might substantially exceed those of the small income gain. Simply having a job could mean that an otherwise unemployed person has the opportunity to improve his working skills and accumulate more human capital, or least stop its deterioration. If this increases his productivity and thus the value of his labor services in the market, it should also raise his chances to be able to climb up the earnings ladder and to find a better-paid job. In this paper, we will use German panel data to provide evidence that taking up a low-paid job improves the chances of unemployed persons to be able to obtain better-paid jobs in the future. Hence, low-paid jobs do not catch workers in a "poverty trap". Quite to the contrary, they can provide a "stepping stone" to better jobs. We extend previous research in this area by showing that the stepping-stone effect is particularly strong for people with low or intermediate levels of education, for people who had been more often unemployed in the past and if the low-wage job is associated with a relatively high social status.

The labor market is typically characterized by incomplete information among the agents, so signals play an important role for labor market outcomes. Among the most important signals are a person's level of education and past unemployment experience. In our study, we will pay strong attention to these signals because there is potential interaction between these signals and the impact of low-wage jobs on future income prospects. Being unemployed, especially for long durations, can be a more adverse signal towards potential employers if the unemployed person is formally well-educated, e.g. if he has a college degree, because employers might assume that high-skilled persons should, under normal circumstances, not be unemployed that often (Vishwanath, 1989). At the same time, a high-skilled person looking for work might avoid taking up a low-paid job as this might be interpreted as a signal that his true productivity is really lower than suggested by his formal level of education (McCormick, 1990). Hence, it is unclear whether unemployed persons, especially high-skilled ones, can improve their long-

term labor market prospects by accepting low-paid jobs. Or as Layard et al. (1991, p. 249) remark: "While unemployment is a bad signal, being in a low-quality job may well be a worse one." Likewise, the duration of past unemployment experiences can be regarded as a negative signal: employers might infer that an applicant has a low productivity if he spent a relatively large share of his working life in unemployment. Regardless of the problem of incomplete information, a person's probability to obtain higher wages in the future is influenced by the quality and status of his current job. An undemanding job that requires neither special working skills nor improves the level of qualification can only have a negligible effect on human capital accumulation and is thus not expected to raise a person's advancement probability.

An important characteristic of labor market dynamics is that a person's labor market status tends to be quite persistent over time; in fact, it tends to be more persistent than what can be explained by the persistence of personal characteristics. This suggests that a person's current labor market position has a *genuine* influence on his future labor market outcomes. There are various theoretical explanations for this type of state dependence in employment and unemployment dynamics (see e.g. Heckman & Borjas (1980)). When modeling such dynamics, two aspects must be taken care of: the influence of spurious state dependence and the endogeneity of the labor market status in the initial period. Failing to account for spurious state dependence would cause biased estimators, leading to an overestimation of the impact of lagged labor market parameters. Moreover, a person's labor market position in the initial period might not be randomly distributed because the first observation in the sample is typically not identical with the start of the dynamic process itself, i.e. a person's working life (Heckman, 1981a). Examining the dynamics of labor market status without taking care of potential endogeneity of the initial wage state may also lead to biased parameters (Stewart & Swaffield, 1999).

There exist a number of related studies that take care of both of these methodological aspects and examine the labor market dynamics of the unemployed, low-paid and high-paid workers separately: Cappellari & Jenkins (2008) and Stewart (2007), who make use of the British Household Panel (BHPS), and Uhlendorff (2006) and Mosthaf et al. (2009), who use the German Socio-Economic Panel (SOEP). Cappellari & Jenkins (2008) are using a multivariate probit model for examining low-pay transitions in Britain. They find evidence for state

dependence and conclude that those who had a low-paid job have a higher probability to become unemployed in the future than those with high-paid jobs. Stewart (2007) uses a range of dynamic random and fixed-effects estimators for examining the extent of state dependence in unemployment and low-pay employment on the likelihood of prospective unemployment. His findings suggest that the adverse effect on future employment prospects is almost as large for low-wage employment as it is for unemployment and the difference between these effects is statistically insignificant. Uhlendorff (2006) uses a multinomial logit model with random effects on German panel data and finds that the employment probability for men increases with low-paid employment compared to staying unemployed. Mosthaf et al. (2009) build on the same model and find evidence that future wage prospects are distinctly better for low-paid women than for unemployed or inactive women.[1]

These results provide some evidence that low-paid jobs can act as stepping stones towards better jobs. A common feature of these studies is that they estimate the stepping-stone effect of low-paid jobs for an average worker. In this study, we want to decompose this effect further and examine the existence and strength of the stepping-stone effect depending on various personal and job characteristics, in particular on a person's education and past unemployment experience as well as the social status of the job. We make use of German panel data from the Socio-Economic Panel (SOEP) and apply a dynamic random-effects probit model that takes potential endogeneity of the initial period and time-invariant individual effects into account. We identify low-paid jobs by applying a weighted relative threshold calculated on an annual basis. To obtain a more differentiated picture of the stepping-stone effect, we conduct separate analyses for men and women and for two different time periods (1998-2002 and 2002-2007). Our results suggest that low-wage jobs can act as stepping stones to better-paid work. The improvement of the chance to obtain a high-wage job by accepting low-paid work is particularly large for less-skilled persons and for individuals with longer unemployment experiences. Low-paid work is less beneficial if the job is also associated with a low social status. We also find evidence that low-paid jobs provide a stepping stone for women, although their advancement probabilities

[1]There are several studies examining the upward wage mobility from low-paid to high-paid jobs in Germany (Mosthaf et al. (2010), Schank et al. (2009) and Kalina (2008)). While these studies estimate the upward mobility of low-wage workers, they do not compare them to the unemployed. Hence, these studies do not allow drawing conclusions about the existence of a stepping-stone effect of low-paid jobs.

are generally lower than those of men. Moreover, there is evidence that low-paid work still served as a stepping-stone in the early time period (1998-2002), but lost this function in the later time period (2002-2007) for college-educated men.

Our paper is structured as follows: Section 2 gives a short description of the data, definitions, and some descriptive statistics. Section 3 outlines the econometric approach, Section 4 presents our empirical results, and Section 5 concludes.

2 Data and Descriptive Statistics

For this study, we use data from the German Socio-Economical Panel (SOEP). The SOEP is a nationally representative, annual household survey in which the same households are interviewed every year (Wagner et al., 2007). We restrict our analysis to the time period 1998-2007.[2] Since the labor market in East Germany has still been in a transition phase during the time period we use for our analysis, we focus only on former West Germany. Employment experiences shortly after entering the labor market and close to retiring will be different from regular labor market experiences, so we restrict our sample to persons aged between 25 and 60. We also exclude those in vocational training, people in compulsory civilian or military service, and the disabled. Since the econometric methods applied in this paper require the panel to be balanced, we include only those individuals who participated in the survey in all years under consideration.[3]

To identify low-paid employment, we calculate an hourly threshold wage, using a relative concept: individuals earning less than two-thirds of the median gross hourly wage (including paid overtime) are considered low-paid, those above high-paid. As the wage distribution changes every year, the thresholds are calculated on an annual basis. The same absolute threshold is applied to men and women. In Table I, the hourly wage thresholds for low-paid employment are presented for the time period 2002 to 2007.

The share of low-paid men among all employed men is between 4% and 6%, the corre-

[2]Since we want to maintain comparability between the different time periods, we do not make use of the 2002 refreshment sample that oversampled high-income earners.

[3]In a similar application, Uhlendorff (2006) shows that the impact of endogenous panel attrition in the SOEP is sufficiently small, so that it does not play a role for our analysis.

Table I: Low-Pay Threshold in € (Gross Hourly Wages)

Year	2002	2003	2004	2005	2006	2007
Threshold	9.86	10.26	10.59	10.77	10.78	10.86

Source: SOEP, weighted observations

sponding share for women is about four times higher. Due to the higher proportion of low-paid women, the average incidence of low-paid employment for both sexes is around 9%. In the following, we will restrict our attention to men for the time period 2002-2007 and compare our findings with those for women and for the time period 1998-2002 later in this paper.

A quick glance at the transition probabilities between labor market positions can give a first impression of the stepping stone-effect. Table II presents the conditional probabilities to be in one of the three different labor market states (high-paid employment, low-paid employment, unemployment) at time t, depending on a person's position in $t-1$.

Table II: Transition Matrix (for men)

	High-paid$_t$	Low-paid$_t$	Unemployed$_t$	Total$_t$
High-paid$_{t-1}$	97.09	1.76	1.16	91.74
Low-paid$_{t-1}$	36.64	51.15	12.21	4.15
Unemployed$_{t-1}$	14.62	11.92	73.46	4.11
Total $_{t-1}$	91.19	4.22	4.59	100.00

Source: SOEP, unweighted balanced pooled sample 2002-2007, n=6 320

Table II suggests that the chances to be in a particular labor market state in year t are strongly correlated with on a person's labor market state in year $t-1$. If a person is employed in a high-paying job already, he has the best chances to be employed in a high-paying job in the next year as well. Furthermore, the share of people moving up from a low-paid job to a high-paid is about four times higher than the share moving from unemployment to a high-paying job during one year. The conditional probabilities depicted in Table II are thus strongly suggestive of state dependence.

Conditional probabilities, however, can lead to erroneous conclusions about state dependence because one cannot control for individual heterogeneity in a transition matrix. We include a number of covariates in our estimations to control for individual heterogeneity. For example, a person's age will probably affect his chances to step up from low-paid employment (it seems likely that prime aged workers have better chances than youths and people shortly

before retirement). We also expect that the regional unemployment rate has a negative effect on persons' chances to advance in the labor market. Also, not all low-paid jobs are alike. It seems likely that people have a higher chance to advance from the low-wage sector if their current job is more demanding or has higher social status. Table III gives an overview of the control variables we use for our estimations.

Table III: Control variables

Variable	Description
age	in years (incl. quadratic term)
handicap	Dummy: 1 if person is capable of gainful employment only to a reduced extent due to medical reasons, 0 otherwise
German citizenship	Dummy: 1 if German citizen, 0 if not
married/cohabiting	Dummy: 1 if married or living in a steady relationship, 0 if not
unemployment rate	state-level unemployment rate; annual averages; in percent
parents' language	Dummy: 1 if parents' native language is not German, 0 otherwise (only used for initial period)
college-educated	Dummy: 1 if person obtained a college degree (ISCED 5 and 6), 0 if not
ue-long	Dummy: 1 if person was unemployed for more than 5% of the entire time active in the labor force starting at the age of 16, 0 otherwise
low-ISEI	Dummy (indicator for low-status job): 1 if ISEI* score of current job is below 30, 0 otherwise

* ISEI: *I*nternational *S*ocio-*E*conomic *I*ndex of Occupational Status (see Ganzeboom et al. (1992)). Examples for ISEI scores are assembly line worker (ISEI 20), hairdresser (ISEI 30), police(wo)man (ISEI 50) and physician (ISEI$\geq$ 80)

Table IV suggests that the three labor market groups are not homogeneous. For example, while about 29% of all persons in our sample are college graduates, only 9% (14%) of those who were low-paid (unemployed) have a college degree in comparison to 31% of those with a high-paid job. Only by controlling for these individual differences, we can make sure that the apparent state dependence is not driven by the heterogeneity between the groups. Hence, to explain the impact of low-paid employment on future employment outcomes, it is necessary to use an econometric model that takes individual characteristics into account. Only if we find that low-paid workers are more likely to advance to high-paid jobs than the unemployed, for otherwise identical individual characteristics, we will provide evidence for a stepping-stone effect of low-paid employment.

Table IV: Descriptive statistics (men only)

	Full sample	high-paid$_t$	low-paid$_t$	unemployed$_t$
ue-long*	12.56	8.50	39.06	73.23
low-ISEI*,**	9.85	8.50	39.06	–
age	42.77 (7.92)	42.72 (7.83)	41.7(8.43)	44.69 (9.09)
college-educated*	29.27	30.94	9.06	13.50
married/cohabiting*	88.23	89.06	80.62	78.15
handicap*	7.18	6.88	10.00	10.76
regional ue-rate	9.50 (2.54)	9.44 (2.50)	9.69 (2.43)	10.53 (3.20)
German citizen*	88.95	89.82	85.93	73.23
parents' language german*	83.14	84.62	72.18	62.46
observations	7584	6939	320	325

Source: SOEP, unweighted balanced pooled sample 2002-2007, n=7 584 Std. deviation in parentheses; * share of observations in the respective group, **only including high-paid and low-paid in full sample.

3 Econometric Approach

By using an econometric model, we want to determine the extent of true state dependence: what influence does taking up a low-paid job exert on the likelihood that a person is subsequently able to move on to higher paid jobs? Estimating the probabilities with which low-paid workers and comparable unemployed persons can obtain better paying jobs should help to determine whether low-paid work is a dead end or can provide a stepping stone to better jobs.

In our analysis, we assume that a person's labor market position at $t-1$ has an influence on his employment status in t. This is a first-order Markov process, leading to a dynamic econometric model. Explaining today's labor market position by its own lagged value can lead to biased estimates unless certain assumptions are respected.

To prevent overestimation, the effect of the lagged dependent variable has to be subjected to closer scrutiny. Any estimated state dependence can either be true or spurious. In the first case, a person's past experience has a genuine behavioral effect so that an otherwise identical individual who has not had this experience will behave differently in the future. Spurious state dependence, however, would arise if certain unobserved characteristics would affect a person's probability to be in a specific labor market status at any point in time, while these characteristics are not influenced by a person's labor market status itself. Failing to control for such factors would overestimate the effect of the lagged labor market status (see Heckman (1981b)). A common approach to overcome this problem is to adjust the error component of

the econometric estimator by adding a time-invariant error term. The usual error term and the new time-invariant error term jointly form the composite error term. It can be shown that the composite error term is correlated over time (Stewart, 2006).

The composite error term and the parameters could either be independent or they could be correlated. A particular feature of our panel data is the large number of observations and the small number of time periods. As a probit model is applied, using fixed effects is inappropriate (Cameron & Trivedi, 2005, p. 782). For this reason, we will use a random-effects model, which requires us to assume that there is no correlation between the time-invariant error term and the regressors.

According to these assumptions, a person's unobserved characteristics are constant over time. Hence, a person's labor market status at the beginning of his working life is solely determined by observed and time-invariant unobserved characteristics, but is by nature independent of past employment experiences. For the vast majority of observed individuals, however, the first observation in the sample does not coincide with the start of their working life. The initial labor market status is thus not randomly distributed, but endogenously determined by this person's preceding, but unobserved working life. This initial conditions problem can be dealt with using the approach proposed by Heckman (1981a). We apply the model developed by Stewart (2006). We restrict our attention to estimating the probability that a person makes the transition (or is able to keep) a high-paid job in year t. Thus, the outcome variable y_{it} is binary:

$$y_{it} = \begin{cases} 1 & \text{if } y_{it} = \text{high-paid} \\ 0 & \text{else} \end{cases}, \tag{1}$$

where the subscript it represents individual $i \in (1, \ldots, N)$ at time $t \in (1, ..., T)$. The observed outcome variable represents a latent outcome variable. We take the potential endogeneity of the initial condition into account by running two estimations. The latent dependent variable for the time period $t \geq 2$ is:

$$\tilde{y}_{it} = x'_{it}\beta + \gamma y_{it-1} + \alpha_i + u_{it}. \tag{2}$$

where x'_{it} is a vector of explanatory variables and y_{it-1} is the lagged dependent variable. u_{it}

is an error term which is assumed to be independent and identically distributed, the distribution being $N(0, \sigma_u^2)$. The second error term, α_i, refers to the individual-specific time-invariant propensity to obtain a high-paid job. As laid out above, we specify the α_i as a random effect, i.e. it is uncorrelated with the explanatory variables. The composite error term is given by:

$$\nu_{it} = \alpha_i + u_{it} \tag{3}$$

Even though the error terms u_{it} are assumed to be serially independent, adding an individual-specific time-invariant error term introduces serial correlation in the composite error term. The correlation of the composite error terms between any two points in time is then given by:

$$\lambda = corr(\nu_{it}, \nu_{is}) = \frac{\sigma_\alpha^2}{\sigma_\alpha^2 + \sigma_u^2} \tag{4}$$

Since a normalization of the error term is required, we follow Stewart (2006) by chosing $\sigma_u^2 = 1$. The latent variable in the initial period $t = 1$ is then given by:

$$\tilde{y}_{i1} = z_{i1}'\pi + \varsigma_{i1} \tag{5}$$

The vector of explanatory variables z_{i1}' contains the values of the variables contained in x for the initial period plus additional presample variables as instruments. It is assumed, that the individual-specific time-invariant α_i term has an impact on the initial period and is therefore correlated with ς_{i1}. Following Stewart (2006), it can be written as $\varsigma_i = \theta\alpha_i + u_{i1}$. u_{i1} is assumed to satisfy the same distributional assumptions as u_{it} for $t \geq 2$. The latent dependent variable for the initial period $t = 1$ is now:

$$\tilde{y}_{i1} = z_{i1}'\pi + \theta\alpha_i + u_{i1} \tag{6}$$

The parameter θ captures potential differences in the error variance between the initial and subsequent periods. The probability to have a high-paid job for individual i at time t, given α_i, is given by (see Stewart (2006)):

1. For time period $t \geq 2$

$$P[y_{it}|x'_{it}, y_{it-1}, \alpha_i] = \Phi[(x'_{it}\beta + \gamma y_{it-1} + \alpha_i)(2y_{it} - 1)] \tag{7}$$

2. For time period $t = 1$

$$P[y_{i1}|z'_{i1}, \alpha_i] = \Phi[(z'_{i1}\pi + \theta\alpha_i)(2y_{i1} - 1)] \tag{8}$$

The joint probability of the observed binary sequence is thus:

$$\Phi[(z'_{i1}\pi + \theta\alpha_i)(2y_{i1} - 1)] \prod_{t=2}^{T} \Phi[(x'_{it}\beta + \gamma y_{it-1} + \alpha_i)(2y_{it} - 1)] \tag{9}$$

The likelihood to be maximized is then given by

$$L_i = \prod_i \int_{\alpha^*} \left\{ \Phi[(z'_{i1}\pi + \theta\alpha_i)(2y_{i1} - 1)] \prod_{t=2}^{T} \Phi[(x'_{it}\beta + \gamma y_{it-1} + \alpha_i)(2y_{it} - 1)] \right\} dF(\alpha^*). \tag{10}$$

F is the distribution function of $\alpha^* = \alpha/\sigma_\alpha$. Given the chosen normalization, $\sigma_\alpha = \sqrt{\lambda/(1-\lambda)}$. The integral over α^* is evaluated using Gaussian-Hermite quadrature (Stewart, 2006).

4 Results

We now turn to estimating the dynamic random-effect model we laid out in the preceding section to determine the effect of a person's past labor market status on his current labor market position. To avoid biased parameter estimates, we account for spurious state dependence and potential endogeneity of the initial period. In the first subsection, we restrict our analysis to men in the years from 2002 to 2007. In a later subsection, we compare our results to those for women in the same time period and with estimated effects for men in the time period from 1998 to 2002.

Table V presents the estimation results of two different models. The first is a static pooled

probit model that does not take individual-specific time-invariant effects and the endogeneity of the initial period into account. The second model is the dynamic random effects model by Stewart (2006) (hereafter referred to as the *Heckman Estimator*). We report the estimated coefficients with their respective z-values and significance levels for the time periods $t > 1$.[4]

As both models involve different normalizations, the predicted values of the *Heckman Estimator* in Table V have to be adjusted if they are to be compared to the estimates of the static probit model by multiplying them by $\sqrt{1-\lambda}$ (see Arumlampalam (1999)).

4.1 Estimates

Due to the time-invariant individual effect, the composite error term is correlated across periods. The strength of this correlation is given by λ, which also represents the proportion of the error variance that can be assigned to the time-invariant success probability of a person. As can be seen in the estimation output in Table V, the parameter λ has a significant influence (z-value = 12.00). Furthermore, the hypothesis that the employment status in the initial period is exogenous ($\theta = 0$) is strongly rejected (z-value = 6.26). Moreover, θ is close to, and insignificantly different from, 1. This means that the impact of the individual effect for the initial period is not significantly different from the impact for the following periods $t \geq 2$. These results suggest that it is indispensable to take individual-specific effects as well as the endogeneity of the initial period into account.

For comparing the model fit of both estimations, we make use of three different criteria. The first two are the Akaike and the Bayesian information criteria, which are based upon the model's log-likelihood. As Table V shows, both criteria indicate that the Heckman Estimator produces a better model fit than a pooled probit model. Additionally, we calculate the adjusted count R^2. This measure tells us by how much the number of mispredicted outcomes changes by using the econometric model as compared to a model-less prediction which simply assigns the most often observed outcome to all observations. While in a binary model, the latter prediction is right at least 50% of the time, any meaningful econometric model should decrease the number

[4]The regression results for the initial period can be found in the Appendix.

of mispredictions substantially. The adjusted count R^2 is calculated as follows:

$$R^2_{AdjCount} = \frac{\sum_j n_{jj} - max_c(n_{+c})}{n - max_c(n_{+c})}$$

where n is the number of observations, n_{+c} is the number of correct "predictions" if the outcome c is assigned to all observations. Then, $max_c(n_{+c})$ is the largest number of correctly classified observations for this model-less prediction. The term $\sum_j n_{jj}$ is the sum of correct classified cases, i.e. the sum of the diagonal entries in the classification table, if the full econometric model is used (Long, 1997, p. 107). As shown in Table V, by using the static pooled probit model, the number of mispredictions can be reduced by 40%. The dynamic model, however, reduces the number of mispredictions by 86%. All three goodness-of-fit criteria thus suggest that both models can contribute to explaining the labor market experiences of the persons in our sample and that the dynamic random-effects model does a far better job than the static model.

4.2 The stepping-stone effect of low-paid jobs

Table V clearly shows that the best thing one can do to ensure having a high-paid job in the future is to have one already. While this might not be surprising, our findings also indicate that persons in low-paid jobs generally have a significantly higher chance to climb up to a high-paying job than a comparable unemployed person. This provides first evidence for a stepping-stone effect of low-paid jobs. With the help of interaction terms, it is possible to test for heterogeneity of the stepping-stone effect and to determine which groups benefit most from low-paid jobs in term of increasing their prospects to climb up the wage ladder. Looking at persons that already have a high-paid job, the probability to stay in a high-paid job (either in the same or a different one) rises if the person has a college degree and falls if the person is employed in a low-status job or has been unemployed for a longer time in the past. Similarly, there is significant evidence that the probability to move from a low-paid to a high-paid job is smaller for former long-term unemployed persons and for people with low-status jobs than for college-educated persons' and for people with high-status jobs. For the unemployed, be-

Table V: Regression results (Men, 2002-2007)

	Pooled Probit			Heckman Estimator		
Regressor	coeff.	z	P$>\|$z$\|$	coeff.	z	P$>\|$z$\|$
independent variable	employed in a high-paid job					
hp$_{t-1}$	2.743	15.28	0.000	2.160	9.52	0.000
*college-educated$_{t-1}$	0.363	3.77	0.000	1.059	3.88	0.000
*ue-long$_{t-1}$	−0.590	−6.27	0.000	−0.680	−4.33	0.000
*low-ISEI$_{t-1}$	−0.423	−5.04	0.000	−0.619	−4.66	0.000
lp$_{t-1}$	0.635	3.06	0.002	1.247	4.45	0.000
*college-educated$_{t-1}$	−0.188	−0.68	0.496	0.607	1.45	0.148
*ue-long$_{t-1}$	−0.232	−1.36	0.173	−0.409	−1.73	0.083
*low-ISEI$_{t-1}$	−0.329	−1.86	0.063	−0.505	−2.13	0.033
ue$_{t-1}$	reference category					
*college-educated$_{t-1}$	0.826	3.22	0.001	2.080	3.94	0.000
*ue-long$_{t-1}$	−0.597	−2.83	0.005	−0.255	−0.89	0.375
age	0.065	1.69	0.092	0.194	2.90	0.004
age$^2/100$	−0.083	−1.88	0.059	−0.224	−2.90	0.004
handicap	−0.138	−1.28	0.201	−0.436	−2.42	0.015
regional ue-rate	−0.025	−2.04	0.041	−0.067	−2.62	0.009
German citizenship	0.233	−2.69	0.007	0.608	3.97	0.000
married/cohabiting	0.161	1.82	0.069	0.247	1.68	0.093
year dummies	included					
constant	−1.535	−1.78	0.076	−2.259	−1.57	0.116
λ	-			0.651	12.00	0.000
θ	-			1.012	6.26	0.000
Log-likelihood	−1259.8951			−1213.2594		
AIC	2577.790			2488.528		
BIC	2778.870			2703.468		
$R^2_{AdjCount}$	40.15			86.02		
Observations	7584			7584		

Source: SOEP, own calculations, hp=high-paid; lp=low-paid; ue=unemployed.

ing college-educated improves the chance to switch directly to a high-paid job, but long-term unemployment reduces it.

To determine whether taking up a low-paid job improves the chances of these subgroups, we have to test the sign and statistical significance of the appropriate linear combinations of the respective coefficients. Table VI presents information on the probability difference between an unemployed and a low-paid worker to move to a high-paid job in the next year, separated according to education, past unemployment experience, and social status of the low-paid job. The first row in each cell shows the sign and level of statistical significance of the probability difference.

Table VI: Effects of taking up low-paid work (Men, 2002-2007)

	High-ISEI in low-wage sector		*Low-ISEI in low-wage sector*	
	less than college degree	at least college degree	less than college degree	at least college degree
short ue-duration	**+++** 61.99 → 84.74	**(-)** 93.39 → 91.56	**++** 61.99 → 76.84	**(-)** 93.39 → 86.09
long ue-duration	**+++** 56.26 → 78.50	**(-)** 91.28 → 87.28	**++** 56.26 → 69.05	**(-)** 91.28 → 80.18

Source: SOEP, unweighted pooled sample 2002-2007, n=6 320. + + +/- - - , + +/- -, +/- represent significance at the 1%, 5%, 10% level, resp.; (+)/(-) not significant

The findings in Table VI suggest:

- Taking up a low-paid job improves the chance to move up to a high-paid job significantly for men without a college degree. This is true regardless of the social status of the low-paid job and their personal exposure to unemployment in the past.

- We do not find statistically significant effects for persons with a college degree. The signs suggest, however, that this group does not benefit from a low-paid job regardless of the social status of the job and unemployment duration. Taking up a low-paid job actually decreases the chances to advance to a high-paid job in the future in all categories, though the effects are not significant.

While this first row in the cells of Table VI shows the statistical significance of the estimated effects, it is also important to know what the magnitudes of these effects are. To facilitate interpretation, we calculate the change in the predicted probability to hold a high-paid job in t,

depending on one's labor market status in period $t-1$, by using the method of counterfactual outcome probabilities (Stewart, 2007). The values in the second row of each cell in Table VI present the predicted probabilities to obtain a high-paid job. The first number in a cell refers to the currently unemployed, the second number to persons who are currently in a low-paid job. The chances to move up on the income ladder are much better for college-educated men, independently of their previous labor market position. Men with less than a college degree, however, can benefit substantially more from taking up a low-paid job. While the predicted probability to have a high-paid job remains almost unchanged if a short-term unemployed person with a college degree takes up a low-paid, but high-status job, a non-college-educated man would increase his chances for high-pay by 23 percentage points. Long-term unemployed men without a college degree also benefit highly from low-paid, high-status jobs: the probability to find a high-paid job increases by more than 22 percentage points. Low-status jobs are less beneficial for finding better paid jobs in the future. Men with less than a college education increase the success probability by 15 percentage points (short unemployment duration) and 13 percentage points (long unemployment duration). For college-educated men, taking up a low-paid, low-status job does not lead to better chances to improve in the job market. This group experiences a (statistically non-significant) deterioration of the success probability of seven (eleven) percentage points if past unemployment was short (long).

We can also calculate probability ratios from the predicted success probabilities. Their values are reported in Table VII, with the number indicating the relative change of the occupational advancement probability in a low-paid job compared to staying unemployed. A low-paid job increases the occupational advancement probability for a person with a college degree by 23% to 41%, depending on relative unemployment duration and job quality. For college-educated men, the most negative effect is a 12% reduction in the advancement probability (for long-term unemployed in low-status jobs). There is no case for which the effect is positive.

To sum up our results for men in the time-period 2002 to 2007, we find that taking up a low-paid job had the potential to improve the chances to move up the income ladder to a high-paid job faster compared to searching for a job while unemployed. Our estimations show that this stepping-stone effect is only detectable for people without college degrees but not for college

Table VII: Predicted Probability Ratios (men)

	High-ISEI in low-wage sector		*Low-ISEI in low-wage sector*	
	less than college degree	at least college degree	less than college degree	at least college degree
short ue-duration	1.3801	0.9801	1.2471	0.9211
long ue-duration	1.4097	0.9556	1.2344	0.8771

Source: SOEP, unweighted pooled sample 2002-2007, n=6 320.

graduates. Among low-paid jobs, those that carry a low social status are associated with smaller improvements in success probabilities than jobs with high social status.

4.3 Comparisons across gender and time

In this section, we will compare the results from the previous section with those for women during the same time period and with men between 1998 and 2002. There is plenty of evidence that women remain disadvantaged in the German labor market compared to men (Schank et al., 2009). Hence, we would expect that women also experience lower chances to move up to high-paid jobs. Whether this means that the propensity of low-paid jobs to act as a stepping stone is also reduced, remains an open question. Moreover, the German low-wage sector has expanded in recent years (Bosch & Kalina, 2008, p. 25). There is no a priori reason to believe that this is associated with a larger, or smaller, stepping-stone effect. On the one hand, the low-wage sector could have expanded because its propensity to provide a stepping stone has increased, making work at low wages temporarily more attractive. On the other hand, the low-wage sector could have grown because less people are able to escape from it. Again, whether the low-wage sector can act more, or less, as a stepping stone in recent years than in the past has to be examined empirically.

Our estimations for women and for men in the time period 1998 to 2002 reproduce the finding that the best prerequisite for having a high-paid job in the future is to have one already.[5] Since this is hardly surprising, we are more interested in the effect of taking up a low-paid job on

[5]The estimation output for women can be found in Table XI and that for men in Table XII in the appendix. In both estimations, the information criteria and the adjusted count R^2 indicate a better model fit for the dynamic model compared to the static model, which is consistent with previous results. The cross-period correlation parameter λ and the parameter for the initial period θ are strongly significant in both estimations and θ is insignificantly different from one.

the probability to be high-paid in the future. Analogously to the previous section, we calculate predicted success probabilities and predicted probability ratios for women (Table VIII).[6] Our findings clearly show that women face lower probabilities to become high-paid than men with similar characteristics. The predicted probability ratios of women with less than a college education are, however, not systematically different from those of men. There is evidence that taking up a low-paid job can increase the chances to be high-paid one year later for those without a college degree. This effect is statistically significant for women without a college degree in high-status jobs (increase in the success probability from 49% to 63% for short-term unemployed and from 35% to 52% for persons with long unemployment durations in the past). The predicted probability ratios suggest that women without a college degree can increase their chances to be high-paid in the future by between 8% and 50% - depending on their job status and unemployment experience - by taking up a low-paid job. For college-educated women, we find probability ratios between 7% and 39%, but none of these effects are statistically significant, except those for college-educated unemployed with a high-status job and long unemployment experiences in the past.

Table VIII: Effects of taking up low-paid work (Women, 2002-2007)

	High-ISEI in low-wage sector		*Low-ISEI in low-wage sector*	
	less than college degree	at least college degree	less than college degree	at least college degree
short ue-duration	**++**	**(+)**	**(+)**	**(+)**
	48.91 → 62.80	59.46 → 72.56	48.91 → 52.91	59.46 → 63.53
	1.2877	1.2228	1.0825	1.0691
long ue-duration	**+++**	**+**	**+**	**(+)**
	35.18 → 52.38	45.48 → 63.03	35.18 → 42.30	45.48 → 53.14
	1.4962	1.3914	1.2050	1.1706

Source: SOEP, unweighted pooled sample 2002-2007, n=4 555. The first line in each cell shows the sign and significance of the stepping-stone effect. + + +/- - - , + +/- -, +/- represent significance at the 1%, 5%, 10% level, resp.; (+)/(-) not significant. The second line reports the change in the advancement probability and the third line gives the predicted probability ratios.

For men in the period 1998-2002, our results are suggestive of a stepping-stone effect depending on a person's educational background and the social status of the job. For low-status jobs, we do not find statistically significant results except for people with less than a college

[6] Applying a gender-specific threshold raises the estimated advancement probabilities of women and lower those of men. The estimated probability ratios and thus the strength of the stepping-stone effect remain unchanged.

education with long unemployment durations. The corresponding data on the predicted success probabilities are presented in Table IX. As can be seen, the promotion probabilities for men without a college degree were generally, with one exception, larger in 1998-2002 than in 2002-2007. For example, the probability that a short-term unemployed person without a college degree would obtain a high-paid job within a year was almost 13 percentage points larger in the earlier than in the later period (75% compared to 62%). Since the advancement chances of the unemployed have deteriorated substantially over time, it is not surprising that the predicted probability ratios have risen between these two time periods. This is especially true for those with short unemployment durations. Hence, even though the evidence in favor of a stepping-stone effect in 1998-2002 is statistically significant, its magnitude is substantially smaller than in 2002-2007. This suggests that, even though it became harder to make the transition from low-paid to high-paid employment, low-paid jobs still provide a stepping stone in the later period because the chances to obtain a high-paid job out of unemployment have deteriorated even more. Contrary to the later period, college-educated men in the period 1998-2002 had a higher advancement probability by picking up a low-paid job regardless of social status and employment duration. Over time the probability to switch directly from unemployment to a high-paid job improved for college graduates, while the promotion probability to move from low-paid to a high-paid job declined.

Table IX: Effects of taking up low-paid work (Men, 1998-2002)

	High-ISEI in low-wage sector		*Low-ISEI in low-wage sector*	
	less than college degree	at least college degree	less than college degree	at least college degree
short ue-duration	**++** 75.35 → 89.82 1.2230	**(+)** 87.93 → 95.74 1.0548	**(+)** 75.35 → 80.18 1.1101	**(+)** 87.93 → 90.33 1.0088
long ue-duration	**+++** 54.09 → 83.08 1.4329	**(+)** 72.30 → 92.06 1.1231	**+** 54.09 → 70.27 1.2057	**(+)** 72.30 → 83.81 1.0248

Source: SOEP, unweighted pooled sample 2002-2007, n=3 564. The first line in each cell shows the sign and significance of the stepping-stone effect. + + +/- - - , + +/- -, +/- represent significance at the 1%, 5%, 10% level, resp.; (+)/(-) not significant. The second line reports the change in the advancement probability and the third line gives the predicted probability ratios.

5 Conclusion

The main question of this study is whether unemployed persons can improve their chances to obtain a high-paid job in the future by taking up employment in the low-wage sector. To answer this question, we build on Stewart (2006) by using a dynamic random-effects model that takes spurious state dependence and the potential endogeneity of the initial period into account. To put the results in perspective, we compared our estimates across gender and different time periods.

Except for the group of people with a college degree, the answer to the initial question is a clear "yes". Low-paid jobs can act as a stepping stone to better-paid employment. This effect is strongest for persons who have been unemployed in the past more often and if the low-paid job carries a relatively high social status. For the long-term unemployed, it is important to signal that they are willing and motivated to work, which they can prove to prospective high-wage employers by taking up even low-paid jobs. For this group, there is hardly any risk that taking up low-paid work could stigmatize them as being less productive. Quite to the contrary, this presumption would adhere to them more if they stayed unemployed than if they took up work. Of course, a job with a higher social status sends a better signal to the labor market, so that high-status jobs provide better stepping stones than low-status jobs.

We do not find a stepping-stone effect for persons with a college degree. For this group, the conjecture by Layard et al. (1991, p. 249) that, if unemployment is already a bad signal, low-paid work might be an even worse signal, cannot be rejected by our data. We do not find that well-educated persons benefit from low-paid work in term of increasing their chances for a high-paid job at all. Regardless of social status or unemployment duration, low-paid jobs might even lower their chances to leave the low-paid sector again. For college graduates, we thus cannot give support to the claim that any job is better than no job, at least from the perspective of future income chances.

Our comparisons show that women have lower chances to obtain a high-paid job than men, but the intensity of the stepping-stone effect is comparable to that of men in the same period, except for college graduates. Even though this suggests that men are in a more comfortable position than women, the labor market prospects for men have also worsened over recent years

for people without a college education. While we find that the stepping-stone effect of low-paid work was substantially weaker in the past, this is not because low-paid jobs were less likely to lead to high-paid jobs. Instead, the unemployed were more likely to find high-paid jobs in the past than they were in recent years. This has raised the benefits of low-paid jobs and strengthened their function as stepping stones.

References

Arumlampalam, W. (1999). A note on estimated coefficients in random effects probit models. *Oxford Bulletin of Economics and Statistics, 61*, 597-602.

Bosch, G. & Kalina, T. (2008). Low-Wage Work in Germany: An Overview. In G. Bosch & C. Weinkopf (Eds.) *Low-Wage Work in Germany*. New York: Sage, 20-105.

Cameron, A. & Trivedi, P. (2005). *Microeconometrics - Methods and Applications.* Cambridge: Cambridge University Press.

Cappellari, L. & Jenkins; S. (2008). Estimating Low Pay Transition Probabilities Accounting for Endogenous Selection Mechanisms. *Journal of the Royal Statistical Society Series C (Applied Statistics), 57*, 165-186.

Ganzeboom, H., Graaf, P., Treiman, D. & Leeuw, J. (1992). A Standard International Socio-Economic Index of Occupational Status. *Social Science Research, 21*, 1-56.

Goebel, J., Krause, K. & Schupp, J. (2005) Growth in Unemployment Raises Poverty Rates. *DIW Berlin Weekly Report, 10/2005*, 115-125.

Heckman, J.J. (1981a). The Incidental Parameters Problem and the Problem of Initial Conditions in Estimating a Discrete Time-Discrete Data Stochastic Process. In C. Manski & D. McFadden (Eds.) *Structural Analysis of Discrete Data with Econometric Applications*, Cambridge: MIT Press, 179-195.

Heckman, J.J. (1981b). Heterogeneity and State Dependence. In S. Rosen (Ed.) *Studies in Labor Markets*, Chicago: University of Chicago Press, 91-140.

Heckman, J.J. & Borjas, G. (1980). Does Unemployment Cause Future Unemployment? Definitions, Questions and Answers from a Continuous Time Model of Heterogeneity and State Dependence. *Economica, 47*, 247-283.

Kalina, T. (2008). Niedriglohnbeschäftigung in Deutschland - Sprungbrett oder Sackgasse? *Arbeit, 17*, 21-37.

Layard, R., Nickell, S. & Jackman, R. (1991). *Unemployment: Macroeconomic Performance and the Labour Market.* Oxford: Oxford University Press.

Long, S. (1997). *Regression Models for Categorical and Limited Dependent Variables.* New York: Sage.

McCormick, B. (1990). A Theory of Signalling During Job Search, Employment Efficiency, and "Stigmatised" Jobs. *Review of Economic Studies, 57*, 299-313.

Mosthaf, A., Schank, T., Schnabel, C. (2009). *Low-wage employment versus unemployment: which one provides better prospects for women?* IZA Discussion Paper 4611.

Mosthaf, A., Schnabel, C., Stephani, J. (2010). Low-wage careers: Are there dead-end firms and dead-end jobs? *Zeitschrift für ArbeitsmarktForschung Online First - Journal for Labour Market Research*.

OECD (2008). *Employment Outlook 2008*. Paris: OECD.

OECD (2009). *Employment Outlook 2009*. Chapter 3 - Is Work the Best Antidote to Poverty? Paris: OECD, 165-210.

Prowse, V. (2005). *State Dependence in a Multi-State Model of Employment Dynamics*. IZA Discussion Paper 1623.

Schank, T., Schnabel, C. & Stephani, J. (2008). Geringverdiener - wem und wie gelingt der Aufstieg? *Jahrbücher für Nationalökonomie und Statistik, 229*, 584-614.

Sinn, H.-W., Holzner, C., Meister, W., Ochel, W., & Werding, M. (2006). *Redesigning The Welfare State. Germany's Current Agenda for an Activating Social Assistance*, Cheltenham: Edward Elgar.

Stewart, M. (2006). Maximum Simulated Likelihood Estimation of Random Effects Dynamic Probit Models with Autocorrelated Errors. *Stata Journal, 6*, 256-272.

Stewart, M. (2007). The Interrelated Dynamics of Unemployment and Low-Wage Employment. *Journal of Applied Econometrics, 22*, 511-531.

Stewart, M. & Swaffield, J. (1999). Low Pay Dynamics and Transition Probabilities. *Economica, 66*, 23-42.

Uhlendorff, A. (2006). *From No Pay to Low Pay and Back Again? A Multi-State Model of Low Pay Dynamics*. IZA Discussion Paper 2482.

Vishwanath, T. (1989). Job Search, Stigma Effect, and Escape Rate from Unemployment. *Journal of Labour Economics, 7*, 487-502.

Wagner, G., Frick, J., & Schupp, J. (2007). The German Socio-Economic Panel Study (SOEP) - Scope, Evolution and Enhancements. *Schmollers Jahrbuch, 127*, 161-191.

A Appendix

Table X: Estimations for initial period (Men)

	Pooled Probit			Heckman Estimator		
Regressor	coeff.	z	P> |z|	coeff.	z	P> |z|
age	0.107	1.53	0.127	0.217	1.97	0.049
age$^2/100$	−0.121	−1.39	0.164	−0.235	−1.71	0.087
college-educated	0.548	3.53	0.000	1.143	3.53	0.000
handicap	−0.147	−0.62	0.537	−0.379	−1.01	0.311
regional ue-rate	−0.071	−3.04	0.002	−0.109	−2.63	0.008
married/cohabiting	0.379	2.48	0.013	0.310	1.30	0.194
parents' language	−0.419	−3.23	0.001	−0.491	−2.42	0.016
constant	−0.072	−0.05	0.958	−1.196	−0.56	0.575
Observations	1264			1264		

Source: SOEP, own calculations, wave 2002.

Table XI: Regression results (Women, 2002-2007)

	Pooled Probit			Heckman Estimator		
Regressor	coeff.	z	P$>\|$z$\|$	coeff.	z	P$>\|$z$\|$
independent variable	employed in a high-paid job					
hp$_{t-1}$	2.505	12.91	0.000	1.752	7.31	0.000
*college-educated$_{t-1}$	0.413	4.42	0.000	0.803	5.22	0.000
*ue-long$_{t-1}$	−0.452	−4.52	0.000	−0.750	−4.38	0.000
*low-ISEI$_{t-1}$	−0.608	−7.08	0.000	−0.935	−5.49	0.000
lp$_{t-1}$	0.219	1.10	0.273	0.611	2.45	0.014
*college-educated$_{t-1}$	0.148	1.09	0.277	0.471	2.14	0.033
*ue-long$_{t-1}$	−0.214	−1.77	0.077	−0.461	−2.62	0.009
*low-ISEI$_{t-1}$	−0.196	−2.05	0.040	−0.438	−2.96	0.003
ue$_{t-1}$	reference category					
*college-educated$_{t-1}$	0.098	0.33	0.743	0.460	1.1	0.272
*ue-long$_{t-1}$	−0.634	−2.62	0.009	−0.609	−2.02	0.043
age	0.086	2.55	0.011	0.211	3.09	0.002
age$^2/100$	−0.105	−2.71	0.007	−0.241	−3.08	0.002
handicap	−0.025	−0.23	0.815	−0.064	−0.35	0.727
regional ue-rate	−0.007	−0.66	0.507	−0.020	−0.99	0.320
German citizenship	−0.219	−2.62	0.009	−0.336	−2.31	0.021
married/cohabiting	0.010	0.14	0.892	−0.018	−0.15	0.883
year dummies	included					
constant	−2.301	−2.98	0.003	−3.829	−2.45	0.014
λ	-			0.658	15.87	0.000
θ	-			1.171	5.94	0.000
Log-likelihood	−1861.080			−1754.843		
AIC	3780.160			3571.686		
BIC	3971.743			3776.481		
$R^2_{AdjCount}$	0.5301			0.7044		
Observations	5466			5466		

Source: SOEP, own calculations, waves 2002-2007, hp=high-paid; lp=low-paid; ue=unemployed

Table XII: Regression results (Men, 1998-2002)

	Pooled Probit			Heckman Estimator		
Regressor	coeff.	z	P$>\|$z$\|$	coeff.	z	P$>\|$z$\|$
independent variable	employed in a high-paid job					
hp$_{t-1}$	2.207	9.29	0.000	1.503	4.94	0.000
*college-educated$_{t-1}$	0.691	4.27	0.000	1.167	4.43	0.000
*ue-long$_{t-1}$	−0.451	−3.79	0.000	−0.666	−3.40	0.001
*low-ISEI$_{t-1}$	−0.270	−2.40	0.017	−0.434	−2.46	0.014
lp$_{t-1}$	0.448	1.50	0.132	0.944	2.39	0.017
*college-educated$_{t-1}$	0.567	1.22	0.222	0.730	1.30	0.192
*ue-long$_{t-1}$	−0.328	−1.31	0.189	−0.507	−1.42	0.156
*low-ISEI$_{t-1}$	−0.422	−1.60	0.110	−0.683	−1.88	0.060
ue$_{t-1}$	reference category					
*college-educated$_{t-1}$	−0.068	−0.13	0.897	0.783	1.20	0.230
*ue-long$_{t-1}$	−0.869	−3.13	0.002	−0.933	−2.56	0.011
age	0.084	1.83	0.067	0.234	2.73	0.006
age$^2/100$	−0.109	−2.04	0.041	−0.289	−2.89	0.004
handicap	−0.390	−3.07	0.002	−0.772	−3.37	0.001
regional ue-rate	−0.060	−3.35	0.001	−0.098	−2.99	0.003
German citizenship	0.089	0.87	0.384	0.096	0.53	0.596
married/cohabiting	0.162	1.44	0.149	0.262	1.47	0.141
year dummies	included					
constant	−1.557	−1.48	0.139	−3.354	−1.76	0.078
λ		-		0.574	8.11	0.000
θ		-		0.958	4.87	0.000
Log-likelihood	−764.024			−741.308		
AIC	1584.048			1542.616		
BIC	1754.896			1771.700		
$R^2_{AdjCount}$	0.3436			0.8060		
Observations	4455			4455		

Source: SOEP, own calculations, waves 1998-2002, hp=high-paid; lp=low-paid; ue=unemployed