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Abstract: Wage mobility among low wage earners has previously been focussing on the characteristics of the low wage earners, whereas the role of the firm has been neglected. The purpose of this study is to focus on the characteristics of the firms when analysing variation in wage mobility. The empirical findings confirm that the characteristics of the employing firm indeed matter for low-wage employees’ likelihood of escaping a low-wage job. Especially does the employing firm affect the destination state – i.e. where a low-wage worker goes after having finished a low-wage job, and the findings enable me to identify three types of firms: career firms with high within-firm upward wage mobility, stepping-stone firms with high between-firm upward wage mobility and dead-end firms with low upward wage mobility.

JEL Codes: J31, J41, J63, M51, M52

Key words: Low wage earners, wage mobility, firm behaviour, employer-employee relations.

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1. Introduction

The issue of working poor, i.e. workers with an income below a threshold ensuring a certain standard of living, has been a concern in the US for a number of decades (see e.g. Wachtel and Betsey (1972) or Gittleman and Joyce (1999)). The widening of the wage distribution in most OECD countries has increased the number of working poor or low-wage workers in the European countries (see Gottshalk and Smeeding (1997) for a survey on selected OECD countries and Andersen (2003) for a study on changes in Danish wages during the 1990s). Therefore, the issue on low-wage workers has received increased interest during the last decade in European labour research as well. The number of low-wage earners is not, however, in itself necessarily a cause for concern. If low-paid jobs are jobs everybody possesses as transitory occupations and as part of the general labour market, then the effect of a low-wage job on lifetime earnings will be small and the disutility minimal. However, if low-paid jobs are dead-end jobs for a group of low-wage workers, these workers will be marginalized in income and hence their jobs will be considered as bad jobs. Thus, wage mobility for low-wage earners is a key question in welfare research, and many studies in Europe as well as in the US have addressed this issue (see e.g. Smith and Vavrichek (1992), Gregory and Elias (1994), Bazen (2001), Stewart and Swaffield (1998), Cappellari (2002) and Asplund et al. (1998)). The main findings of this literature indicate that for a vast majority low pay is a transitory state; within 5-10 years most low-paid workers have moved up the earnings ladder. It is furthermore found that mobility out of low wage is higher for young workers and highly educated individuals, whereas the gender effect differs between the different countries of study.

So far, the issue on low wage and low-wage mobility has only been focusing on the supply side of the labour market and typically concentrated on the continuously employed, i.e. the effects of individual characteristics on the probability of moving from low-wage to high-wage have caught the interest of researchers. However, wage mobility is not just a concern of the workers. Firms may more or less deliberately choose a certain policy on wages and wage mobility. It is most likely that firms with different characteristics will apply different policies concerning this issue, either due to different production methods, different firm size, different business strategies etc. (see Hachen (1992) and Haveman and Coven (1994)). Thus, not only who a low-wage worker is, but also where he is employed can affect his chance of escaping low wage.

To my knowledge, a recent paper by Andersson et al. (2002) is the only paper dealing with both the supply and demand side of low-wage mobility. Their study is carried out on US data, and they find, among other things, that job and industry changes increase the escape rates out of low wage; that wage increases for low-wage men occur within the traditional industries, while they occur within the service industries for women; and that larger firms are better places to escape low wage by staying - not by changing firm.

The aim of this paper is to investigate the simultaneous impact of firm and individual characteristics on low-wage individuals' transitions out of low wage; i.e., what are the characteristics of firms with a low upward mobility in wages compared to firms with high mobility, when keeping the individual effects constant? Can low-wage jobs at some firms be seen as a good qualification for high-wage jobs at other firms, while low-wage jobs at other firms are more likely to lead to unemployment?

This paper contributes to the present literature on low-wage workers and wage mobility in a number of aspects. First of all, as mentioned above, firm-specific characteristics are taken into account in analysing the probability of escaping low wage. The inclusion of both individual and firm characteristics helps avoiding the selection bias problem due to different people being employed in different firms. It also allows me to examine, if and how the employing firms affect the transitions out of low-wage jobs, for two similar workers.

The firm-specific information available consists not only of size and industry code of the firm, but also geographic location and various aspects of the labour force composition of the firm. Hence, the analysis contributes in terms of the rich detail of the data. Furthermore, unlike the year-to-year transitions applied by many of the previous studies, I apply a duration model. The advantages of the duration model are, among others, that it makes it possible to account for right-censored spells to estimate the duration dependence and to correct for unobserved heterogeneity. Finally, the data allow me to define the unit of the analysis as a *low-wage job*, i.e. a low-wage spell within the same firm. This feature enables me to investigate where low-wage employees go after ending a low-wage job, distinguishing between high-wage stayers, high-wage movers and low-wage movers.

In Section 2, I present the data used in the empirical part, in Section 3 I present descriptive and econometric estimation results regarding low-wage firms, in Section 4 low-wage job spells are defined and descriptive statistics are presented, in Section 5 I briefly describe the duration model

applied in the analysis and the results are presented, and finally Section 6 closes the paper with a summary and conclusion.

2. Data

Data consist of an employer-employee data set from Statistics Denmark. I use a 5% sample of all persons in Denmark who have been employed in the private sector at any time between 1980 and 1999. These individuals are followed in any labour market state they have experienced during the observation period, 1980-2000. The individuals are restricted to the age 25 to 65 in order to exclude pre-students, apprentices and pensioners with a wage job. On the employer side, only firms in the private sector with more than three employees in each of the years they are present in the data are included.

Following e.g. Gregory and Elias (1994), I define low wage as the lowest quintiles of the hourly wage distribution measured each year. Thus, low wage is defined as a relative measure. Hourly wage is calculated as total labour income divided by number of working hours in the year. I have chosen to apply the hourly wage, since I find this earnings variable to be closest to the decision of the firm and therefore the best measure for my purpose.

Besides a range of individual characteristics such as age, family status, gender, income, experience etc., the labour market state of the individual and the identification of a potential employer are known for each year at the end of November. These data are merged with information about the employers: firm/plant size, industry code, firm/plant location, labour composition etc. Finally, information on the job levels is available. This gives me a unique data set both in terms of the length of the observation period, the size of the sample and the detailed variable information. Merging the employer and employee sides allows me to characterise the workforce at each firm.

I have information on wage income on a yearly basis as measured by the end of November. Thus, it is only possible to define a person's labour market state for an entire year, and consequently some information is lost. If a person, for instance, experiences a couple of months of unemployment during summer, this will not be taken into account. However, to make sure that individuals are not defined as employed during the entire year merely because they are employed in November, individuals with a yearly employment rate less than 50% are defined as

being out of employment no matter what their state in November is. Likewise, individuals with a zero hourly wage rate are defined as being out of employment.

3. Low-wage firms

In this section, I look at the characteristics of low-wage firms, i.e. firms with a high fraction of low-wage employees. Since low wage is defined as a relative measure consisting of the two lowest deciles of the hourly wage distribution, an equal distribution of low-wage earners across all firms would imply a share of 20% low-wage earners within each firm. In Table 3.1, the distribution of the average share of low-wage employees across firms is shown. It is seen that the low-wage employees are quite unevenly distributed among the firms. Nearly 10% of the firms have had no low-wage employees during the entire observation period, whereas in about 3% of the firms 90-100% of the employees were low-wage workers. The distribution of the share of low-wage employees differs by characteristics of the firm. E.g., the distribution narrows with increasing firm size. This is, of course, mainly due to the fact that more observations are used when calculating the distribution for large firms. However, we also see that the median share of low-wage employees is decreasing with firm size, i.e., for small firms it is 0.2-0.3, for medium-sized firms it is 0.1-0.2 and for large firms it is less than 0.1. For the share of female employees, I find that firms with few females are more likely to have no low-wage employees, and among these firms no firm has more than 70% low-wage employees on average. On the other hand, among firms with a high share of females, more than 10% have 70% or more low-wage employees on average. Likewise, firms with a low average education level among their employees have a high low-wage employees share. Thus, 25% of these firms have more low-wage than high-wage employees. This is only true for 12% of the high-education firms.

Table 3.1. Distribution of firms, by average share of low-wage employees.

Average share of low-wage employees for the period 1980-2000 ¹⁾									
%	All	Firm size			Rate of female			Average education	
		4-20	21-100	>100	<30 %	30-70%	>70%	<12 years	>12 years
0	9.1	10.2	1.6	0.3	12.0	5.7	6.6	2.1	3.5
(0-0.1]	13.8	10.8	32.1	60.2	16.4	12.6	7.2	17.7	23.6
(0.1-0.2]	16.7	15.2	28.1	23.4	17.9	16.0	13.9	18.7	25.9
(0.2-0.3]	17.4	17.7	16.3	7.0	18.3	15.1	19.6	14.9	20.2
(0.3-0.4]	10.6	11.0	8.9	3.9	9.9	11.2	12.0	12.4	13.8
(0.4-0.5]	12.1	13.1	5.4	2.4	10.4	12.6	17.2	10.7	7.6
(0.5-0.6]	5.1	5.3	3.7	1.4	3.3	7.1	6.6	8.3	3.2
(0.6-0.7]	5.1	5.6	2.1	0.6	3.4	7.5	6.0	6.5	1.5
(0.7-0.8]	4.7	5.2	0.9	0.3	0	3.7	5.6	6.0	4.3
(0.8-0.9]	2.6	2.8	0.5	0.2	0	1.9	3.7	2.1	2.8
(0.9-1]	2.9	3.2	0.3	0.4	0	2.9	2.9	2.8	1.6
Total	100	100	100	100	100	100	100	100	100

Note: Private-sector firms with at least four employees.

1) It is an unbalanced panel, so not all firms are present in the sample for the entire period.

To characterize low-wage firms further, I estimate a model of the share of low-wage employees in the firms on a set of firm characteristics. Since the dependent variable is limited from zero to one with the lower bound binding, an ordinary and a random effect Tobit model is applied. Thus, the observed fraction of low-wage employees at time t within firm j , y_{jt}^* , is a realisation of the latent variable y_{jt} ,

$$\text{where } y_{jt}^* = \begin{cases} 0 & \text{for } y_{jt} \leq 0 \\ y_{jt} & \text{for } 0 < y_{jt} < 1 \\ 1 & \text{for } y_{jt} \geq 1 \end{cases}$$

The fraction of low-wage workers is explained by a vector of firm characteristics, \mathbf{Z}_j , such that:

$$y_{jt} = \alpha_j + \beta' \mathbf{Z}_{jt} + \varepsilon_{jt},$$

where $\alpha_j = \alpha$ in the ordinary model, and $\alpha_j = \alpha + v_j$, $v_j \sim \text{Gaussian}(0, \sigma_v^2)$ in the random effect model.

The estimation results are shown in Table 3.2. In general, there is no big difference between the results in the two models, but the likelihood ratio test (LR-test) testing the significance of the random effects implies that the within-panel variance component is significant different from zero, and thus the random effect model is preferable.

Table 3.2. Dependent variable: share of low-wage employees in the firm.

	Tobit		Random effect Tobit	
	Coefficient	Std. Err.	Coefficient	Std. Err.
<i>Labour force composition inside firm:</i>				
Mean education (years)	-0,013*	0,000	-0,025*	0,000
Mean age (years)	-0,011*	0,000	-0,009*	0,000
Mean experience (years)	-0,008*	0,000	-0,004*	0,000
<i>Mean proportion inside firms of:</i>				
Employees with firm tenure >10 y.	0,057*	0,002	0,050*	0,001
New employees (1 year tenure)	-0,018*	0,001	-0,014*	0,001
Managerial employees	-0,206*	0,002	-0,141*	0,002
Females	0,150*	0,001	0,089*	0,001
On sick leave	0,319*	0,001	0,214*	0,001
< 20 employees	0,036*	0,003	0,021*	0,005
20-100 employees	0,011*	0,003	0,016*	0,005
100-500 employees	-0,014*	0,004	0,002	0,005
> 500 employees	ref.		ref.	
Primary sector	-0,011*	0,001	-0,023*	0,002
Manufacturing	-0,015*	0,001	-0,053*	0,002
Retail trade	0,062*	0,001	0,035*	0,002
Transportation	-0,076*	0,001	-0,106*	0,002
Finance	-0,025*	0,001	-0,038*	0,002
Service sector	ref.		ref.	
Constant	0,747*	0,005	0,851*	0,006
LR-test ($\nu=0$)	Chi ² (01)= 4.0e+05, Prob>= Chi ² (01) = 0.000			

Note: * indicates parameter estimates significantly different from zero at a 5% level.

Private-sector firms with at least four employees.

Not surprisingly, I find that to a large extent the labour force composition inside firms with relatively many low-wage employees corresponds to the typical low-wage workers. Thus, the average age, average levels of education and work experience among the employees as well as the share of managers decrease the share of low-wage workers. Likewise, firms with relatively many women and employees on sick leave have more low-wage employees. Furthermore, the typical low-wage firm is a small or medium-sized firm (less than 100 employees) in the service or retail trade sector (including hotels and restaurants). Rather surprisingly, I find that low-wage firms typically have a low turnover, i.e. they have many long-tenured employees and few new employees. Several factors can give rise to this result. First, there might be a trade-off between wage and job security, so that in return for the low wages these firms offer stable jobs. Second, it might also be the case that these low-wage firms are no stepping-stones, i.e. employees in these

firms do not receive any better job offers, so they might as well stay.¹ Moreover, the low-wage firms are not attractive to new employees, which explains the negative effect on the rate of new employees. So the inflow to low-wage firms is low, as is the outflow.

4. Low-wage job spells

I have chosen low-wage job spells as the unit of the analysis in the duration model. This approach has several advantages; in the duration model the longitudinal feature of the data can be exploited, and moreover this model is especially well suited for analyses focusing on a specific state, such as the low-wage state. Using the low-wage *job* as the unit of analysis enables me to focus on the effect of a job. Usually, low-wage mobility studies do not take job or employer changes into account when analysing mobility out of low-wage.² However, a change in the wage is one of the most apparent adjustments occurring as a result of a job change, and it therefore seems natural to include it directly in the analysis.

A low-wage job spell is defined as the time a person spends in low wage within the same firm.³ This approach gives me the opportunity to distinguish between continuing in high wage in the same firm (high-wage stayer) or in a new firm (high-wage mover), continuing in low wage at another firm (low-wage mover) or leaving employment. To understand the role of the firm, it is important to know what kind of jobs are stepping-stones to higher-wage jobs at other firms, and what kind of jobs lead to other low-wage jobs or unemployment – analysing dead-end jobs is not only a concern of upward wage mobility inside the firm, the alternative options outside the firm are just as important. However, to account for stigmatisation from low wage in general, I include the duration of past low wage as an explanatory variable, in the case where the individual comes from a low-wage job in another firm.

Hence, each spell of low-paid jobs in a firm has transition possibilities $l=hs, hn, ln$ or o , defined as:

- hs*: high-wage job in the same firm
- hn*: high-wage job in a new firm
- ln*: low-wage job in a new firm
- o*: out of employment (entrepreneurship, unemployment or out of the labour market)

¹ This issue is investigated further in the duration analysis part.

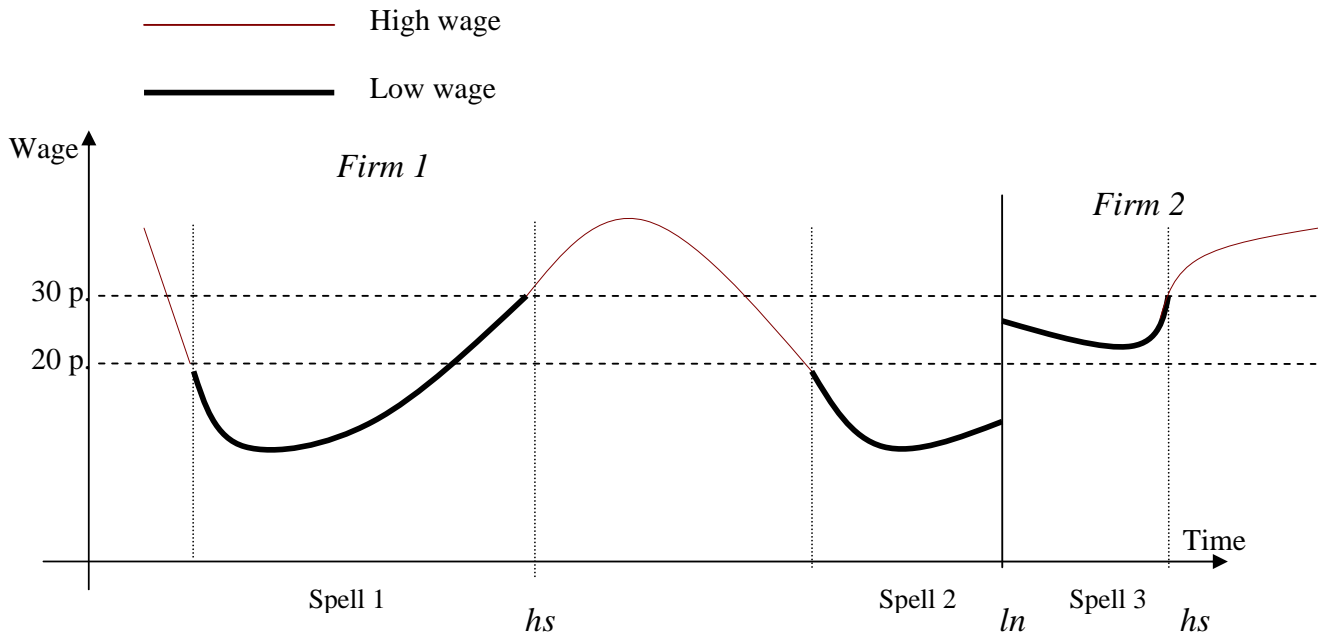
² To my knowledge, the only exceptions are Andersson et al. (2002, 2003).

³ Note, a person might change job tasks during a low-wage job spell; the low-wage job definition is only affected by wage and employer changes.

The low-wage job spells may be uncompleted, i.e. censored, at the end of the observation period. Only low-wage jobs occupied by wage earners in the private sector are included, but information on self- and public employment is used for defining the destination states.

In order to avoid people moving in and out of low pay merely because of minor changes in the relative low-wage threshold, a wage-buffer is included. That is, for an employee to enter the low-wage state, the hourly wage must decrease below the 20th percentile of the hourly wage distribution, and it needs to increase above the 30th percentile for him to leave low wage again. Thus, each low-wage *job* spell ends by the individual either receiving a wage above the 30th percentile of the hourly wage distribution, or leaving the job (see Figure 4.1).

Figure 4.1. Definition of low-wage job spells. Person with three spells within two different firms.



I include all low-wage job spells in the sample beginning during the period 1981-1999. Labour market information for year 2000 is only used for determining the destination states for spells ending in 1999, thus the maximum duration of a low-wage job spell is 19 years. Applying these restrictions, I end up with a data set consisting of 55,440 low-wage job spells distributed on 37,732 different individuals employed in 24,864 different firms.

Next, I focus on the mean duration and distribution of the low-wage jobs. The figures are divided by the subsequent labour market states (destination states) and shown in Columns 1-3 in Table 4.1. About 35% of the low-wage job spells end by the individual moving to a higher-wage

job, either in the same firm (25%) or in a new firm (10%), and nearly 20% continue in a low-wage job with a new employer. About 35% leave low wage by leaving employment; 25% to unemployment, 8% leaving the labour force and about 2% become self-employed. Finally, 12% of the low-wage job spells were still in progress at the end of the observation period.

Table 4.1. Mean duration of low-wage job spells (1st quintile) by destination states.

Destination state	Escape low wage at 30p			Escape low wage at 20p		
	Distribution (%)	Mean duration	St.d.	Distribution (%)	Mean duration	St.d.
Higher wage same firm	24.8	2.3	1.9	36.5	1.8	1.5
Higher wage new firm	10.6	1.8	1.4	11.5	1.6	1.2
Low wage new firm	17.9	2.2	2.0	11.3	2.0	1.8
Entrepreneurship	1.7	2.0	1.7	1.6	1.9	1.7
Unemployment	25.1	2.0	1.7	22.7	1.8	1.6
Out of labour force*	7.7	2.2	2.1	7.2	2.0	2.0
Uncompleted	12.2	4.0	2.9	9.2	3.6	2.7
All	100.0	2.3	2.1	100.0	2.0	1.8

* Education, pension and other leave schemes.

The average durations of the completed low-wage jobs vary between 1.8 and 2.3 years, indicating that low-wage jobs in general are short. Comparing the average durations between destination states, we note that the average duration of low-wage job spells is about half a year longer for transitions to higher wage in the same firm compared to higher wage in a new firm. Thus, it seems as if transitions to higher-wage jobs at other firms are reached faster than higher-wage jobs within the same firm. It should, however, be emphasised that the differences in mean durations are not significant as the standard deviations indicate.

To establish how the mean duration and distribution by destination state of low-wage jobs are affected by the definition of low wage, these values are presented for low wage ending at the 20th percentile (Columns 4-6 in Table 4.1). The most striking difference between the two is the fact that more low-wage earners leave for higher wage in the same firm in the case with no wage buffer. This clearly indicates that a large amount of those escaping the 1st quintile within the same firm do not manage to escape the 30th percentile but fluctuate around the low-wage threshold. Obviously, the average duration of a low-wage job is increased when the wage buffer is included.

As mentioned above, the current paper focuses on low-wage *job* spells and not low-wage spells as in the previous literature. To compare the two spell definitions, the average duration and distribution of the spells as well as the average number of firms within each low-wage spell are presented in Table 4.2. As expected, the average duration of a low-wage spell is longer than the average duration of a low-wage job, although by less than half a year. Note also, that the percentage of uncompleted spells is higher for the low-wage spells, which increases the downward bias on the average duration. As regards the number of firms per low-wage spell, individuals leaving low wage by leaving employment, compared to other low-wage employees, have on average worked in more firms within the low-wage spell. However, the difference is not significant (standard deviations around 0.5).

Table 4.2. Mean durations of low-wage job spells and low-wage spells by destination states.

Destination state	Low-wage job spells		Low-wage spells		
	Distribution	Duration	Distribution	Duration	No. firms pr. spell
Higher wage same firm	24.8	2.3	28.7	2.6	1.16
Higher wage new firm	10.6	1.8	12.1	2.0	1.15
Low wage new firm	17.9	2.2	--	--	--
Out of employment	34.5	2.0	40.5	2.3	1.26
Uncompleted	12.2	4.0	18.7	4.5	1.16
All		2.3	100.0	2.7	1.17
No. of spells	55,440		48,339		

Next, I divide the low-wage job spells into groups by size and industry of the firm (see Tables 4.3 and 4.4). I find that the distribution of destination states varies considerably between the different types of firms. The number of transitions to higher wage in the same firm increases with the size of the firm, whereas the number of transitions to higher wage in a new firm decreases. The number of transitions out of employment decreases with the size of the firm, while the number of uncompleted spells increases with the size of the firm.

Table 4.3. Distribution of destination states by firm size.

Destination state	Number of employees			
	4-20	21-100	101-500	>500
Higher wage same firm	20.8	24.5	29.2	27.3
Higher wage new firm	12.7	11.3	9.6	8.0
Low wage new firm	16.7	18.2	15.4	21.0
Out of employment	38.8	35.0	32.3	29.7
Uncompleted	11.0	11.1	13.5	14.1
Number of spells	46,340	37,107	22,882	31,245

The distribution of destination states is also affected by the industry of the firm. About 28% of the low-wage jobs in the manufacturing sector end with higher wage in the same firm, whereas only 18% of the low-wage jobs in the primary sectors do. In the primary sector, there is a high rate of low-wage employees leaving employment (nearly 45%), whereas in the transport sector a large percentage move on to another low-wage job (26%).

Table 4.4. Distribution of destination states by industry.

Destination state	Industry					
	Primary	Manufacturing	Trade	Transport	Finance	Service
Higher wage same firm	18.48	27.98	20.12	22.03	32.39	21.5
Higher wage new firm	10.45	10.7	10.41	11.85	11.5	7.28
Low wage new firm	14.74	15.19	19.52	26.38	16.84	18.35
Out of employment	44.43	34.1	37.52	27.22	29.63	35.8
Uncompleted	11.9	12.04	12.42	12.52	9.64	17.07
Number of spells	3,903	41,676	44,199	13,583	17,026	7,573

The tables above clearly indicate that the mobility out of low-wage jobs is affected by firm characteristics. However, these raw figures do not account for the individual characteristics, and thus the differences in transitions out of low wage might be due to differences in the workforce composition within each firm category. Therefore, I now apply a parametric duration model, which accounts for both individual and firm characteristics.

5. The duration analysis

Because the data is grouped into yearly observations, a grouped duration model specification is suitable for this application with the duration time divided into K one-year intervals, $(0, t_1]$, $(t_1, t_2]$, ..., $(t_{K-1}, t_K]$ (see e.g. Lancaster (1990) for a comprehensive introduction to duration models). I

apply a mixed proportional competing risk hazard specification with a stepwise constant baseline hazard, and with firm-specific observable covariates, $Z_j(t)$, individual-/job-specific observable covariates, $X_i(t)$ including occurrence and lagged duration dependence and individual unobserved characteristics, v_{il} :⁴

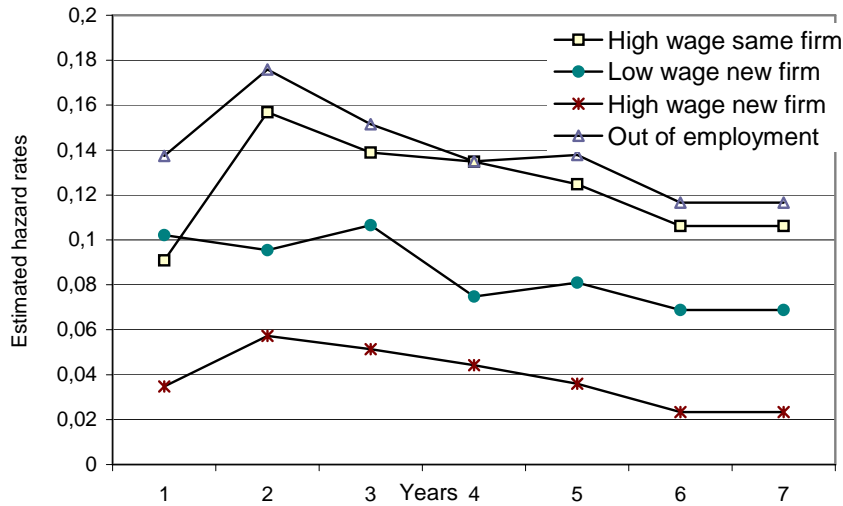
$$h_l(k | \mathbf{X}_i(k), \mathbf{Z}_j(k)) = \exp(\mathbf{X}_i(k)' \beta_l + \mathbf{Z}_j(k)' \gamma_l + \beta_{n(k),l}^0 + v_{il}), \quad n(k) = 1, 2, \dots, m$$

where $h(\cdot)$ is the interval-specific hazard function out of low-paid jobs for person i in firm j , and $l = hs, hn, ln, o$ indicates the four destination states. One interesting feature of this specification is that it allows me to analyse, whether low-wage workers who move to higher wage in the same firm differ from those moving to higher wage in another firm, and similarly do the employing firms differ. Moreover, I do not have to condition on continuous employment when applying this type of model. The model is estimated for the entire sample and for sub-samples according to gender and educational level. The results are shown in Tables 5.2-5.4

The duration dependence, i.e. the dependence between the conditional probability of ending a low-wage job spell and the time already spent in the current low-wage job, is shown in Figure 5.1. The adoption of a competing risk hazard specification implies that the conditional probability of ending a low-wage job spell depends on how the individual leaves low wage (by high wage in the same firm, high wage in a new firm, low wage in a new firm or by leaving employment). Thus, the duration dependence is presented for each destination state, separately.

⁴ Ideally, the model should be corrected for firm-specific unobserved heterogeneity simultaneously with the individual unobserved heterogeneity. However, this approach is not currently feasible, since it implies individuals sharing effects with different individuals during the period of observations, leading to intractable integrations.

Figure 5.1. Estimated hazard rates out of low-wage jobs by destination state



Note: The levels of the hazard rates are calculated for the mean value of the observed explanatory variables. The correction for unobserved heterogeneity divides the sample into low- and high-exit individuals, and the estimated hazard rates are shown for the low-exit individuals accounting for 62%.

Except for transitions to low wage in a new firm, the conditional probability of leaving a low-wage job increases during the first year and decreases slowly thereafter. Recognising the standard deviations for the baseline hazard terms implies, however, that there is no significant duration dependence for leaving a low-wage job. Thus low-wage employees do not seem to be stigmatised or “locked in” by remaining in the same low-wage job, since their probability of leaving the job is not decreasing with the length of the spell. In fact, when estimating the model without correcting for unobserved characteristics, I do find negative duration dependence. This indicates that when some people are staying longer in a low-wage job, this is not due to the duration of the low-wage job itself, but rather because of observed or unobserved characteristics of the person or the firm.⁵ Some potential duration dependence may, nonetheless, be hidden within the first year, since data is grouped on yearly basis.⁶

⁵ Stewart and Swaffield (1999) consider the *state dependence* of being in low wage. They also find that individual heterogeneity is very important; without accounting for endogenous selection into low wage the state dependence is overstated by a factor of 2. They do, however, still find significant *state dependence* also after correcting for individual heterogeneity.

⁶ Earlier studies on *job durations* suggest a negative duration dependence during the first months of a job (see e.g. Cockx et al. (1998)).

Next, I turn to the parameter estimates of the duration model (see Table 5.1). The effects of the individual characteristics do not deviate much from those found in the previous literature. Consequently, I will not comment on these.

The status of the previous labour market spell as well as the duration of a previous low-wage spell are included in the model to account for lagged state and duration dependence. With the exception of entrants to the labour market, I find that low-wage employees coming from another low-wage spell have the lowest likelihood of getting higher wage within the same firm, whereas they are the most likely to move to high wage in another firm, as long as the previous low-wage spell was not too long. However, this group is also the most likely one to continue in a new low-wage job. Coming from an out-of-employment state (the reference state) increases the risk of leaving employment again. In accordance with the findings of Stewart and Swaffield (1999) and Cappellari and Jenkins (2003), this indicates a cycle of low pay and out of employment, but since I am not looking at the transition into low pay, I cannot say if individuals outside employment have a higher probability of getting a low wage job, too. The length of a latent previous low-wage job spell seems to have a small negative effect on the transition to all destinations except low wage in a new firm, i.e. the longer a person has been in low wage prior to entering the present low-wage job, the longer will the present low-wage spell be.

I now turn to the effects of job and firm characteristics. Not surprisingly, I find that employees in higher-level jobs have a high transition rate to higher wage, whereas employees in low-level jobs are more likely to continue in a new low-wage job or even leave employment.

Two variables describing the labour market conditions are included: the aggregate yearly unemployment rate (grouped into three intervals) and the unemployment rate of the municipality where the firm is located relative to the aggregate yearly unemployment rate. The purpose of the latter variable is to test the effect of the tightness of the local labour market. I find that a higher aggregate unemployment rate increases the transition to higher wage in the same firm, but also into low-wage jobs at other firms and out of employment. It seems plausible that in periods of high unemployment the internal labour market will tend to be stronger, i.e. firms avoid new hires and promote from within the firm. Moreover, due to stronger competition for jobs low-wage employees who leave the firm will have to take another low-wage job or even leave employment. Concerning the relative unemployment rate, it is found that the transition out of a low-wage job is increasing with the relative tightness of the local labour market. Thus, low-wage

employees in firms located in high-unemployment municipalities will tend to stay in the same low-wage job.

Table 5.1. The competing risk hazard rate out of low-wage jobs.

	Higher wage same firm		Higher wage new firm		Low wage new firm		Out of employment	
<i>Individual characteristics:</i>								
Age 25-30	0.64**	0.05	1.45**	0.09	0.57**	0.05	-0.14**	0.04
Age 30-40	0.47**	0.04	1.12**	0.08	0.41**	0.04	-0.24**	0.03
Age 40-50	0.29**	0.03	0.72**	0.08	0.25**	0.04	-0.41**	0.03
Age > 50	ref.		ref.		ref.		ref.	
Children aged 0-14	0.01	0.02	0.01	0.04	0.00	0.03	0.08**	0.02
Woman	-0.35**	0.03	-0.69**	0.05	0.04*	0.03	0.12**	0.03
Experience <5 years	-0.48**	0.04	-0.35**	0.07	0.03	0.04	0.43**	0.03
Experience 5-10 years	-0.13**	0.03	-0.01	0.05	0.05*	0.03	0.21**	0.03
Experience > 10 years	ref.		ref.		ref.		ref.	
Education <10 years	-0.14**	0.03	-0.09*	0.05	0.05*	0.03	0.19**	0.03
Education 10-12 years	-0.19**	0.03	-0.15**	0.05	-0.05*	0.03	0.09**	0.03
Education >12 years	ref.		ref.		ref.		ref.	
<i>Previous labour market state</i>								
Entrant	-0.14**	0.04	-0.10*	0.07	-0.02	0.04	-0.36**	0.04
Lag status: low wage	-0.07*	0.04	0.16*	0.07	0.20**	0.04	-0.10**	0.04
Lag status: high wage	0.00	0.03	-0.13*	0.06	-0.10**	0.04	-0.40**	0.03
Lag status: out of work	ref.		ref.		ref.		ref.	
Lag duration in low wage	-0.03*	0.01	-0.03*	0.02	0.02**	0.01	-0.02*	0.01
<i>Job characteristics</i>								
Low level	-0.15**	0.04	-0.22**	0.08	0.20**	0.06	0.10*	0.05
Medium level	-0.22**	0.04	-0.33**	0.08	0.16**	0.06	-0.02	0.05
High level	ref.		ref.		ref.		ref.	
Job level unknown	-0.25**	0.06	-0.51**	0.10	0.01	0.07	-0.06	0.06
<i>Firm characteristics</i>								
< 20 employees	0.05*	0.03	0.43**	0.06	0.03	0.04	0.29**	0.03
20-100 employees	0.05*	0.03	0.28**	0.06	0.08**	0.03	0.21**	0.03
100-500 employees	0.05*	0.03	0.11*	0.06	-0.12**	0.04	0.13**	0.03
> 500 employees	ref.		ref.		ref.		ref.	
Unempl. <6%	-0.50**	0.05	-0.04	0.08	-0.13**	0.05	-0.60**	0.04
Unempl. 6-10%	-0.13**	0.03	0.12**	0.05	0.02	0.03	-0.25**	0.03
Unempl. >10%	ref.		ref.		ref.		ref.	
Relative unempl.	-0.44**	0.06	-0.10	0.10	-0.24**	0.06	-0.39**	0.05
Primary	0.07	0.10	-0.11	0.17	0.00	0.11	0.25**	0.07
Manufacturing	0.32**	0.06	0.12	0.11	0.20**	0.06	0.34**	0.05
Transportation	0.25**	0.07	0.48**	0.12	0.95**	0.07	0.42**	0.06
Finance	0.38**	0.06	0.31**	0.11	0.27**	0.07	0.19**	0.06
Trade	0.05	0.06	0.05	0.11	0.26**	0.06	0.22**	0.05
Service sector	ref.		ref.		ref.		ref.	

	Higher wage same firm	Higher wage new firm	Low wage new firm	Out of employment
<i>Labour force composition inside the firm</i>				
Mean age	-0.14** 0.03	-0.07* 0.06	-0.15** 0.04	0.01 0.03
Mean education level	0.07** 0.01	0.02 0.02	-0.06** 0.01	-0.03** 0.01
Mean level of experience [#]	-0.12** 0.04	-0.10* 0.07	0.20** 0.04	-0.29** 0.03
<i>Mean rate inside firms of:</i>				
Women	-0.21** 0.06	-0.19* 0.10	0.38** 0.06	0.24** 0.05
Managers	0.40** 0.10	0.41** 0.17	0.05 0.12	0.38** 0.10
Low wage earners	-1.73** 0.09	-0.48** 0.13	0.30** 0.08	0.41** 0.06
<i>Unobserved heterogeneity terms</i>				
v_j	-4.73** 0.57	-5.72** 0.71	-4.29** 0.96	-4.30** 0.90
Prob($v_{hs}=v_{hn}=v_m=v_o=0$)	0.33** 0.00			

Note: * indicates parameter estimates significantly different from zero at a 10% level, ** indicates parameter estimates significantly different from zero at a 1% level. Standard deviations in *italics*.

Total labour market experience.

Firm characteristics have previously been largely neglected except for variables like firm size and industry/sector (Stewart and Swaffield (1998) and Asplund et al. (1998)). Concerning the size of the firm Stewart and Swaffield (1998) find that low-wage employees in small U.K. firms (less than 25 employees) have a higher probability of being in low wage in the subsequent year. This is not in accordance with my result. I find that the probability of getting higher wage in the *same* firm is unaffected by the firm size, whereas the probability of getting higher wage in a *new* firm decreases with firm size. Thus, it seems as if smaller firms are better stepping-stones to better paid jobs at other firms, maybe because smaller firms provide more general on-the-job-training, which is better exploited in jobs in other firms. However, when carrying out separate analyses by gender, I find that the effect of being employed in a small firm (<20 employees) differs significantly between males and females (Table 5.2). Thus, female employees in small firms have a higher probability of obtaining a higher wage, whereas for males the probability is lower. One plausible explanation for this result is that women are better at showing their worth at smaller firms, and thus they have a better chance of escaping low wage. Moreover, transitions to low wage in a new firm are more likely for women in small firms, while it is less likely for men in small firms. The transition out of employment is decreasing with firm size for both males and females.

Table 5.2. The competing risk hazard rate out of low-wage jobs divided by gender.

	Higher wage same firm		Low wage new firm		Higher wage new firm		Out of employment	
	Male	Female	Male	Female	Male	Female	Male	Female
Individual covariates	yes	yes	yes	Yes	yes	Yes	yes	yes
Other firm covariates	yes	yes	yes	Yes	yes	Yes	yes	yes
< 20 employees	-0.08* 0.06	0.11** 0.04	-0.12* 0.07	0.11** 0.04	0.39** 0.09	0.45** 0.08	0.30** 0.07	0.25** 0.03
20-100 employees	0.01 0.05	0.04 0.04	-0.07 0.07	0.15** 0.04	0.23** 0.09	0.34** 0.08	0.21** 0.06	0.19** 0.03
100-500 employees	0.05 0.05	0.02 0.04	-0.22** 0.07	-0.11** 0.05	0.14* 0.10	0.12* 0.08	0.22** 0.07	0.10** 0.04
> 500 employees	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
<i>Mean rate inside firms of:</i>								
women	-0.32** 0.10	-0.13* 0.07	0.25* 0.13	0.34** 0.07	-0.14 0.16	0.00 0.14	-0.23* 0.11	0.39** 0.06
high-level jobs	0.43** 0.17	0.40** 0.13	0.77** 0.22	0.01 0.15	0.71** 0.25	0.51* 0.25	0.62** 0.18	0.38** 0.12
low-wage earners	-1.24** 0.14	-2.09** 0.11	0.14 0.16	0.40** 0.10	-0.47** 0.18	-0.68** 0.19	0.28** 0.11	0.45** 0.07

Note: * indicates parameter estimates significantly different from zero at a 10% level, ** indicates parameter estimates significantly different from zero at a 1% level. Standard deviations in *italics*.

Table 5.3. The competing risk hazard rate out of low-wage jobs divided by education level.

	Higher wage same firm		Low wage new firm		Higher wage new firm		Out of employment	
	Low- educated	Highly- educated	Low- educated	Highly- educated	Low- educated	Highly- educated	Low- educated	Highly- educated
	<13 years	>12 years	<13 years	>12 years	<13 years	>12 years	<13 years	>12 years
Individual covariates	yes	yes	yes	Yes	yes	yes	yes	yes
Other firm covariates	yes	yes	yes	Yes	yes	yes	yes	yes
Mean age	-0.07* 0.05	-0.20** 0.05	-0.17** 0.05	-0.12** 0.05	-0.01 0.09	-0.12* 0.08	0.04 0.04	-0.01 0.04
Mean education level	0.03* 0.02	0.10** 0.02	-0.07** 0.02	-0.06** 0.02	-0.01 0.03	0.04* 0.03	-0.06** 0.01	-0.02 0.02
Avg. level of experience	-0.22** 0.06	-0.04 0.05	0.19** 0.06	0.22** 0.06	-0.21* 0.10	-0.09 0.09	-0.36** 0.04	-0.16** 0.05

Note: * indicates parameter estimates significantly different from zero at a 10% level, ** indicates parameter estimates significantly different from zero at a 1% level. Standard deviations in *italics*.

In general, low-wage jobs in service-sector firms seem to be more persistent. On the other hand, low-wage earners in firms in the transport industry have high turnovers, i.e. high transitions to both low-wage jobs and high-wage jobs in new firms. Andersson et al. (2002) find that in the U.S. women have higher wage improvement probabilities in the service sectors, whereas men have higher wage increase probabilities in the traditional industries such as transports, manufacturing and trade. I find no gender differences in the industry effects (not shown). The highest transition rate to higher wage in the same firm is found in the financial sector, whereas the transport sector has the highest transition rate to higher wage in another firm.

I now turn to the effect of the composition of the firm's labour force. Average values of age, educational level and work experience, as well as frequency of women, managers and low-wage earners in each firm are calculated and included as explanatory variables in the regressions.

Higher education levels inside firms increase the transition to higher wage in the same firm and decrease the transition to low wage in a new firm and out of employment. It seems as if low-wage employees in high-education firms tend to stay in the firm and climb the wage ladder. This effect is present for both low- and highly-educated low-wage workers (see Table 5.3). In contrast, the average level of work experience in the firm decreases the transition to higher wage inside the firm, but increases the transition to low wage at a new firm. This finding could be due to a harder competition within firms with a high average level of work experience among their employees. Thus, where high-education firms seem to provide better opportunities, high-experience firms seem to provide worse opportunities for their low-wage employees.

Ierulli et al. (2002), using Swedish data, find that the average age of the workforce affects the upward wage mobility negatively. This is well in accordance with the findings of the present paper, where the hazard rate out of a low-wage job decreases with the average age, especially for transitions to higher wage in the same firm and to low wage in a new firm. Looking at the low- and highly-educated groups separately, I find that these effects differ by educational level of the low-wage worker (Table 5.3). For a low-educated low-wage worker, the transition into higher wage is negatively affected by the average labour market experience of his co-workers, but not affected by his co-workers' mean age. On the other hand, for a highly educated low-wage worker the transition into higher wage is negatively affected by the age of his co-workers, but not by the mean level of their work experience. Thus, low-educated workers seem to be more affected by the experience level of their co-workers, while highly-educated workers are more affected by their co-workers' age.

The higher the average proportion of women in the firm is, the lower are the transition probabilities to higher wage and the higher is the transition probabilities to low wage in a new firm and out of employment. Thus, not only being a woman but also having many women as colleagues have a negative impact on the chance of escaping low wage. The negative effect of the share of female co-workers on transitions to higher wage within the firm is present for both males and females, but the effect is stronger for males (see Table 5.2). Likewise, the share of women affects the transition to low wage in another firm positively for both males and females, and the effect is stronger for females. The negative effect on the transition to higher wage in a new firm disappears in the analysis by gender. Moreover, unlike low-wage women, low-wage men working in firms with a high share of women are less likely to leave employment. Thus,

males stay to a higher degree in their current low-wage job in firms with a high share of women, whereas females to a higher extent seem to leave these firms.

The share of managerial level jobs inside the firm increases the transition to higher wage in the same firm and out of employment. Thus, firms with a high proportion of managers in general have a higher job turnover, transferring their low-wage employees either to higher wage or out of employment. Furthermore, firms with relatively many managerial employees seem to be better stepping-stones for higher wage jobs at other firms.

Finally, we consider the importance of the proportion of low-wage earners in the firm. The higher the proportion is, the lower is the transition to higher wage in the same firm and the higher is the transition to a new firm and out of employment. Thus, low-wage earners in low-wage firms obviously have a harder time moving up the income ladder, not only within the current low-wage firm but also when moving to other firms, and according to the estimates it seems as if they leave employment instead. Consequently, low-wage jobs at low-wage firms are dead-end jobs in several senses: not only do they decrease the internal upward wage mobility, they also decrease the possibility to move to higher wages in other firms, and they increase the transitions out of employment and to other low-wage jobs.

The empirical evidence presented above indicates that not only the characteristics of a low-wage worker but also the characteristics of the employing firm will affect the low-wage worker's chances of escaping a low-wage job. In Table 5.4, this aspect is further described by calculations of the expected duration of a low-wage job for the same example individual in three different example firms. For simplicity, I have chosen only to let the three firms differ in four characteristics: size, industry, share of women and share of low-wage employees. The values of these variables are set to reflect three realistic firm types: a medium-large financial firm with an overweight of males and very few low-wage employees, a large service-sector firm with 75% female and half of the employees being low-wage earners and a small transportation firm with very few women and a high share of low-wage employees. The rest of the firm variables are set to their mean values for all three firms.

The expected duration of the low-wage job varies between 3.4 years when the person is employed in firm 3, and 4.4 years when he is employed in firm 2. However, the importance of the firm is even more pronounced when we look at the destination-specific hazard rates and the corresponding expected durations. Although the low-wage employee seems to have a better chance of escaping his low-wage job if he is employed in firm 3 compared to firm 1, the

destination-specific hazard rates indicate that his likelihood of actually moving to a high-wage job is lower in firm 3, due to a very low hazard rate to a high-wage job in the same firm.

Table 5.4. Expected duration of a low-wage job for the same person in three different firms.

	Firm 1 [#]		Firm 2 ^{##}		Firm 3 ^{###}	
	Exp. dur. (year)	Hazard rate	Exp. dur. (year)	Hazard rate	Exp. dur. (year)	Hazard rate
All destinations	4.2	0.41	4.4	0.33	3.4	0.64
<i>Destination-specific</i>						
Same firm high wage	43.8	0.08	174.6	0.02	133.7	0.03
New firm high wage	67.7	0.06	154.4	0.03	48.6	0.08
New firm low wage	43.4	0.12	38.4	0.13	12.9	0.29
Out of employment	26.4	0.15	30.1	0.14	13.6	0.24

Note: Calculated using the parameter estimates from Table 5.1.

[#] Firm 1: 101-500 employees, finance sector, share of women 0.35, share of low-wage employees 0.1.

^{##} Firm 2: >500 employees, service sector, share of women 0.75, share of low-wage employees 0.5.

^{###} Firm 3: 4-20 employees, transport sector, share of women 0.15, share of low-wage employees 0.6.

Identical characteristics for all three firms: local unemployment rate 6-10%, average work experience 6 years, average education level 11.4 years, mean age 34 years, share of managers 0.11.

Example individual: male, aged 30-40, no small children, not married, work experience 5-10 years, education >10years, low-level job, previous labour market state: out of employment, unobserved low exit group.

6. Conclusion

Previous analyses of wage mobility among low-wage earners have almost exclusively focused on the characteristics of the low-wage earners, whilst the roles of firms and workplace characteristics have been largely neglected. The purpose of this study has been to consider both individual and firm characteristics in the analysis of wage mobility, and the empirical evidence indeed shows that the characteristics of the employing firm do matter for a low-wage employee's likelihood of escaping a low-wage job. The employing firm does especially affect the destination state: where a low-wage worker goes after exiting a low-wage job.

I began the analysis by examining low-wage firms, i.e. firms with a high rate of low-wage employees. These firms are characterized by a low average age, low levels of education and work experience among the employees, as well as a low share of managerial employees. These firms have relatively many women and employees on sick leave. Furthermore, the typical low-wage firm is a small or medium-sized firm (less than 100 employees) in the service or retail trade sector (including hotels and restaurants). Rather surprisingly, I find that low-wage firms typically have a low workforce turnover.

Concerning the wage mobility I find that individual, job and firm characteristics are all important in explaining the probability of exiting low-wage jobs. The linked employer-employee feature of the data makes it possible to distinguish between stayers and movers among individuals exiting a low-wage job spell.

As for firm characteristics, I find that transitions from low wage to higher wage in the *same* firm are unaffected by the size of the firm, whereas transitions to higher wage in a *new* firm decrease with the size of the old firm. If small firms are more likely to provide general skills and large firms more likely to generate specific skills, the skills obtained at larger firms are less usable at other firms, and thus, the transition to higher wage in a new firm will be smaller for larger firms. Low-wage employees in service-sector firms were shown to be less likely to escape their current low-wage jobs, whereas low-wage workers in the financial sector have better chances especially if they stay in the same firm. Generally, low-wage employees in the transport sector have high transition rates out of their low-wage jobs, which also includes high transitions to new low-wage jobs at other firms and out of employment, so they might not actually escape low wage.

Not only the characteristics of the low-wage worker but also the employing firms' workforce composition were shown to affect the hazard rate out of low-wage jobs. Thus, for instance, the probability of escaping low wage within the firm increases with the average educational level of the firm's labour force. The average level of work experience has, however, a negative impact. The transition out of a low-wage job was found to increase with the share of managerial personnel in the firm, except for transition to low wage in a new firm. Finally, I found that the chance of escaping low wage is decreasing with the share of low-wage workers in the firm. This is true not only within the firm, but also for moving to another firm. Moreover, the transitions out of employment are increasing with the share of low-wage workers, as well. Thus, low-wage jobs at low-wage firms seem to be truly dead-end jobs.

7. Appendix

Table A.1. Mean value of explanatory variables for the selected sample.

	Sample	
	Mean	St.d.
Age 25-30	0.25	0.43
Age 30-40	0.30	0.46
Age 40-50	0.24	0.43
Age > 50	0.20	0.40
Children aged 0-14	0.39	0.49
Experience <5 years	0.16	0.37
Experience 5-10 years	0.27	0.45
Experience > 10 years	0.56	0.50
Woman	0.64	0.48
Education <10 years	0.31	0.46
Education 10-12 years	0.22	0.41
Education >12 years	0.48	0.50
Low level job	0.55	0.50
Medium level job	0.32	0.47
High level job	0.06	0.24
Firm size	2175	5852
< 20 employees	0.30	0.46
20-100 employees	0.26	0.44
100-500 employees	0.18	0.38
> 500 employees	0.26	0.44
Manufacturing	0.40	0.49
Transportation	0.08	0.27
Finance	0.10	0.30
Trade	0.35	0.48
Service sector	0.05	0.22
Mean age	39.02	10.60
Mean level of experience	13.41	4.50
Mean education level	11.45	1.12
Rate of high level jobs	0.14	0.13
Rate of women	0.41	0.25
N (persons*years)	128,789	

8. Literature

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