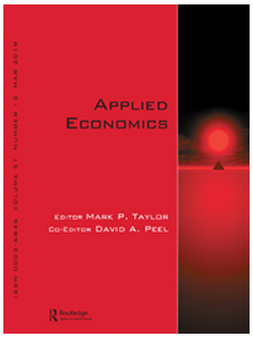

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The British low-wage sector and the employment prospects of the unemployed

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ABSTRACT

Are low wages a way for the unemployed to switch to higher-paying jobs? Using data from the British Household Panel Survey, the labour market dynamics of unemployed, low-paid and higher-paid employed men are analysed. Moreover, the respective (un)employment duration and occupational skill level are accounted for. Results show that in general low wages significantly reduce the risk of future unemployment and increase the chances of ascending the salary ladder, especially in the case of long-term unemployment (>360 days). Furthermore, the occupational skill level has a substantial influence on the upward mobility of low-paid jobs: individuals working in the initial period in a low-paid and higher-skilled occupation have on average an 11 percentage points higher probability of entering higher pay compared to when working in a low-paid and low-skilled occupation.

KEYWORDS

Unemployment dynamics; low-pay dynamics; initial conditions problem; random-effects probit models; maximum simulated likelihood

JEL CLASSIFICATION

J64; J62; J31

I. Introduction

In Great Britain, about every fifth worker is employed in the low-wage[1] sector – a share that has remained fairly constant since the 1970s (OECD 2016). The effect of such employment on labour market prospects provides a focus for many scholars. These jobs might be considered 'bad' jobs, as they increase the risk of becoming unemployed or of staying low-paid employed.[2] On the other hand, they may offer a way for the unemployed to improve their labour market prospects: they may make it easier for them to find better-paid employment, rather than remaining unemployed.[3] In the political discussion, the concern is that low wages might push workers into a low-pay–no pay cycle (OECD 1997; European Commission 2003). Several studies (e.g. Stewart and Swaffield 1999; Stewart 2007; Cappellari and Jenkins 2008; Clark and Kanellopoulos 2013) confirm these concerns and paint a particularly negative picture of the employment prospects of low-paid workers in Great Britain. For example, Stewart (2007: 511) concludes that being employed in the low-wage sector has 'almost as large an adverse effect as unemployment on future prospects'. This study examines whether this general negative picture of low wages also holds when accounting for (un)employment duration and the occupational skill level.

From a theoretical perspective, the effect of unemployment on labour market prospects is rather clear: unemployment may lead to a deterioration in human capital (or send out a negative signal that such a deterioration might have happened). Moreover, the intensity of the negative signal caused by unemployment is likely dependent on its duration. In the economic literature, this is called 'negative duration dependence in unemployment': the longer someone is unemployed, the more likely it is that he/she will stay unemployed. However, the effect that a low-paid job might have on one's employment prospects is, from the theoretical perspective, unclear. In general, finding a job might be helpful in terms of increasing the level of human capital – or (in the case of a previous spell of unemployment) at least stopping its deterioration. However, the positive impact of low-wage employment on the level of human capital could be in doubt if the job has a low occupational skill level, e.g. monotonous manual work, which might have almost no significant effect on the manual or

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[1]Low pay and low wage are used as synonyms in this study.

[2]This might go along with the differentiation of 'good' and 'bad' jobs (Acemoglu 2001).

[3]In the literature, this effect is also called the 'stepping stone effect' (see, for instance, Uhlendorff 2006) or 'springboard effect' (see, for instance, Knabe and Plum 2013).

intellectual abilities of the worker. Moreover, due to the lack of complete information in labour markets, signals play an important role – and might not appreciate low-paid work. As the true productivity of an applicant is unknown to an employer, the employer must evaluate the applicant using the information available to him – for example, by looking at the applicant's education or work experience. However, if the applicant has taken a low-paid job in the past, this might send out a negative signal for the future: the employer could interpret this (falsely) as poor productivity. Layard et al. (1991: 249) summarized this aspect in the following phrase: 'While unemployment is a bad signal, being in a low-quality job may well be a worse one'.

The aim of this study is to examine how employment in the low-wage sector affects the chances of the currently unemployed of finding better-paid work. As was shown by Knabe and Plum (2013), labour market transitions could be influenced by job-related characteristics. The authors find evidence that in the German labour market, when a low-paid job is associated with low social status, the probability of obtaining better-paid work is lower than when the job has high social status. Following this approach, the effect of low wages is examined according to the occupational skill level. Moreover, existing empirical evidence shows that the re-employment probability of someone who is unemployed declines with the duration of unemployment (see, for example, Kroft, Lange, and Notowidigdo 2013): hence, low-paid employment might be helpful to someone who is long-term unemployed, rather than to someone with a short spell of unemployment. In this study, the unemployed are differentiated into short-term (unemployment duration below 90 days), medium-term (90–360 days) and long-term (>360 days) unemployed.

To analyse labour market transitions in Great Britain, data from the British Household Panel Survey (BHPS) for the years 1996–2008 are used. The crucial assumption in this study is that the labour market position in the previous period $t-1$ has a genuine effect on the current position at time t. Moreover, to analyse state dependence in the occupational skill-level type, the probability of someone working in a job with a low occupational skill level at t is modelled separately. To estimate true state dependence in labour market dynamics, the aspect of unobserved heterogeneity must be allowed for: workers differ not only in such observable characteristics as educational background but also in unobservable characteristics, such as motivation or ability (Heckman 1981*a*). Due to the fact that three different and mutually exclusive labour market positions (having a higher-paid job, having a low-paid job and being unemployed) and the occupational skill level are considered, the unobserved characteristics could be correlated between these stages: e.g. someone with a high level of ability is less likely to become unemployed and has a good chance of being higher-paid employed and of working in a job with a higher occupational skill level. To address correlated unobserved heterogeneity, correlated random-effects parameters are included in the estimation. Furthermore, the labour market position in the initial period might not be randomly distributed (Heckman 1981*b*). To take care of this 'initial conditions problem', we follow the approach of Wooldridge (2005) and condition the dynamic sequence of the model $(t > 0)$ on the labour market outcome of the first period $(t = 0)$. For the estimation, we use maximum simulated likelihood, based on pseudo-random numbers (here, Halton draws).

The main findings of the article are that, in general, the risk of becoming or staying unemployed is significantly reduced by taking a low-paid job, rather than staying unemployed. Moreover, if we consider the prospects of climbing up the salary ladder, the effect of low-paid employment does hardly vary according to the occupational skill level: irrespective of the occupational skill level of the low-paid job at $t-1$, the chances of ascending the salary ladder are improved compared to being unemployed. This positive effect increases with (un)employment duration. Furthermore, indications are presented that men who were low-paid in a higher-skilled occupation in the initial period have a significantly higher probability of becoming higher-paid employed in the future compared to when being low-paid employed in a low-skilled occupation at $t = 0$.

However, the upward mobility towards higher-paid jobs is less pronounced when restricting the sample to men without post-secondary education.

The remainder of this article is structured as follows: Section II reviews the key economic literature on labour market dynamics. Section III introduces the data and provides descriptive statistics, and Section IV describes the empirical strategy. Results are presented in Section V and conclusions thereafter.

II. Literature review

State dependence on unemployment

As Heckman (2001: 706) noted in his Nobel lecture 'a frequently noted empirical regularity in the analysis of unemployment data is that those who were unemployed in the past or have worked in the past are more likely to be unemployed (or working) in the future'. Looking at the economic literature, several theoretical explanations are provided as to why the experience of unemployment *itself* increases the risk of staying unemployed. For example, to evaluate the worker's productivity, firms might use unemployment duration as an indicator (Vishwanath 1989). The assumption is that the ability of a worker is negatively correlated with the unemployment duration of the applicant. Blanchard and Diamond (1994) show in a labour market model with job creation/destruction and matching that the hiring decision of a firm is influenced by the unemployment duration. The authors show that, when using unemployment duration as a ranking device, already unemployed workers face a lower rate of exit from unemployment than employed workers who have only recently become unemployed.

However, Pissarides (1990) shows that there is not necessarily a negative duration dependence on unemployment. The availability of higher-quality jobs might be limited, and so the higher-skilled unemployed might be prepared to wait for a job that is appropriate to their skill level. This search strategy on the part of the unemployed might be anticipated by firms, and therefore, unemployment need not necessarily be considered by the employer in a negative light.

Additionally, the size of the stigmatizing effect of unemployment might not be constant over time. For example, Lockwood (1991) and Omori (1997) argue that there might be a relationship between stigma effects and the business cycle. The rationale is that an employer might consider unemployment more suspicious during periods of an economic upturn as unemployment is relatively uncommon. On the contrary, the stigmatizing effect should decline when the unemployment rate is low. Referring to the empirical testing, Biewen and Steffes (2010) show for the German labour market that the average partial effect (APE) of past unemployment only varies slightly for different values of the cyclical unemployment rate. However, Ayllón (2013) presents evidence of stigma effects in the Spanish labour market.

On the other hand, the risk of becoming unemployed might be negatively correlated with employment duration. One explanation is provided by the human capital theory: during a spell of employment, the worker accumulates firm-specific human capital, becomes more productive and gets more valuable to the firm (Becker 1962). Another explanation might be that protection against dismissal, especially in the case of mass lay-offs, depends, among other factors, on the duration of employment.

Though beyond the scope of this study, it is also noted that state dependence in employment and unemployment is likely age dependent. For example, following the efficiency-wage theory of Lazear (1981), wages have to increase over time to stop employees from shirking. Pissarides (1990) further contends that a beneficial worker–firm match requires searching time and thus might be correlated with the age of the employee. These arguments indicate that the probability to stay employed might increase by age. However, as the job search intensity might be negatively age related (Ljungqvist and Sargent 1998) and adaptation rate to new technologies might be lower for the senior worker (Friedberg 2003), state dependence in unemployment might also increase over age.

Numerous empirical studies exist that use survey data to show that there is state dependence in unemployment: for example, in the US (Heckman and Borjas 1980); in Germany (Mühleisen and Zimmermann 1994); in the UK (Arulampalam, Booth, and Taylor 2000); and in Europe generally (Plum and Ayllón 2015). However, studies based on field experiments provide a less clear picture.

For example, Kroft, Lange, and Notowidigdo (2013) find for the US strong indications of negative duration dependence on unemployment. These findings are confirmed for Switzerland by Oberholzer-Gee (2008). However, on the other hand, Eriksson and Rooth (2014) find only a little evidence of a stigma effect in Sweden.

The effect of low pay on employment prospects

While there is a clear perception of how unemployment affects employment prospects, this is less clear for low-paid employment. Leaving the ranks of the unemployed and working in the low-wage sector might well slow the deterioration in human capital – or even improve a worker's skills. However, McCormick (1990) argues that a highly skilled worker will find low-quality jobs less satisfying and will thus avoid such jobs. This search strategy is anticipated by firms, and the employment record of an applicant will be used as a device to screen his productivity. Hence, accepting low-paid employment may have a negative impact on future earnings and could trap the worker in a low-quality, low-pay job and with damaged prospects of climbing the salary ladder.

On the other hand, the educational/skills mismatch literature provides arguments why unemployed might select themselves – at least temporarily – in a low-paid/low-skilled job. The underlying concept of educational/skills mismatch is that 'persons whose schooling exceeds (is less than) the required schooling for their occupation (…), respectively, receive lower (higher) wages than workers with similar levels of schooling in occupations (…) having the required schooling' (Cohn and Khan 1995, p. 67). However, studies indicate that mismatch might partially represent (age related) transitory patterns, which refer to life-cycle effects (e.g. Handel 2003). Thus, from a context of a career ladder, high-skilled unemployed might improve the chances of a better match in the future by choosing these types of jobs.[4]

There are numerous studies that analyse the labour market transitions of low-wage British workers. Stewart and Swaffield (1999: 23) use data from the BHPS and apply a bivariate probit model. They conclude that 'the probability of being low-paid depends strongly on low pay in the previous year' and find evidence of a low-pay–no pay cycle. Stewart (2007), also using data from the BHPS, applies a range of dynamic random- and fixed-effects estimators and finds evidence that low-wage employment has almost as great an adverse effect on the probability of becoming unemployed in the subsequent period as unemployment. The author concludes that 'in terms of future employment prospects, low-wage jobs are closer to unemployment than to higher-paid jobs' (Stewart 2007: 529). Cappellari and Jenkins (2008), also using data from the BHPS, model the transition into and out of low-paid employment. A multivariate probit model is applied that also accounts for panel dropout, employment retention and the initial conditions problem. Evidence is found that the probability of being low paid is higher for someone who works in the low-wage sector than in a high-wage sector. Clark and Kanellopoulos (2013), using data from the European Community Household Panel, estimate state dependence in low pay in 12 European countries, including Great Britain. Applying various dynamic random-effects probit models, the authors find evidence of low-pay persistence in Great Britain and other countries. Although these studies find indications of low-pay persistence, low wages are not necessarily harmful because remaining unemployed might have a more deleterious effect on an individual's probability of occupational advancement. This might especially be the case for the long-term unemployed.

III. Data and descriptive statistics

To derive the impact of low-paid work on the probability of obtaining a better-paid job in Great Britain, data from the BHPS for the years 1996–2008 are used. The BHPS is a nationally representative survey of households and individuals that includes information on employment (Taylor 2006). As earning dynamics differ substantially between men and women (see, for instance, Blackaby, Booth, and Frank 2005; Arulampalam et al. 2007), it is assumed that, to capture the effect of gender, it would not be

[4]To control for this effect, in a robustness estimation, the sample is restricted to individuals without post-secondary education (see the section on Job-related characteristics).

sufficient to integrate a gender-related indicator variable into the estimation (for discussion, see Machin and Puhani 2003; Cappellari and Jenkins 2008). Therefore, the sample is split according to sex, and only the employment dynamics of men are considered. It is also assumed that the employment schemes of self-employed or disabled men, of men in education and of men who are serving in the army differ substantially from the employment dynamics of employees, and these are therefore dropped from the sample.[5] In order to avoid feedback from the schooling and retirement schemes, observations for individuals younger than 20 years and older than 60 years are also dropped.

Those individuals without employment are separated into those unemployed versus inactive. Applying the International Labour Organization (ILO) definition, individuals are defined as unemployed if they are actively searching for a job and are otherwise defined as inactive.[6] The degree to which those who are inactive seek to participate in the labour market is unclear (e.g. Flinn and Heckman 1983), and therefore, we follow the approach of Stewart (2007) and exclude them from the sample. Empirical evidence shows that the labour market prospects of an unemployed individual deteriorate with the duration of unemployment (Kroft, Lange, and Notowidigdo 2013). In the BHPS, information is provided for the duration of the individual's labour market status at the time of interview. Using this information, the unemployed are differentiated into the short-term unemployed (below 90 days in a spell of unemployment), the medium-term unemployed (spell length 90–360 days) and the long-term unemployed (more than 360 days).[7] The left panel of Figure 1 shows the distribution of the type of unemployed. The numbers of short-term and medium-term unemployed are similar, at roughly 26%; however, almost every second unemployed person has been unemployed for over 360 days.

Afterwards, we distinguish between the higher-paid employed and the low-paid employed, following the OECD (1997) definition: a job with a labour market income that exceeds two-thirds of the median gross hourly wage of both sexes (including paid overtime) is defined as a higher-paid job; otherwise, it is a low-paid job. The low-wage threshold is annually adjusted according to the weighted labour market income. The low-wage threshold stood at £4.73 in 1998 and increased annually to £7.70 in 2008.[8]

The final sample consists of 26,980 observations, of which 80.56% are higher-paid employed, 13.90% low-paid employed and 4.42% unemployed. The focus of the study is to analyse the effect of low-paid employment on labour market prospects. One explanation for advancement from low-paid employment to higher-paid employment is given by the life-cycle model of Heckman (1976): in the course of employment, a worker increases his human capital level and, with productivity, increases his wages. However, it might be feared that some jobs have only a small effect on the human capital level of the worker, e.g. if the job is very monotonous or repetitive. To differentiate jobs according to their skill level, we use the information of the RGSC for the present job.[9] There are six classes, and, depending on the kind of work and the skill level of the job, each employee is assigned to one of them. The distribution of the six classes, differentiated for the higher-paid and the low-paid employed, is presented in Figure 1, right-hand panel. About 90% of the currently higher-paid employed work in a professional occupation, a managerial and technical

[5]To identify self-employed, we use the information whether the individual is an employee or self-employed at the current job (WAVE-JBSEMP).

[6]According to the ILO definition, the second restriction for the differentiation between being unemployed and inactive is whether the person is ready to begin work within the next two weeks. The BHPS does not have any information concerning this issue; therefore, the differentiation is solely based on the searching scheme.

[7]Moreover, we differentiate the currently employed according to the length of their employment spell into the following three categories: employment spell <90 days, 90–360 days and >360 days. However, it is not possible to differentiate the employment spell into higher-paid and low-paid employed.

[8]Some men receive a gross hourly wage that is slightly above or below the low-wage threshold. A small change in their pay or in their working hours could lead to a change in their labour market position, even though their gross hourly wage remains almost unaffected. When a large percentage of men change their labour market position and only experience a negligible change in the hourly wages, this could result in an overestimation of the transition probability between the two employment positions. In a robustness check, those workers who changed their labour market position and experienced a change in their wage of 10% (in absolute terms) or less were dropped. However, this did not affect the main findings of the study.

[9]In a robustness estimation, to derive the occupational skill level, we used information based on the socio-economic group classification that distinguishes jobs into 19 categories. Personal service work, semi-skilled or unskilled manual work and agricultural work were classified as low-skilled occupations; otherwise, occupations were higher skilled. The findings hardly changed.

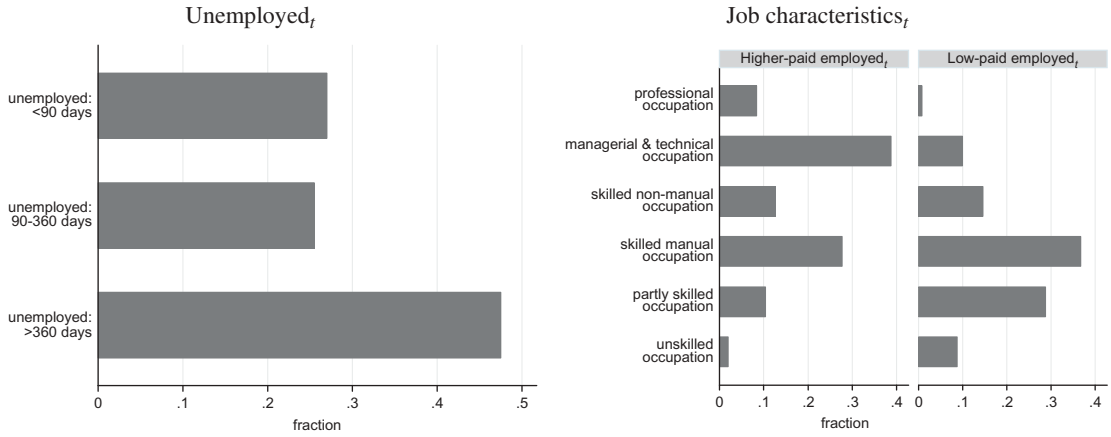

Figure 1. Type of unemployment (left) and occupational skill level (right).

Source: BHPS (1998–2008), N = 26,980. In the left figure, the currently unemployed are differentiated into short-term (unemployment spell <90 days), medium-term (90–360 days) and long-term (>360 days) unemployed. In the right figure, the currently higher-paid and low-paid employed are differentiated according to their occupational skill level, based on the Registrar-General's Social Class (RGSC) classification.

occupation or a skilled (non-)manual occupation. We group these classes together as 'higher-skilled occupations'. The remaining 10% work in a partly skilled or unskilled occupation (grouped together as 'low-skilled occupations'). With respect to the currently low-paid employed, about 37% work in either a partly skilled or an unskilled class of occupation.

To derive the prospects for becoming higher paid depending on the occupational skill level, the ratio of gross hourly wages to the low-wage threshold is calculated.[10] The left panel of Figure 2 shows the distribution of this ratio for low-skilled and higher-skilled occupations. It is evident that the share of employed with a gross hourly wage close to the low-wage threshold (indicated by the dashed vertical line) is much higher among workers in a low-skill occupation than among those in a higher-skill occupation. Moreover, looking at the origins of currently higher-paid employed who were not higher-paid employed at $t-1$ (Figure 2, right-hand panel), we can see that previously roughly 58% were low-paid employed in a higher-skilled occupation, and about 28% were low-paid employed in a low-skilled occupation.

Figure 2. Occupational skill level-specific wage distribution (left) and origins for entering higher-paid employment (right).

Source: BHPS (1998–2008), N = 26,980. In the left-hand figure, the distribution of the ratio between gross hourly wage and the low-wage threshold, differentiated according to workers with a low-skilled and a higher-skilled occupation, is presented. The dashed vertical line refers to the case where the gross hourly wage equals the low-wage threshold. In the right-hand figure, the origins of currently higher-paid employed individuals at time t who were not higher-paid employed at $t-1$ are shown.

[10]The wage distribution for the total sample can be found in the Appendix (see Figure A 1).

Thus, the probability of ascending the pay ladder depends on the occupational skill level and its state dependence.

Another impression about labour market transitions as they depend on the occupational skill level and the duration of unemployment might be derived by looking at a transition matrix (Table 1). The transition matrix gives the probability of someone being higher paid, low paid or unemployed in the current period *t*, conditional on the labour market position in the previous period *t-1*. In the case of higher-paid employed, about 91% of those in a higher-skill occupation are to be observed in the same labour market position in the subsequent period. In the case of higher-paid employed in a low-skill occupation, this probability decreases to 62%; however, about 22% manage to switch to a higher-skilled occupation. Moreover, about 11% stay in the same occupation category but become low-paid employed. Among the low-paid employed, a noticeable difference in the probability of someone ascending the salary ladder may be observed, depending on the skill level of the occupation: while about 43% (38.86% + 3.93%) of the low-paid employed in a higher-skill occupation switch to higher-paid employment, this is the case for only 32% (10.91% + 21.48%) of low-paid workers in a low-skill occupation. Moreover, the risk of becoming unemployed is nearly 50% greater among low-paid workers in a low-skill occupation (5.52%) than among low-paid workers in a higher-skill occupation (3.53%). Differences in the labour market dynamics can also be observed for the unemployed: for example, while about three-quarters of the long-term unemployed (<360 days) stay unemployed, this is only the case for 30% of the short-term unemployed (<90 days) and for 46% of the medium-term (90–360 days) unemployed. Moreover, while about 40% (30.99% + 8.48%) of the short-term and 27.7% (21.87% + 5.83%) of the medium-term unemployed manage to become higher-paid employed in the subsequent period, that share is noticeably lower among the long-term unemployed – 12.9% (8.83% + 4.07%).

However, it is doubtful that safe conclusions about labour market transitions can be drawn when only the transition matrix is considered. The implicit assumption is that the differences in the conditional probabilities in the transition matrix are caused exclusively by the different labour market positions and not by differences in the (un)observable characteristics. However, for example, it is expected that a high educational level will have a positive impact on the probability of becoming better paid and that men with no post-secondary education are more often stuck in low-paid jobs. However, unobservable aspects, such as an individual's level of motivation, could also cause differences in the probability of his achieving a labour market transition, i.e. someone who is highly motivated might stand a better chance of ascending the salary ladder. Hence, the source of heterogeneity in labour market transitions among men might be explained by differences in their observable and unobservable characteristics. Thus, to evaluate low wages and their labour market impact on future labour market outcomes, it is necessary to take account of the differences in observable characteristics.

IV. Econometric specification

The general assumption in this study is that one's previous labour market position has a genuine effect

Table 1. Transition matrix.

		Higher-paid employed$_t$		Low-paid employed$_t$			
		Higher-skilled occ	Low-skilled occ	Higher-skilled occ	Low-skilled occ	Unemployed$_t$	Total$_{t-1}$
Higher-paid employed$_{t-1}$	Higher-skilled occ	91.33	2.87	3.90	0.60	1.30	70.48
	Low-skilled occ	21.80	61.73	3.53	10.77	2.17	10.08
Low-paid employed$_{t-1}$	Higher-skilled occ	38.86	3.93	46.27	7.41	3.53	9.35
	Low-skilled occ	10.91	21.48	13.47	48.62	5.52	5.37
Unemployed$_{t-1}$	<90 days	30.99	8.48	20.18	9.65	30.70	1.27
	90–360 days	21.87	5.83	13.99	12.24	46.06	1.27
	>360 days	8.83	4.07	4.24	5.94	76.91	2.18
Total$_t$		71.65	10.03	8.68	5.22	4.42	

Source: BHPS (1998–2008), N = 26,980. *Interpretation example*: The conditional probability of being higher-paid employed in a higher-skilled occupation at t when the worker was already higher-paid employed in a higher-skilled occupation at $t-1$ is 91.33%.

on one's present labour market position. Furthermore, it is assumed that the probability of remaining in a particular labour market position is influenced by its duration. Referring to labour market transitions, it is assumed that they follow a first-order Markov process. Or in other words, it is assumed that the labour market position in the previous year $(t-1)$ has a genuine effect on today's (t) labour market position. In general, when a dynamic model is applied, it must address several aspects, such as unobserved heterogeneity (Heckman 1981*a*) and its correlation with the initial conditions (Heckman 1981*b*). As Skrondal and Rabe-Hesketh (2014) have pointed out, not accounting for these aspects might cause biased results.

Referring to the labour market process, the following binary outcome variables are defined as:

$$y_{it}^{\text{ue}} = \begin{cases} 1 \text{ if the person is unemployed,} \\ 0 \text{ otherwise} \end{cases} \tag{1a}$$

$$y_{it}^{\text{lp}} = \begin{cases} 1 \text{ if the person is low-paid employed,} \\ 0 \text{ otherwise} \end{cases} \tag{1b}$$

and

$$y_{it}^{\text{hp}} = \begin{cases} 1 \text{ if the person is higher-paid employed,} \\ 0 \text{ otherwise} \end{cases} \tag{1c}$$

Referring to the occupational skill level, the binary outcome variable takes the following form:

$$y_{it}^{\text{low-skill}} = \begin{cases} 1 \text{ if the person works in a low-skill occupation,} \\ 0 \text{ otherwise} \end{cases} \tag{1d}$$

and

$$y_{it}^{\text{higher-skill}} = \begin{cases} 1 \text{ if the person works in a higher-skill occupation,} \\ 0 \text{ otherwise} \end{cases} \tag{1e}$$

with the subscripts $i \in \{1, \ldots, N\}$ indicating the individuals and $t \in \{1, \ldots, T_i\}$ the time point. Note that the labour market states are mutually exclusive, e.g. someone who is higher-paid employed $\left(y_{it}^{\text{hp}} = 1\right)$ cannot be unemployed $\left(y_{it}^{\text{ue}} = 0\right)$ or low-paid employed $\left(y_{it}^{\text{lp}} = 0\right)$. Moreover, an employed individual who does not work in a low-skilled occupation $\left(y_{it}^{\text{low-skill}} = 0\right)$ works in a higher-skilled occupation $\left(y_{it}^{\text{higher-skill}} = 0\right)$.[11]

To estimate the effect of an individual's past labour market position on future position(s), the respective lagged labour market position (higher-paid employed, low-paid employed and unemployed) is included as an explanatory variable. However, it is expected that the occupational skill level and the (un)employment duration might have an effect on the transition probability. Thus, the lagged labour market position of the higher- and low-wage employed $\left(y_{it-1}^{\text{hp}},\ y_{it-1}^{\text{lp}}\right)$ is interacted with the occupational skill level indicator $\left(y_{it-1}^{\text{low-skill}}, y_{it}^{\text{higher-skill}}\right)$. Furthermore, with respect to the unemployment duration, three indicator variables are included $\left(y_{it-1}^{\text{ue-short}},\ y_{it-1}^{\text{ue-med}},\ y_{it-1}^{\text{ue-long}}\right)$. Thus, the lagged labour market position indicator is a seven-value categorical variable. As reference category, being higher-paid employed in a higher-skilled occupation is chosen. Moreover, three indicator variables with respect to the previous employment duration are included $\left(y_{it-1}^{\text{em-short}},\ y_{it-1}^{\text{em-med}},\ y_{it-1}^{\text{em-long}}\right)$, with being short-term employed chosen as the reference category.[12] For the time period $t \geq 1$, the observed binary outcome variables are:

$$\begin{aligned} y_{it}^{\text{ue}} = \mathbf{1}(&\gamma_{11} y_{it-1}^{\text{hp}} y_{it-1}^{\text{low-skill}} + \gamma_{22} y_{it-1}^{\text{lp}} y_{it-1}^{\text{higher-skill}} \\ &+ \gamma_{23} y_{it-1}^{\text{lp}} y_{it-1}^{\text{low-skill}} \gamma_{14} y_{\text{it}-1}^{\text{ue-short}} \\ &+ \gamma_{15} y_{\text{it}-1}^{\text{ue-med}} + \gamma_{16} y_{\text{it}-1}^{\text{ue-long}} \\ &+ \gamma_{14} y_{\text{it}-1}^{\text{ue-short}} + \gamma_{15} y_{\text{it}-1}^{\text{ue-med}} \\ &+ \gamma_{16} y_{\text{it}-1}^{\text{ue-long}} + \eta_{11} y_{\text{it}-1}^{\text{em-med}} \\ &+ \eta_{12} y_{\text{it}-1}^{\text{em-long}} + x'_{1it}\beta_1 + \alpha_{1\text{i}} \\ &+ \varepsilon_{1it} > 0) \end{aligned} \tag{2a}$$

and if $y_{it}^{ue} = 0$,

[11]Another potential approach is to model each combination of labour market position separately (e.g. unemployed, higher-paid employed in a higher-skilled occupation, higher-paid employed in a low-skilled occupation, low-paid employed in a higher-skilled occupation and low-paid employed in a low-skilled occupation). However, the multinomial random effects logit model as suggested by Uhlendorff (2006) did not converge. This issue may be picked up in the future research, for example, by using a different data set or estimation strategy.

[12]Due to the lack of information, it is not possible to decompose further the employment duration into higher-paid and low-paid spells. We assume that the effect of the employment duration is homogeneous between low-paid and higher-paid employed, and therefore, no additional interaction included.

$$y_{it}^{\text{hp}} = \mathbf{1}(\gamma_{21} y_{it-1}^{\text{hp}} y_{it-1}^{\text{low-skill}} + \gamma_{22} y_{it-1}^{\text{lp}} y_{it-1}^{\text{higher-skill}} + \gamma_{23} y_{it-1}^{\text{lp}} y_{it-1}^{\text{low-skill}} + \gamma_{24} y_{it-1}^{\text{ue-short}} + \gamma_{25} y_{it-1}^{\text{ue-med}} + \gamma_{26} y_{it-1}^{\text{ue-long}} + \eta_{21} y_{it-1}^{\text{em-med}} + \eta_{22} y_{it-1}^{\text{em-long}} + x_{2it}' \beta_2 + \alpha_{2i} + \varepsilon_{2it} > 0) \tag{2b}$$

and if $y_{it}^{ue} = 0$,

$$y_{it}^{\text{low-skill}} = \mathbf{1}(\gamma_{31} y_{it-1}^{\text{hp}} y_{it-1}^{\text{low-skill}} + \gamma_{32} y_{it-1}^{\text{lp}} y_{it-1}^{\text{higher-skill}} + \gamma_{33} y_{it-1}^{\text{lp}} y_{it-1}^{\text{low-skill}} + \gamma_{34} y_{it-1}^{\text{ue-short}} + \gamma_{35} y_{it-1}^{\text{ue-med}} + \gamma_{36} y_{it-1}^{\text{ue-long}} + \eta_{31} y_{it-1}^{\text{em-med}} + \eta_{32} y_{it-1}^{\text{em-long}} + x_{3it}' \beta_3 + \alpha_{3i} + \varepsilon_{3it} > 0) \tag{2c}$$

Further, explanatory variables[13] are the exogenous regressors x_{jit}' with $j \in \{1, 2, 3\}$ and a time-invariant error term α_{ji} is included that captures individual-specific effects like motivation or ability. Moreover, ε_{jit} is a time-specific idiosyncratic shock. However, due to a correlation between the time-invariant error term and the initial conditions, the labour market position in the initial period might not be randomly distributed. To take care of the 'initial conditions problem', we follow the suggestion of Wooldridge (2005) by applying a conditional random-intercept model:

$$\alpha_{ji} = \pi_{j1} y_{it-1}^{\text{hp}} y_{i0}^{\text{low-skill}} + \pi_{j2} y_{i0}^{\text{lp}} y_{i0}^{\text{higher-skill}} + \pi_{j3} y_{i0}^{\text{lp}} y_{it-1}^{\text{low-skill}} + \pi_{j4} y_{i0}^{\text{ue-short}} + \pi_{j5} y_{i0}^{\text{ue-med}} + \pi_{j6} y_{i0}^{\text{ue-long}} + \bar{x}_{1i}' \delta_1 + \kappa_{1i} \tag{3}$$

Inserting Equation (3) into (2a) to (2c) yields:

$$y_{it}^{\text{ue}} = \mathbf{1}(\gamma_{11} y_{it-1}^{\text{hp}} y_{it-1}^{\text{low-skill}} + \gamma_{12} y_{it-1}^{\text{lp}} y_{i0}^{\text{higher-skill}} + \gamma_{13} y_{it-1}^{\text{lp}} y_{it-1}^{\text{low-skill}} + \gamma_{14} y_{it-1}^{\text{ue-short}} + \gamma_{15} y_{it-1}^{\text{ue-med}} + \gamma_{16} y_{it-1}^{\text{ue-long}} + \eta_{11} y_{it-1}^{\text{em-med}} + \eta_{12} y_{it-1}^{\text{em-long}} + x_{1it}' \beta_1 + \pi_{11} y_{it-1}^{\text{hp}} y_{i0}^{\text{low-skill}} + \pi_{12} y_{i0}^{\text{lp}} + \pi_{13} y_{i0}^{\text{lp}} y_{it-1}^{\text{low-skill}} + \pi_{14} y_{i0}^{\text{ue-short}} + \pi_{15} y_{i0}^{\text{ue-med}} + \pi_{16} y_{i0}^{\text{ue-long}} + \bar{x}_{1i}' \delta_1 + \kappa_{1i} + \varepsilon_{1it} > 0) \tag{4a}$$

and if $y_{it}^{ue} = 0$, and

$$y_{it}^{\text{hp}} = \mathbf{1}(\gamma_{21} y_{it-1}^{\text{hp}} y_{it-1}^{\text{low-skill}} + \gamma_{22} y_{it-1}^{\text{lp}} y_{i0}^{\text{higher-skill}} + \gamma_{23} y_{it-1}^{\text{lp}} y_{it-1}^{\text{low-skill}} + \gamma_{24} y_{it-1}^{\text{ue-short}} + \gamma_{25} y_{it-1}^{\text{ue-med}} + \gamma_{26} y_{it-1}^{\text{ue-long}} + \eta_{21} y_{it-1}^{\text{em-med}} + \eta_{22} y_{it-1}^{\text{em-long}} + x_{2it}' \beta_2 + \pi_{21} y_{it-1}^{\text{hp}} y_{i0}^{\text{low-skill}} + \pi_{22} y_{i0}^{\text{lp}} + \pi_{23} y_{i0}^{\text{lp}} y_{it-1}^{\text{low-skill}} + \pi_{24} y_{i0}^{\text{ue-short}} + \pi_{25} y_{i0}^{\text{ue-med}} + \pi_{26} y_{i0}^{\text{ue-long}} + \bar{x}_{2i}' \delta_2 + \kappa_{2i} + \varepsilon_{2it} > 0) \tag{4b}$$

and

$$y_{it}^{\text{low-skill}} = \mathbf{1}(\gamma_{31} y_{it-1}^{\text{hp}} y_{it-1}^{\text{low-skill}} + \gamma_{32} y_{it-1}^{\text{lp}} y_{i0}^{\text{higher-skill}} + \gamma_{33} y_{it-1}^{\text{lp}} y_{it-1}^{\text{low-skill}} + \gamma_{34} y_{it-1}^{\text{ue-short}} + \gamma_{35} y_{it-1}^{\text{ue-med}} + \gamma_{36} y_{it-1}^{\text{ue-long}} + \eta_{31} y_{it-1}^{\text{em-med}} + \eta_{32} y_{it-1}^{\text{em-long}} + x_{3it}' \beta_3 + \pi_{31} y_{it-1}^{\text{hp}} y_{i0}^{\text{low-skill}} + \pi_{32} y_{i0}^{\text{lp}} + \pi_{33} y_{i0}^{\text{lp}} y_{it-1}^{\text{low-skill}} + \pi_{34} y_{i0}^{\text{ue-short}} + \pi_{35} y_{i0}^{\text{ue-med}} + \pi_{36} y_{i0}^{\text{ue-long}} + \bar{x}_{3i}' \delta_3 + \kappa_{3i} + \varepsilon_{3it} > 0) \tag{4c}$$

For the idiosyncratic shock, the normalization $\varepsilon_{jit} \sim N(0, 1)$ is chosen and for the random effects (REs) $\kappa_{ji} \sim N\left(0, \sigma_{\kappa_j}^2\right)$. The composite error term is $v_{jit} = \kappa_{ji} + \varepsilon_{jit}$, and due to the time-invariant error term, the composite error term is correlated over time and follows an equi-correlation structure:

$$corr\left(v_{jit}, v_{jis}\right) = \begin{cases} \sigma_{\kappa_j}^2 & \text{if } t \neq s \\ \sigma_{\kappa_j}^2 + 1 & \text{if } t = s \end{cases} \tag{5}$$

and $t, s \in \{1, \ldots, T_i\}$. Furthermore, it is assumed that the composite error terms are correlated in the following way:

$$\Omega_v = \begin{pmatrix} \sigma_{\kappa_1}^2 + 1 & & \\ \rho_1 \sigma_{\kappa_1} \sigma_{\kappa_2} & \sigma_{\kappa_2}^2 + 1 & \\ \rho_2 \sigma_{\kappa_1} \sigma_{\kappa_3} & \rho_3 \sigma_{\kappa_2} \sigma_{\kappa_3} & \sigma_{\kappa_3}^2 + 1 \end{pmatrix} \tag{6}$$

The individual outcome probabilities are:

[13]A list of control variables can be found in Table A 1 and descriptive statistics in Table A 2.

$$P_{it}\left(\kappa_1^*, \kappa_2^*, \kappa_3^*\right) = \{\Phi[\mu^{\text{ue}}]\}^{y_{it}^{\text{ue}}} \left\{\Phi[-\mu^{\text{ue}}]\Phi\left[\left(2y_{it}^{\text{hp}} - 1\right)\mu^{\text{hp}}\right] \Phi\left[\left(2y_{it}^{\text{low-skill}} - 1\right)\mu^{\text{low-skill}}\right]\right\}^{\left(1-y_{it}^{\text{ue}}\right)} \tag{7}$$

and Φ refers to the cumulative univariate normal distribution function and

$$\begin{aligned}\mu^{\text{ue}} = {} & \gamma_{11}\, y_{it-1}^{\text{hp}}\, y_{it-1}^{\text{low-skill}} + \gamma_{12}\, y_{it-1}^{\text{lp}}\, y_{it-1}^{\text{higher-skill}} \\ & + \gamma_{13}\, y_{it-1}^{\text{lp}}\, y_{it-1}^{\text{low-skill}} + \gamma_{14}\, y_{it-1}^{\text{ue-short}} + \gamma_{15}\, y_{it-1}^{\text{ue-med}} \\ & + \pi_{12}\, y_{i0}^{\text{lp}}\, y_{i0}^{\text{higher-skill}} + \pi_{13}\, y_{i0}^{\text{lp}}\, y_{it-1}^{\text{low-skill}} \\ & + \pi_{14}\, y_{i0}^{\text{ue-short}} + \pi_{15}\, y_{i0}^{\text{ue-med}} + \pi_{16}\, y_{i0}^{\text{ue-long}} \\ & + \bar{x}_{1i}'\delta_1 + \sigma_{\kappa_1}\kappa_1^*\end{aligned}$$

and

$$\begin{aligned}\mu^{\text{hp}} = {} & \gamma_{21}\, y_{it-1}^{\text{hp}}\, y_{it-1}^{\text{low-skill}} + \gamma_{22}\, y_{it-1}^{\text{lp}}\, y_{it-1}^{\text{higher-skill}} \\ & + \gamma_{23}\, y_{it-1}^{\text{lp}}\, y_{it-1}^{\text{low-skill}} + \gamma_{24}\, y_{it-1}^{\text{ue-short}} + \gamma_{25}\, y_{it-1}^{\text{ue-med}} \\ & + \gamma_{26}\, y_{it-1}^{\text{ue-long}} + \eta_{21}\, y_{it-1}^{\text{em-med}} + \eta_{22}\, y_{it-1}^{\text{em-long}} \\ & + x_{2it}'\beta_2 + \pi_{21}\, y_{it-1}^{\text{hp}}\, y_{i0}^{\text{low-skill}} + \pi_{22}\, y_{i0}^{\text{lp}}\, y_{i0}^{\text{higher-skill}} \\ & + \pi_{23}\, y_{i0}^{\text{lp}}\, y_{it-1}^{\text{low-skill}} + \pi_{24}\, y_{i0}^{\text{ue-short}} + \pi_{25}\, y_{i0}^{\text{ue-med}} \\ & + \pi_{26}\, y_{i0}^{\text{ue-long}} + \bar{x}_{2i}'\delta_2 + \sigma_{\kappa_2}\kappa_2^*\end{aligned}$$

$$\begin{aligned}\mu^{\text{low-skill}} = {} & \gamma_{31}\, y_{it-1}^{\text{hp}}\, y_{it-1}^{\text{low-skill}} + \gamma_{32}\, y_{it-1}^{\text{lp}}\, y_{it-1}^{\text{higher-skill}} \\ & + \gamma_{33}\, y_{it-1}^{\text{lp}}\, y_{it-1}^{\text{low-skill}} + \gamma_{34}\, y_{it-1}^{\text{ue-short}} \\ & + \gamma_{35}\, y_{it-1}^{\text{ue-med}} + \gamma_{36}\, y_{it-1}^{\text{ue-long}} + \eta_{31}\, y_{it-1}^{\text{em-med}} \\ & + \eta_{32}\, y_{it-1}^{\text{em-long}} + x_{3it}'\beta_3 + \pi_{31}\, y_{it-1}^{\text{hp}}\, y_{i0}^{\text{low-skill}} \\ & + \pi_{32}\, y_{i0}^{\text{lp}}\, y_{i0}^{\text{higher-skill}} + \pi_{33}\, y_{i0}^{\text{lp}}\, y_{it-1}^{\text{low-skill}} \\ & + \pi_{34}\, y_{i0}^{\text{ue-short}} + \pi_{35}\, y_{i0}^{\text{ue-med}} + \pi_{36}\, y_{i0}^{\text{ue-long}} \\ & + \bar{x}_{3i}'\delta_3 + \sigma_{\kappa_3}\kappa_3^*\end{aligned}$$

with $\kappa_j^* = \kappa_j \big/ \sigma_{\kappa_j}$. The individual likelihood contribution is:

$$L_i = \int_{\kappa_1^*}\int_{\kappa_2^*}\int_{\kappa_3^*}\left\{\prod_{t=1}^{T_i} P_{it}\left(\kappa_1^*, \kappa_2^*, \kappa_3^*\right)\right\} g\left(\kappa_1^*\right)g\left(\kappa_2^*\right)g\left(\kappa_3^*\right)d\kappa_1^* d\kappa_2^* d\kappa_3^* \tag{8}$$

and $g\left(\kappa_j^*\right)$ are the probability density functions that need to be integrated out. Using random numbers based on prime numbers (also called Halton draws, see Train 2009), three times R standard uniform distributed draws $\tilde{\kappa}_j^r \in \{0, \ldots, 1\}$ are derived and transformed by the inverse cumulative standard normal distribution $\Phi^{-1}\left(\tilde{\kappa}_j^r\right)$. For each draw, the likelihood is derived for each observation, multiplied over all individuals and time points and finally averaged over all draws:

$$MSL = \prod_{i=1}^{N}\frac{1}{R}\sum_{r=1}^{R}\left\{\prod_{t=1}^{T_i} P_{it}\left(\kappa_1^r, \kappa_2^r, \kappa_3^r\right)\right\} \tag{9}$$

In this application, we use 75 Halton draws. An illustration of the effect of the number of Halton draws on the estimation results can be found in Plum (2016).

V. Results

The aim of this study is to examine the labour market impact of low wages. As descriptive statistics indicate, labour market dynamics might differ according to the occupational skill level and the duration of (un)employment. Moreover, in the econometric specification, correlated REs were included to capture the effect of unobserved heterogeneity (Heckman 1981*a*). For this estimation, a three-equation RE probit model that allows for correlation in the time-invariant error terms is applied.

In Table 2, the coefficients and SEs with reference to the labour market position in the previous period $(t-1)$ and in the initial period $(t=0)$ are presented. The left-hand part of the table presents the coefficients and the SEs for the probability of becoming or remaining unemployed. In the middle of the table, the coefficients and SEs refer to the probability of becoming higher-paid employed; and in the right-hand part, they refer to the probability of becoming employed in a low-skilled occupation – both panels conditional on the person not currently being unemployed. Moreover, the bottom part of Table 2 shows the variances $\left(\hat{\sigma}_{\kappa_1}^2, \hat{\sigma}_{\kappa_2}^2, \hat{\sigma}_{\kappa_3}^2\right)$ and the correlation coefficients $\left(\hat{\rho}_1, \hat{\rho}_2, \hat{\rho}_3\right)$ of the REs, including their respective SEs.

Random-effects error terms were included in the regression to account for unobserved heterogeneity. In each equation, the variances of the random-effects error terms differ significantly from zero at the 1% level. Moreover, correlation parameters of the RE variances differ significantly from zero at the 1% level in each case. A negative correlation indicates that – keeping all observables

constant – an individual who is more likely to become unemployed is less likely to become higher-paid employed instead of low-paid employed $(\hat{\rho}_1 = -0.4934)$. Moreover, due to the positive correlation parameter, this individual who is more likely becoming unemployed is more likely to work in a low-skilled occupation than in a higher-skilled occupation $(\hat{\rho}_2 = 0.2598)$. Furthermore, an individual who is more likely to become higher-paid employed instead of low-paid employed is less likely to be working in a low-skilled occupation than in a higher-skilled occupation $(\hat{\rho}_3 = -0.4650)$.

In Table 2, the reference category is being higher-paid employed in a higher-skilled occupation in the previous period. Though there are indications that the risk of future unemployment is lower for low-paid employed, both with respect to higher-skilled and low-skilled occupations, the size of the respective coefficients is small $(\hat{\gamma}_{12} = -0.1479, \hat{\gamma}_{13} = -0.0984)$ and only being low-paid employed in a higher-skilled occupation at $t-1$ is significantly different from zero at the 10% level. Unsurprisingly, the risk of future unemployment increases with a longer unemployment duration $(\hat{\gamma}_{14} = 0.3870, \hat{\gamma}_{15} = 0.7067, \hat{\gamma}_{16} = 1.2599)$ and all three coefficients are significantly different from zero at the 1% level. Going in line with our expectations, the employment duration has a significant negative effect on the risk of becoming unemployed $(\hat{\eta}_{11} = -0.2564, \hat{\eta}_{12} = -0.5040)$.

With reference to the conditional probability of ascending the salary ladder (conditional on not becoming unemployed) (middle part of Table 2), the evidence is found that unemployment and low-paid employment (irrespective of occupational skill level) have a negative effect on the chances of someone becoming higher-paid employed. However, the chance of becoming higher-paid employed increases with the duration of employment, though no significant difference between $\hat{\eta}_{21}$ and $\hat{\eta}_{22}$ is detected.[14]

So far, the coefficients in Table 2 indicate that the risk of becoming/staying unemployed or moving to being higher-paid employed at t differs between low-paid employed and

Table 2. Estimation results.

	Unemployed in t		Higher-paid employed in t		Low-skilled occupation in t	
Dependent variable:	Coefficient	SE	Coefficient	SE	Coefficient	SE
Higher-paid$_{t-1}$ and higher-skill occ			*Reference category*			
Higher-paid$_{t-1}$ and low-skill occ	−0.0435	0.0939	−0.0310	0.0561	1.2897***	0.0507
Low-paid$_{t-1}$ and higher-skill occ	−0.1479*	0.0861	−0.7879***	0.0465	0.0817	0.0602
Low-paid$_{t-1}$ and low-skill occ	−0.0984	0.0985	−0.7399***	0.0624	1.0969***	0.0656
Unemployed$_{t-1}$: <90 days	0.3870***	0.1261	−0.7470***	0.1245	0.5275**	0.1389
Unemployed$_{t-1}$: 90–360 days	0.7067***	0.1226	−0.6954***	0.1341	0.6113***	0.1463
Unemployed$_{t-1}$: >360 days	1.2599***	0.1311	−0.3488**	0.1589	0.8846***	0.1699
Employed$_{t-1}$: <90 days			*Reference category*			
Employed$_{t-1}$: 90–360 days	−0.2564***	0.0776	0.1152**	0.0600	0.0571	0.0686
Employed$_{t-1}$: >360 days	−0.5040***	0.0695	0.1264***	0.0539	0.0246	0.0624
Higher-paid$_{t=0}$ and higher-skill occ			*Reference category*			
Higher-paid$_{t=0}$ and low-skill occ	0.0363	0.1056	−0.7050***	0.0749	1.8430***	0.0967
Low-paid$_{t=0}$ and higher-skill occ	0.2813***	0.0874	−1.2557***	0.0691	0.5855***	0.0781
Low-paid$_{t=0}$ and low-skill occ	0.4452***	0.1111	−1.6511***	0.0948	1.8746***	0.1087
Unemployed$_{t=0}$: <90 days	0.9276***	0.1387	−1.2053***	0.1294	1.3081***	0.1508
Unemployed$_{t=0}$: 90–360 days	1.1889***	0.1454	−1.4181***	0.1427	1.4841***	0.1686
Unemployed$_{t=0}$: >360 days	1.5210***	0.1571	−1.7559***	0.1462	1.5401***	0.1622
$\hat{\sigma}^2_{\kappa_1}$	0.4914***	0.0885				
$\hat{\sigma}^2_{\kappa_2}$	0.7970***	0.0644				
$\hat{\sigma}^2_{\kappa_3}$	0.9532***	0.0835				
$\hat{\rho}_1$	−0.4934***	0.0705				
$\hat{\rho}_2$	0.2598***	0.0594				
$\hat{\rho}_3$	−0.4650***	0.0398				
N	26,980					
Log likelihood	−15,296.789					

Source: BHPS 1996–2008, N = 26,980, *own calculations*. ***, ** and * denote the statistical significance at the 1%, 5% and 10% levels, respectively. The complete estimation table results, including the covariates (and their time means), can be obtained from the author on request.

[14] $H_0 : \hat{\eta}_{21} = \hat{\eta}_{22}; \chi^2(1) = 0.08\ [p - val : 0.7770]$.

unemployed at $t-1$. However, the occupational skill level of the low-paid job in the previous period seems not to have any major impact on the future labour market position as no significant difference in the size of the respective coefficients is found.[15] With respect to the influence of the labour market position in the initial period $t=0$, Table 2 indicates that low-paid employed in a low-skilled occupation $(\hat{\pi}_{13}=0.4452)$ have a higher risk of becoming unemployed at t than low-paid employed with a higher-skilled occupation $(\hat{\pi}_{12}=0.2813)$ – though the difference is not significantly different from zero at the 10% level.[16] Moreover, with respect to the chances of becoming higher-paid employed, the probability of those on low pay in a higher-skilled occupation in the initial period $(\hat{\pi}_{23}=-1.2557)$ declines significantly less strong than of those who were low-paid employed in a low-skilled occupation $(\hat{\pi}_{23}=-1.6511)$.[17]

Furthermore, there are indications of state dependence in working in a low-skilled occupation (right-hand part of Table 2): irrespective of employment type, working in a low-skilled occupation in the previous period increases the chances of working in such an occupation in the subsequent period. In addition, the unemployed have a greater risk than the higher-paid employed in a higher-skilled occupation of ending up working in a low-skilled occupation, and this risk increases with the duration of unemployment. Interestingly, no indications are found that increased employment duration changes the risk of entering a low-skilled occupation.

Finally, those who were working in a low-skilled occupation in the initial period face a substantially higher risk of working in such occupation $\left(\hat{\gamma}_{11}=1.2897, \hat{\gamma}_{13}=1.0969\right)$ in the future compared to the reference category of higher-paid employment in a higher-skilled occupation.

VI. Average partial effects

To derive the effect of an individual's previous labour market position on his occupational advancement probabilities, the APE of low-paid employment compared to unemployment is calculated.[18] To capture the effect of different types of occupation, the APE is differentiated according to the skill level of the occupation. Moreover, the APE is derived for different levels of unemployment and employment durations (both three categories). The APEs derived can be found in the left-hand panel, top part of Table 3 for men in a higher-skilled occupation, and in the left-hand panel, bottom part for men in a low-skilled occupation.

Irrespective of the type of occupation, the low-paid employed on average have a significantly lower risk of becoming unemployed in the future compared to someone who is already unemployed. Though the APE for a low-paid person employed in a higher-skilled occupation is, in absolute terms, somewhat greater than for a low-paid person employed in a low-skilled occupation, the difference in absolute terms for the same (un)employment duration category is below 1 percentage points (pp). Moreover, the APE increases with the duration of employment: for example, compared to the risk of someone who is short-term unemployed (<90 days) remaining unemployed, the risk of becoming unemployed for an individual who is currently on low pay in a higher-skilled employment for less than 90 days is 5.2 pp lower; and for someone who has been in such a job for more than 360 days, the risk is 7.8 pp lower. The duration of unemployment has an even stronger effect: whereas someone who is short-term unemployed (<90 days) has a 5.2 pp greater risk of being observed unemployed in the future than someone who is in short-term, low-paid employment in a higher-skilled occupation has of becoming unemployed, the figure increases to 21.2 pp in the case of long-term unemployment (>360 days). To sum up the findings, there are indications that, irrespective of occupation type, low-paid employment reduces the risk of future unemployment, especially compared to

[15] $H_0: \hat{\gamma}_{12}=\hat{\gamma}_{13}; \chi^2(1)=0.23$ $[p-val: 0.6286]$; $H_0: \hat{\gamma}_{22}=\hat{\gamma}_{23}; \chi^2(1)=0.61$ $[p-val: 0.4356]$.
[16] $H_0: \hat{\pi}_{12}=\hat{\pi}_{13}; \chi^2(1)=2.09$ $[p-val: 0.1479]$.
[17] $H_0: \hat{\pi}_{22}=\hat{\pi}_{23}; \chi^2(1)=19.63$ $[p-val: <; 0.001]$.
[18] The calculation of the APE can be found in the Appendix.

Table 3. APE of becoming unemployed (left panel), resp. of becoming higher-paid employed (right panel).

		APE of becoming unemployed$_t$			APE of becoming higher-paid employed$_t$		
		Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$			*Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$*		
Unemployed$_{t-1}$		<90 days	90–360 days	>360 days	<90 days	90–360 days	>360 days
	<90 days	−0.0518***	−0.0673***	−0.0779***	0.0246	0.0555***	0.0638***
		(0.0171)	(0.0182)	(0.0194)	(0.0260)	(0.0256)	(0.026)
	90–360 days	−0.0988***	−0.1142***	−0.1249***	0.0468	0.0778***	0.0861***
		(0.0235)	(0.0249)	(0.0262)	(0.0290)	(0.0288)	(0.0294)
	>360 days	−0.2122***	−0.2276***	−0.2383***	0.0820***	0.1129***	0.1212***
		(0.0389)	(0.0403)	(0.0416)	(0.0392)	(0.0394)	(0.0402)
		Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$			*Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$*		
Unemployed$_{t-1}$	<90 days	−0.0482***	−0.0647***	−0.0761***	0.0315	0.0628***	0.0717***
		(0.0170)	(0.0180)	(0.0192)	(0.0264)	(0.0261)	(0.0265)
	90–360 days	−0.0952***	−0.1116***	−0.1231***	0.0538*	0.0850***	0.0939***
		(0.0232)	(0.0245)	(0.0259)	(0.0292)	(0.0291)	(0.0297)
	>360 days	−0.2086***	−0.2250***	−0.2364***	0.0889***	0.1202***	0.1291***
		(0.0384)	(0.0399)	(0.0413)	(0.0391)	(0.0395)	(0.0404)

Source: BHPS (1998–2008), N = 26,980. SEs in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. *Interpretation example*: The risk of becoming unemployed is reduced by 5.2 pp (4.8 pp) if the short-term unemployed person picks up low-paid employment in a higher-skilled (low-skilled) occupation and is employed for less than 90 days.

medium-term (90–360 days) and long-term (>360 days) unemployment.

Homogeneous effects of low-paid employment are also found when we look at the prospects of becoming higher-paid employed in the next period (see the right-hand panel of Table 3). Again, duration of employment has a positive effect on the labour market prospects of the low-paid employed. Moreover, longer unemployment spells have a negative effect on the APE of the unemployed in becoming higher-paid employed. Irrespective of occupation type and the employment duration, someone in a low-wage job has significantly better prospects on average of becoming higher-paid employed than does someone who is long-term unemployed. For example, compared to being unemployed for more than 360 days, being on low pay in a higher-skilled (low-skilled) occupation for less than 90 days increases on average the probability by 8.2 pp (8.9 pp) to become higher-paid employed.

To analyse the persistence in the type of occupational skill level, the APE is calculated for someone who works for low pay in a low-skilled occupation and for low pay in a higher-skilled occupation compared to someone who is unemployed (see Table 4). For those low-paid employed in a higher-skilled occupation, the chances of ending up in a low-skilled occupation are on average slightly lower than for someone who is unemployed (3.1–4.7 pp). However, the APE is significantly different from zero at the 10% level for six out of nine combinations. This finding is independent of the duration of (un)employment. In contrast, a low-paid worker in a higher-skilled occupation has on average a significantly higher chance of staying at that occupational skill level than an unemployed person has of moving into a higher-skilled occupation. The effect is especially marked for the long-term unemployed, who are on average between 25.9 and 27.8 pp less likely to work in a higher-skilled occupation.

Furthermore, someone who is low-paid employed in a low-skill occupation has on average a significantly higher probability of remaining in his low-skill occupation than someone unemployed entering such a low-skill occupation. This finding is independent of the duration of (un)employment. With respect to the chances of working in a higher-skilled occupation, those on low pay in a low-skilled occupation have – in two cases significantly – a lower chance compared to someone short-term unemployed. Not much difference in the chance of working in a higher-skilled occupation can be found between someone who was low-paid employed in a low-skill occupation and someone medium-term unemployed. However, the long-term unemployed have a significantly lower chance of working in a higher-skilled occupation than the low-paid employed have of working in a low-skill occupation.

So far, the effect of the occupational skill level on the probability of becoming unemployed or higher-paid employed for those on low pay at $t-1$ is small. As the estimated coefficients of Table 2 indicates, it is expected that the effect of the occupational skill level becomes more prominent when differentiating according to the initial labour market condition. To

Table 4. APE of working in a low-skilled (left panel), resp. of a higher-skilled (right panel) occupation.

		APE of working in a low-skilled occupation$_t$			APE of working in a higher-skilled occupation$_t$		
		Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$			*Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$*		
Unemployed$_{t-1}$		<90 days	90–360 days	>360 days	<90 days	90–360 days	>360 days
	<90 days	−0.0404***	−0.0316*	−0.0330*	0.0923***	0.0988***	0.1109***
		(0.0184)	(0.0180)	(0.0180)	(0.0232)	(0.0234)	(0.0239)
	90–360 days	−0.0403***	−0.0314	−0.0328*	0.1391***	0.1456***	0.1577***
		(0.01950)	(0.0191)	(0.0192)	(0.0273)	(0.0277)	(0.0284)
	>360 days	−0.0468*	−0.0380	−0.0394	0.2590***	0.2656***	0.2776***
		(0.0244)	(0.0242)	(0.0243)	(0.0381)	(0.0387)	(0.0395)
		Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$			*Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$*		
Unemployed$_{t-1}$	<90 days	0.1003***	0.1169***	0.1154***	−0.0520***	−0.0522***	−0.0394
		(0.0225)	(0.0220)	(0.0215)	(0.0260)	(0.0262)	(0.0264)
	90–360 days	0.1004***	0.1171***	0.1156***	−0.0052	−0.0054	0.0075
		(0.0231)	(0.0226)	(0.0222)	(0.0295)	(0.0298)	(0.0303)
	>360 days	0.0939***	0.1105***	0.1090***	0.1147***	0.1145***	0.1274***
		(0.0267)	(0.0263)	(0.0262)	(0.0392)	(0.0399)	(0.0406)

Source: BHPS (1998–2008), N = 26,980. SEs in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. *Interpretation example*: The risk of working in a low-skilled occupation is reduced by 4.0 pp (increased by 10.0 pp) if the short-term unemployed picks up low-paid employment in a higher-skilled (low-skilled) occupation and is employed for less than 90 days.

derive the effect of the initial occupational skill level of low-pay employment, respective APEs of becoming unemployed (upper part of Table 5), higher-paid employed (middle part) and working in a low-skilled occupation (lower part) are calculated (see also the Appendix). To calculate the APE, the same labour market position in the previous period is considered, but the coefficients with respect to the initial period are differentiated between being on low pay in a higher-skilled occupation in the initial period and being on low pay in a low-skilled occupation at $t = 0$. With respect to the risk of becoming/staying unemployed, the effect is small and ranges between below 1 pp and 4.6 pp. Furthermore, none of the APEs are on average significantly different from zero at the 10% level. However, the effect becomes noticeable when turning to the probability of entering higher-paid employment. For example, someone who was low-paid employed in a low-skilled occupation in the previous period has on average an 11.2 pp higher probability of becoming higher-paid employed in the subsequent period when he was low-paid employed in a higher-skilled occupation in the initial period compared to being low-paid employed in low-skilled occupation at $t = 0$. The size of the APE gets even more pronounced when looking at the chances entering a low-skilled occupation, indicating that individuals who were on low pay and in a higher skilled occupation in the initial period are on average significantly less likely working in a low-skilled occupation in the future compared to when being on low-pay and in a low-skilled occupation at $t = 0$.

Table 5. APEs of initially low-paid employed.

(un)employment duration	<90 days	90–360 days	>360 days
	APE of becoming unemployed$_t$		
Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$	−0.0140	−0.0099	−0.0068
	(0.0105)	(0.0075)	(0.0052)
Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$	−0.0149	−0.0106	−0.0074
	(0.0104)	(0.0075)	(0.0052)
Unemployed$_{t-1}$	−0.0253	−0.0332	−0.0455
	(0.0181)	(0.0234)	(0.0317)
	APE of becoming higher-paid employed$_t$		
Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$	0.1115***	0.1122***	0.1122***
	(0.0246)	(0.0249)	(0.0250)
Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$	0.1118***	0.1122***	0.1121***
	(0.0249)	(0.0250)	(0.0250)
Unemployed$_{t-1}$	0.1101***	0.1080***	0.1009***
	(0.0248)	(0.0251)	(0.0271)
	APE of working in a low-skilled occupation$_t$		
Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$	−0.2231***	−0.2360***	−0.2360***
	(0.0258)	(0.0258)	(0.0256)
Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$	−0.3100***	−0.3205***	−0.3257***
	(0.0269)	(0.0270)	(0.0270)
Unemployed$_{t-1}$	−0.2506***	−0.2374***	−0.2058***
	(0.0283)	(0.0284)	(0.0298)

Source: BHPS (1998–2008), N = 26,980. SEs in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. *Interpretation example*: The risk of becoming unemployed is reduced by 1.4 pp if the low-paid employed (<90 days) in a higher-skilled occupation was low-paid employed in a higher-skilled occupation in the initial period compared to being low-paid employed in low-skilled occupation at $t = 0$.

VII. Job-related characteristics

From the economic literature, it is well known that job-related characteristics have an impact on labour market transitions (e.g. Booth, Francesconi, and Frank 2002). In the following, the initial estimation is extended by controlling for the following job characteristics a $t-1$: non-permanent

contract, working part-time and holding a second job. Furthermore, these indicator variables interacted with the lagged labour market status, thus whether holding a higher-paid job in a higher-skilled occupation, a higher-paid job in a low-skilled occupation, a low-paid job in a higher-skilled occupation or a low-paid job in a low-skilled occupation.[19]

The average partial effects for becoming unemployed or higher-paid employed are derived and illustrated in Table 6. With respect to the job characteristics, it is assumed that the low-paid worker is working full-time, has a permanent contract and does not hold a second job. Unsurprisingly, the APEs are somewhat on average greater than those of the initial estimation in Table 3. The increase is especially pronounced with respect to the chances of becoming higher-paid employed: for example, compared to being short-term unemployed, the APE becoming higher-paid employed increases from 3.2 pp (not significantly different at the 10% level) for someone picking up a low-paid employment in a low-skilled occupation and is employed for less than 90 days to 5.9 pp (significantly different at the 1% level) if the low-paid job has a permanent contract, the employee works full-time and does not hold a second job.

When deriving the effect of the initial labour market position (Table 7), the findings are very similar to those of the initial estimation (Table 5). While no significant effect on the probability becoming unemployed can be found when the initially low-paid employed was working in a higher-skilled occupation instead of in a low-skilled occupation, a significant increase (at the 1% level) of on average 10 pp becoming higher-paid employed is detected.

To estimate the impact of the job characteristics having a permanent contract or working full time and the effect of holding a second job, the average partial effects of low pay are accordingly differentiated (see Table 8). With respect to the risk of becoming unemployed, irrespective of the occupational skill level indications are found that on average being on a non-permanent contract significantly increases the risk of becoming unemployed. For example, someone lowpaid in a higher-skilled occupation for less than 90 days on a non-permanent contract is 7.3 pp more likely entering unemployment in the next period compared being on a permanent contract. Furthermore, this effect declines with the employment duration. Besides that, having a second job or working not fulltime only has on average a marginal effect (<1 pp) on the risk entering unemployment, the respective APEs are moreover not significantly different from zero at the 10% level. Turning to the APE becoming higher-paid employed, significant effects at the 1% level are found for part-time employed when working on

Table 6. APE of becoming unemployed (left panel), resp. of becoming higher-paid employed (right panel).

		APE of becoming unemployed$_t$			APE of becoming higher-paid employed$_t$		
		Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$			*Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$*		
		<90 days	90–360 days	>360 days	<90 days	90–360 days	>360 days
Unemployed$_{t-1}$	<90 days	−0.0697***	−0.0807***	−0.0886***	0.0419	0.0685***	0.0727***
		(0.0195)	(0.0204)	(0.0214)	(0.0274)	(0.0268)	(0.0271)
	90–360 days	−0.1219***	−0.1328***	−0.1408***	0.0676***	0.0943***	0.0985***
		(0.0266)	(0.0277)	(0.0287)	(0.0309)	(0.0305)	(0.0309)
	>360 days	−0.2471***	−0.2580***	−0.2660***	0.1151***	0.1417***	0.1459***
		(0.0427)	(0.0437)	(0.0448)	(0.042)	(0.0419)	(0.0425)
		Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$			*Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$*		
Unemployed$_{t-1}$	<90 days	−0.0700***	−0.0808***	−0.0888***	0.0588***	0.0849***	0.0892***
		(0.0197)	(0.0205)	(0.0215)	(0.0281)	(0.0277)	(0.0279)
	90–360 days	−0.1221***	−0.1329***	−0.1409***	0.0845***	0.1106***	0.1149***
		(0.0267)	(0.0277)	(0.0288)	(0.0314)	(0.0311)	(0.0315)
	>360 days	−0.2473***	−0.2582***	−0.2661***	0.1320***	0.1580***	0.1624***
		(0.0427)	(0.0437)	(0.0448)	(0.0424)	(0.0424)	(0.0430)

Source: BHPS (1998–2008), N = 26,980. SEs in parentheses. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. *Interpretation example*: The risk of becoming unemployed is reduced by 7.0 pp (7.0 pp) if the short-term unemployed person picks up low-paid employment in a higher-skilled (low-skilled) occupation with a permanent contract, is working full time, does not hold a second job and is employed for less than 90 days.

[19]The estimation output can be obtained from the author upon request.

Table 7. APEs of initially low-paid employed.

(un)employment duration	<90 days	90–360 days	>360 days
	APE of becoming unemployed$_t$		
Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$	−0.0101	−0.0075	−0.0055
	(0.0087)	(0.0065)	(0.0048)
Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$	−0.0100	−0.0074	−0.0054
	(0.0082)	(0.0061)	(0.0044)
Unemployed$_{t-1}$	−0.0231	−0.0301	−0.0405
	(0.0190)	(0.0246)	(0.0327)
	APE of becoming higher-paid employed$_t$		
Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$	0.1068***	0.1073***	0.1074***
	(0.0246)	(0.0248)	(0.0249)
Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$	0.1071***	0.1072***	0.1072***
	(0.0248)	(0.0248)	(0.0249)
Unemployed$_{t-1}$	0.1039***	0.1011***	0.0924***
	(0.0246)	(0.0248)	(0.0267)

Source: BHPS (1998–2008), N = 16,250. SEs in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. *Interpretation example*: The risk of becoming unemployed is reduced by 1.0 pp if the low-paid employed (<90 days) in a higher-skilled occupation was low-paid employed in a higher-skilled occupation in the initial period compared to being low-paid employed in low-skilled occupation at $t = 0$.

Table 8. APEs of job-related characteristics.

Employment duration	<90 days	90–360 days	>360 days
	APE of becoming unemployed$_t$		
Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$			
Non-permanent contract$_{t-1}$	0.0727***	0.0573***	0.0445***
	(0.0281)	(0.0232)	(0.0188)
Second job$_{t-1}$	−0.0026	−0.0019	−0.0014
	(0.0122)	(0.0091)	(0.0068)
Part-time employed$_{t-1}$	0.0097	0.0073	0.0055
	(0.0195)	(0.0149)	(0.0113)
Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$			
Non-permanent contract$_{t-1}$	0.0676***	0.0531***	0.0412***
	(0.0270)	(0.0223)	(0.0179)
Second job$_{t-1}$	−0.0073	−0.0055	−0.0040
	(0.0139)	(0.0104)	(0.0076)
Part-time employed$_{t-1}$	0.0266	0.0204	0.0155
	(0.0195)	(0.0152)	(0.0118)
	APE of becoming higher-paid employed$_t$		
Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$			
Non-permanent contract$_{t-1}$	−0.0128	−0.0042	0.0055
	(0.0336)	(0.0312)	(0.0300)
Second job$_{t-1}$	0.0272	0.0260	0.0260
	(0.0222)	(0.0209)	(0.0206)
Part-time employed$_{t-1}$	−0.0626	−0.0600	−0.0595
	(0.0382)	(0.0369)	(0.0368)
Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$			
Non-permanent contract$_{t-1}$	−0.0628*	−0.0537	−0.0458
	(0.0360)	(0.0342)	(0.0335)
Second job$_{t-1}$	0.0328	0.0307	0.0301
	(0.0289)	(0.0272)	(0.0270)
Part-time employed$_{t-1}$	−0.1524**	−0.1468***	−0.1455***
	(0.0463)	(0.0455)	(0.0457)

Source: BHPS (1998–2008), N = 16,250. SEs in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. *Interpretation example*: The risk of becoming unemployed is increased by 7.3 pp if the low-paid employed (<90 days) in a higher-skilled occupation had a non-permanent contract compared to a permanent contract.

low pay in a low-skilled occupation: for example, someone employed less than 90 days is on average 15.2 pp less likely becoming higher-paid employed compared to someone working full time. However, these effects should be treated with caution, as the number of observations is rather small: for example, the total number of individuals – this includes individuals on higher pay – working part time (having a non-permanent contract) are $N = 528$ $(N = 545)$.

VIII. Post-secondary education

The unemployment rate among men with post-secondary education is below the UK national average, and only a small share is affected by low wages. Moreover, there is empirical evidence for unemployed people that depending on the educational background, the length of a spell of unemployment affects the probability of the re-employment differently (Eriksson and Rooth 2014). One explanation is provided by Pissarides (1990), who argues that high-skilled jobs are more thinly distributed, and high-skilled workers are willed to wait longer for an adequate job offer – something that is again anticipated by the employer. One strategy to handle this heterogeneity is to include in the regression an interaction term between the educational background indicator variable and the lagged labour market variable (see, for example, Knabe and Plum 2013). In this study, we follow a different approach, by restricting the sample to men without post-secondary education.

The respective APEs are presented in Table 9. With respect to the risk of becoming unemployed, independent of the occupational skill level, on average taking low-paid employment significantly reduces the future risk of unemployment compared to someone who is already unemployed. Compared with the initial estimation of Table 3, the APEs are somewhat smaller. For example, while in the initial sample on average the risk of future unemployment is reduced by 5.2 pp when instead of short-term unemployment being low-paid employed in a higher-skilled occupation (>90 days), this number declines to 3.9 pp when restricting the sample to men without post-secondary education.

Looking at the chances of becoming higher-paid employed, the differences compared to the initial sample become more pronounced. The APE decline, though again on a small scale. For

Table 9. APEs of becoming unemployed and of becoming higher-paid employed (excluding men with post-secondary education).

		APE of becoming unemployed$_t$			APE of becoming higher-paid employed$_t$		
		Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$			*Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$*		
		<90 days	90–360 days	>360 days	<90 days	90–360 days	>360 days
Unemployed$_{t-1}$	<90 days	−0.0389*	−0.0669***	−0.0788***	0.0227	0.0544	0.0630*
		(0.0204)	(0.0220)	(0.0234)	(0.0347)	(0.0342)	(0.0343)
	90–360 days	−0.0831***	−0.1111***	−0.1230***	0.0255	0.0572	0.0658*
		(0.0266)	(0.0289)	(0.0304)	(0.037)	(0.0369)	(0.0373)
	>360 days	−0.2114***	−0.2394***	−0.2514***	0.0716	0.1033***	0.1119***
		(0.0452)	(0.0478)	(0.0493)	(0.0458)	(0.0466)	(0.0473)
		Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$			*Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$*		
Unemployed$_{t-1}$	<90 days	−0.0336*	−0.0634***	−0.0763***	0.0158	0.0485	0.0576*
		(0.0201)	(0.0216)	(0.0230)	(0.0353)	(0.0349)	(0.0350)
	90–360 days	−0.0778***	−0.1076***	−0.1205***	0.0186	0.0513	0.0603
		(0.0262)	(0.0285)	(0.0301)	(0.0373)	(0.0373)	(0.0377)
	>360 days	−0.2062***	−0.2360***	−0.2488***	0.0647	0.0974***	0.1064***
		(0.0444)	(0.0472)	(0.0488)	(0.0458)	(0.0467)	(0.0475)

Source: BHPS (1998–2008), N = 16,250. SEs in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. *Interpretation example*: The risk of becoming unemployed is reduced by 3.9 pp (3.3 pp) if the short-term unemployed person picks up low-paid employment in a higher-skilled (low-skilled) occupation and is employed for less than 90 days.

example, on average in the full sample, an individual improves his chances of becoming higher-paid employed by about 5.4 pp if instead of being medium-term unemployed he is on low pay in a low-skilled occupation for less than 90 days. This number drops to 1.9 pp when excluding post-secondary educated. Moreover, with a few exceptions, most APEs are not significantly different from zero at the 10% level. In line with our previous findings, choosing a low-paid employment on average improves significantly the prospects of climbing the salary ladder if the individual was long-term unemployed (except for being employed <90 days). Again, the APEs only differ slightly between the occupational skill levels.

In Table 10, APEs are derived with respect to being on low pay in the initial period and differentiated according to the occupational skill level. In line with the findings of the initial sample, with respect to the risk of becoming unemployed, no significant difference is detected whether an individual was on low pay in higher-skilled or in a low-skilled occupation in the initial period. However, on a somewhat smaller level, again those on low pay in a higher-skilled occupation in the initial period are on average significantly more likely entering higher pay than when being on low pay in a low-skilled occupation at $t = 0$.

IX. Conclusion

The main objective of this study is to analyse whether low wages improve the labour market prospects of the unemployed in Great Britain. Descriptive statistics signalled that jobs in low-skilled occupations are more often affected by low wages than are those in higher-skilled occupations. Thus, following Knabe and Plum (2013), the employment effect of low wages is differentiated according to the occupational skill level of the job. Moreover, it is assumed that the (un)employment duration has an impact on the labour market prospects, and we control for respective spell lengths.

For the analysis, BHPS panel data for the years 1996–2008 are used. In the econometric specification, the transition between the three mutually exclusive labour market positions – unemployed, low-paid and higher-paid employed – and the risk of working in a low-skilled occupation are modelled. Moreover, following Heckman (1981*a*), differences in unobservables are also controlled for, by including individual-specific time-invariant error terms. Furthermore, correlation of the random-effects error terms is controlled for between the different stages. To derive the effect of the correlated random parameters, a simulation based on quasi-random numbers (Halton draws) is applied.

The results indicate that, irrespective of the (un) employment duration and the occupational skill level, on average a low-paid employed person has a significantly lower risk of becoming unemployed in the subsequent period compared to the risk of someone who is already unemployed remaining unemployed. However, in terms of the chances of ascending the pay ladder, the effect of low pay is mixed. In the short run, the effect of the occupational skill level at the previous period on the future

Table 10. APEs of initially low-paid employed (excluding men with post-secondary education).

(un)employment duration	<90 days	90–360 days	>360 days
	APE of becoming unemployed$_t$		
Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$	−0.0207	−0.0159	−0.0119
	(0.0152)	(0.0118)	(0.0090)
Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$	−0.0217	−0.0167	−0.0127
	(0.0152)	(0.0118)	(0.0090)
Unemployed$_{t-1}$	−0.0323	−0.0392	−0.0479
	(0.0229)	(0.0275)	(0.0332)
	APE of becoming higher-paid employed$_t$		
Low-paid$_{t-1}$ in a higher-skilled occupation$_{t-1}$	0.0854***	0.0897***	0.0905***
	(0.0189)	(0.0199)	(0.0200)
Low-paid$_{t-1}$ in a low-skilled occupation$_{t-1}$	0.0867***	0.0909***	0.0917***
	(0.0198)	(0.0206)	(0.0208)
Unemployed$_{t-1}$	0.0833***	0.0813***	0.0795***
	(0.0193)	(0.0193)	(0.0210)

Source: BHPS (1998–2008), N = 16,250. SEs in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. *Interpretation example*: The risk of becoming unemployed is reduced by 2.1 pp if the low-paid employed (<90 days) in a higher-skilled occupation was low-paid employed in a higher-skilled occupation in the initial period compared to being low-paid employed in low-skilled occupation at $t = 0$.

labour market position seems negligible: the APE of the low-paid employed in a higher-skilled occupation and the low-paid employed in a low-skilled occupation are of comparable size. However, when differentiating the labour market prospects according to the initial labour market position, the evidence is presented that individuals who were working in the low-pay sector in a higher-skilled job in the initial period are on average significantly more likely becoming higher-paid employed than when working in the low-wage sector in a low-skilled occupation at $t = 0$.

In a robustness estimation, we drop those individuals with post-secondary education. In line with our previous findings, we find indications that low pay lowers on average significantly the risk of future unemployment. However, the positive effect of low pay on becoming higher-paid employed is predominantly restricted to long-term unemployed. As uncovered for the initial sample, those who were on low pay in a higher-skilled occupation in the initial period are on average significantly more likely entering higher pay than when being on low pay in a low-skilled occupation at $t = 0$.

To sum up, low wages can be considered helpful in reducing the risk of future unemployment. Further, in line with the conclusion of Knabe and Plum (2013), low-paid jobs can act as a 'springboard' to better-paid employment, especially for men with longer spells of unemployment. Moreover, indications are presented that occupational skill level has a long-lasting effect, the short terms are found to be of negligible size. These findings underline the necessity to control for the initial occupational skill level of the employment spell when modelling low-pay dynamics.

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References

Acemoglu, D. 2001. "Good Jobs versus Bad Jobs." *Journal of Labour Economics* 19: 1–21.

Arulampalam, W., A. Booth, and M. Bryan. 2007. "Is There a Glass Ceiling over Europe? Exploring the Gender Pay Gap across the Wage Distribution." *Industrial and Labour Relations Review* 60: 163–186.

Arulampalam, W., A. Booth, and M. Taylor. 2000. "Unemployment Persistence." *Oxford Economic Papers* 52: 24–50.

Ayllón, S. 2013. "Unemployment Persistence: Not Only Stigma but Discouragement Too." *Applied Economics Letters* 20: 67–71.

Becker, G. 1962. "Investment in Human Capital: A Theoretical Analysis." *Journal of Political Economy* 70: 9-49.

Biewen, M., and S. Steffes. 2010. "Unemployment Persistence: Is There Evidence for Stigma Effects?" *Economics Letters* 106: 188–190.

Blackaby, D., A. Booth, and J. Frank. 2005. "Outside Offers and the Gender Pay Gap: Empirical Evidence from the UK Academic Labour Market." *The Economic Journal* 115: F81–F107.

Blanchard, O., and P. Diamond. 1994. "Ranking, Unemployment Duration, and Wages." *The Review of Economic Studies* 61: 417–434.

Booth, A. L., M. Francesconi, and J. Frank. 2002. "Temporary Jobs: Stepping Stones or Dead Ends?" *The Economic Journal* 112 (480): F189–F213.

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

Clark, K., and N. Kanellopoulos. 2013. "Low Pay Persistence in Europe." *Labour Economics* 23: 122–134.

Cohn, E., and S. Khan. 1995. "The Wage Effects of Overschooling Revisited." *Labour Economics* 2: 67–76.

Eriksson, S., and D. Rooth. 2014. "Do Employers Use Unemployment as a Sorting Criterion When Hiring? Evidence from a Field Experiment." *The American Economic Review* 104: 1014–1039.

European Commission. 2003. *Joint Report on Social Inclusion*. Luxembourg: European Commission.

Flinn, C., and J. Heckman. 1983. "Are Unemployment and Out of the Labour Force Behaviorally Distinct Labour Force States?" *Journal of Labour Economics* 1: 28–42.

Friedberg, L. 2003. "The Impact of Technological Change on Older Workers: Evidence from Data on Computer Use." *Industrial and Labour Relations Review* 56: 511–529.

Handel, M. 2003. "Skills Mismatch in the Labour Market." *Annual Review of Sociology* 29: 135–165.

Heckman, J. 1976. "A Life-Cycle Model of Earnings, Learning, and Consumption." *Journal of Political Economy* 84 (4): S9–S44.

Heckman, J. 1981a. "Heterogeneity and State Dependence." In *Studies in Labour Markets*, edited by S. Rosen. Chicago: University of Chicago Press (for NBER), 91-140.

Heckman, J. 1981b. "The Incidental Parameters Problem and the Problem of Initial Conditions in Estimating a Discrete Time - Discrete Data Stochastic Process." In *Structural Analysis of Discrete Data with Econometric Applications*, edited by C. Manski and D. McFadden. Cambridge: MIT Press, 1-114.

Heckman, J. 2001. "Micro Data, Heterogeneity, and the Evaluation of Public Policy: Nobel Lecture." *Journal of Political Economy* 109: 673–748.

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

Knabe, A., and A. Plum. 2013. "Low-Wage Jobs – Springboard to High-Paid Ones?" *Labour: Review of Labour Economics and Industrial Relations* 27: 310–330.

Kroft, K., F. Lange, and M. Notowidigdo. 2013. "Duration Dependence and Labour Market Conditions: Evidence from a Field Experiment." *The Quarterly Journal of Economics* 128: 1123–1167.

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

Lazear, E. 1981. "Agency, Earnings Profiles, Productivity, and Hours Restrictions." *American Economic Review* 71: 606–620.

Ljungqvist, L., and T. Sargent. 1998. "The European Unemployment Dilemma." *Journal of Political Economy* 106: 514–550.

Lockwood, B. 1991. "Information Externalities in the Labour Market and the Duration of Unemployment." *The Review of Economic Studies* 58: 733–753.

Machin, S., and P. Puhani. 2003. "Subject of Degree and the Gender Wage Differential: Evidence from the UK and Germany." *Economics Letters* 79: 393–400.

McCormick, B. 1990. "A Theory of Signalling during Job Search, Employment Efficiency, and "Stigmatised" Jobs." *Review of Economic Studies* 57: 299–313.

Mühleisen, M., and K. Zimmermann. 1994. "A Panel Analysis of Job Changes and Unemployment." *European Economic Review* 38: 793–801.

Oberholzer-Gee, F. 2008. "Nonemployment Stigma as Rational Herding: A Field Experiment." *Journal of Economic Behavior & Organization* 65: 30–40.

OECD. 1997. *OECD Employment Outlook 1997 - Low-Wage Jobs: Stepping Stones to a Better Future or Traps?* Paris, France: OECD Publishing.

OECD: 2016,OECD Statistic, available under http://stats.oecd.org/

Omori, Y. 1997. "Stigma Effects of Nonemployment." *Economic Inquiry* 35: 394–416.

Pissarides, C. 1990. *Equilibrium Unemployment Theory*. Cambridge: MIT Press.

Plum, A. 2016. *Bireprob: An Estimator for Bivariate Random-Effects*. Probit Models, forthcoming in The Stata Journal, 16(1): 96-111.

Plum, A., and S. Ayllón. 2015. "Heterogeneity in Unemployment State Dependence." *Economics Letters* 136: 85-87.

Skrondal, A., and S. Rabe-Hesketh. 2014. "Handling Initial Conditions and Endogenous Covariates in Dynamic/Transition Models for Binary Data with Unobserved Heterogeneity." *Journal of the Royal Statistical Society: Series C (Applied Statistics)* 63 (2): 211–237.

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

Stewart, M., and J. Swaffield. 1999. "Low Pay Dynamics and Transition Probabilities." *Economica* 66: 23–42.

Taylor, M. 2006. "Introduction, Technical Report and Appendices." In *British Household Panel Survey User Manual*, edited by M. Taylor. Colchester: Institute for Social and Economic Research.

Train, K. E. 2009. *Discrete Choice Models with Simulation*. Cambridge: Cambridge University Press.

Uhlendorff, A. 2006. *From No Pay to Low Pay and Back Again? A Multi-State Model of Low Pay Dynamics*. IZA discussion papers, Institute for the Study of Labour (IZA), Bonn.

Vishwanath, T. 1989. "Job Search, Stigma Effect, and Escape Rate from Unemployment." *Journal of Labour Economics* 7 (4): 487-502.

Wooldridge, J. 2005. "Simple Solutions to the Initial Condition Problem in Dynamic, Nonlinear Panel Date Models with Unobserved Heterogeneity." *Journal of Applied Econometrics* 20: 39–54.

Appendix

Figure A1. Wage distribution (total sample).

Source: BHPS (1998–2008), N = 26,980. The figure shows for the total sample the distribution of the ratio between gross hourly wage and low-wage threshold. The dashed vertical line indicates the low-pay threshold.

Figure A2. Distribution of the number of labour market transitions.

Source: BHPS (1998–2008), N = 26,980. The figure shows the distribution of the number of labour market transitions.

Table A1. Control variables.

Variables	Description
Age ≤30	Dummy: 1 if observation is 30 years or younger, 0 otherwise
Age 31–40	Dummy: 1 if observation is between 31 and 40 years, 0 otherwise
Age 41–50	Dummy: 1 if observation is between 41 and 50 years, 0 otherwise
Age >50	Dummy: 1 if observation is older than 50 years, 0 otherwise
Married	Dummy: 1 if observation is married, 0 otherwise
Health	Dummy: 1 if self-reported health status is excellent or good, 0 else
Ue rate	Regional-level unemployment rate; annual averages; in per cent
Post-sec. educ.	Dummy: 1 if individual has post-secondary education (ISCED 5 or 6), 0 otherwise

Source: BHPS (1998–2008). *ISCED*: International Standard Classification of Education.

Table A2. Descriptive statistics.

Variables	Full sample$_t$	High-paid$_t$	Low-paid$_t$	Unemployed$_t$
Age ≤30	0.214	0.182	0.357	0.358
	(0.410)	(0.386)	(0.479)	(0.480)
Age 31–40	0.298	0.312	0.235	0.242
	(0.457)	(0.463)	(0.424)	(0.428)
Age 41–50	0.279	0.299	0.187	0.198
	(0.448)	(0.458)	(0.390)	(0.399)
Age >50	0.209	0.207	0.221	0.202
	(0.407)	(0.405)	(0.415)	(0.402)
Married	0.765	0.804	0.611	0.524
	(0.424)	(0.397)	(0.488)	(0.500)
Health	0.780	0.796	0.733	0.638
	(0.414)	(0.403)	(0.442)	(0.481)
Ue rate	5.457	5.434	5.507	5.708
	(1.257)	(1.267)	(1.184)	(1.258)
Post-sec. educ.	0.398	0.445	0.183	0.206
	(0.489)	(0.497)	(0.386)	(0.405)
Observations	*26,980*	*22,038*	*3,750*	*1,192*

Source: BHPS (1998–2008). Share of observations in the respective groups. SD in parenthesis.

APE

$\mathrm{APE} = N^{-1}\sum \mathrm{PE}_{it}$ with the following partial effects:

$$(\hat{a}_j = x'_{1it}\hat{\beta}_1 + \hat{\pi}_{11}y^{hp}_{it-1}y^{low\text{-}skill}_{i0} + \hat{\pi}_{12}y^{lp}_{i0}y^{higher\text{-}skill}_{i0} + \hat{\pi}_{13}y^{lp}_{i0}y^{low\text{-}skill}_{it-1} + \hat{\pi}_{14}y^{ue\text{-}short}_{i0} + \hat{\pi}_{15}y^{ue\text{-}med}_{i0} + \hat{\pi}_{16}y^{ue\text{-}long}_{i0} + \overline{x}_{1i}\hat{\delta}_1 \text{ and j } \widehat{\mathrm{I}}\{1,2,3\})$$

Partial effect (PE) of becoming unemployed$_t$ between someone who was low-paid-employed$_{t-1}$ in a higher-skilled occupation for less than 90 days and someone short-term unemployed$_{t-1}$ (Table 3)	$\mathrm{PE}_{it} = \Phi\left((\hat{\gamma}_{12} + \hat{a}_1)\sqrt{1/\hat{\sigma}^2_{\kappa_1} + 1}\right) - \Phi\left((\hat{\gamma}_{14} + \hat{a}_1)\sqrt{1/\hat{\sigma}^2_{\kappa_1} + 1}\right)$
Partial effect (PE) of becoming higher-paid employed$_t$ between someone who was low-paid-employed$_{t-1}$ in a higher-skilled occupation for less than 90 days and someone short-term unemployed$_{t-1}$ (Table 3)	$\mathrm{PE}_{it} = \Phi\left(-(\hat{\gamma}_{12} + \hat{a}_1)\sqrt{1/\hat{\sigma}^2_{\kappa_1} + 1}\right)\Phi\left((\hat{\gamma}_{22} + \hat{a}_2)\sqrt{1/\hat{\sigma}^2_{\kappa_2} + 1}\right) - \Phi\left(-(\hat{\gamma}_{14} + \hat{a}_1)\sqrt{1/\hat{\sigma}^2_{\kappa_1} + 1}\right)\Phi\left((\hat{\gamma}_{24} + \hat{a}_2)\sqrt{1/\hat{\sigma}^2_{\kappa_2} + 1}\right)$
Partial effect (PE) of working in a low-skilled occupation$_t$ between someone who was low-paid-employed$_{t-1}$ in a higher-skilled occupation for less than 90 days and someone short-term unemployed$_{t-1}$ (Table 4)	$\mathrm{PE}_{it} = \Phi\left(-(\hat{\gamma}_{12} + \hat{a}_1)\sqrt{1/\hat{\sigma}^2_{\kappa_1} + 1}\right)\Phi\left((\hat{\gamma}_{32} + \hat{a}_3)\sqrt{1/\hat{\sigma}^2_{\kappa_3} + 1}\right) - \Phi\left(-(\hat{\gamma}_{14} + \hat{a}_1)\sqrt{1/\hat{\sigma}^2_{\kappa_1} + 1}\right)\Phi\left((\hat{\gamma}_{34} + \hat{a}_3)\sqrt{1/\hat{\sigma}^2_{\kappa_3} + 1}\right)$
Partial effect (PE) of becoming unemployed$_t$ who was low-paid-employed$_{t-1}$ in a higher-skilled occupation for less than 90 days between someone low-paid-employed$_{t=0}$ in a higher-skilled occupation and someone low-paid-employed$_{t=0}$ in a low-skilled occupation (Table 5)	$\mathrm{PE}_{it} = \Phi\left(\left(\hat{\gamma}_{12} + x'_{1it}\hat{\beta}_1 + \hat{\pi}_{12} + \bar{x}'_{1i}\hat{\delta}_1\right)\sqrt{1/\hat{\sigma}^2_{\kappa_1} + 1}\right) - \Phi\left(\left(\hat{\gamma}_{12} + x'_{1it}\hat{\beta}_1 + \hat{\pi}_{13} + \bar{x}'_{1i}\hat{\delta}_1\right)\sqrt{1/\hat{\sigma}^2_{\kappa_1} + 1}\right)\mathrm{r}$