

We thus define a job-to-job transitions as follows. In Europe, we consider any transition between two jobs with an observed duration of one month or less and for which the interviewee reports that the second job was not preceded by a period of nonemployment as a job-to-job transition. In the U.S., the only information that we have is through a monthly calendar of activities. We therefore retain as a job-to-job transition any job change with no intervening nonemployment period (which, given the structure of the calendar of activities, can hide nonemployment spells of less than three weeks).

CHAPTER 13

Job Changes and Wage Growth over the Careers of Private Sector Workers in Denmark ☆

Paul Bingley and Niels Westergaard-Nielsen *

Abstract

We describe and model careers for Denmark's population of men and women who are continuously full-time employed. Individual pay and mobility between firms is assumed to be a function of firm and industry pay and retention policies. These policies are characterized by firm and industry specific returns to education, experience and tenure. Workers solve the dynamic programming problem of mobility between firms by accounting for the expected future consequences of current decisions until retirement. This highly complex problem is considered as a problem of choosing between different wage trajectories believed to represent different wage offers. We use information on all private sector white collar full-time employed men and women aged 20–54 in 1980. They are followed until 2000, and matched throughout to their employers and industries. The data allow us to study all wage changes for a very large group of workers and whether these differences happened between different work places or within the same work place. Substantive findings are: the average person has 12 different employers between ages 20 and 60, experiences a doubling of real earnings, three quarters of which is achieved before the age of 40 in the first 8 jobs. One third of wage growth is between jobs. In estimations of a model for moving or staying, we find that a high expected wage level in the current firm means lower probability of moving. The higher the expected

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wage growth in the current firm, the less likely is a move. The higher expected wage or wage growth in competing firms, the more likely is a move.

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JEL classifications: J31, J64

1. Motivation

Recent studies have reported high rates of worker turnover in a number of countries OECD (1997) and European Commission (1998). This has a micro-economic as well as a macroeconomic dimension. The micro dimension is the mechanism that determines the mobility decision of each worker, within a given framework of labour protection. Previous studies for Denmark have shown very high turnover rates for most labour force participants but we have not been able to explain the large level of turnover, (Albaek and Sørensen, 1998; Bingley *et al.*, 1999; Bingley and Westergaard-Nielsen, 2003). The second dimension is how these mechanisms are affected by different sets of labour protection laws in various countries. Denmark seems to be an outlier in continental Europe, with relatively weak labour protection.

OECD (1997) demonstrates that differences in worker turnover between countries are related to differences in regulations of layoff possibilities. However, it is probably only a small part of the total labour turnover which is due to regular layoffs, whereby an employer takes the initiative and consequently labour protection rules may apply. More often, an employee receives a wage offer from another firm and decides to move to the better paying firm. The most important explanation for worker mobility is therefore the search for new and better jobs.

But what does employment protection have to do with mobility decisions, if employer-initiated layoffs are relatively uncommon? One likely explanation is that workers may lose their protection shield when moving between employers, because it takes several months before new hires are subject to protection. Consequently, workers will be less tempted to move, even if they may get a pay rise by moving.

Though it is fairly straight forward to argue that liberal labour market regulations will be positively correlated to mobility because it makes it easier for employers to layoff their workers, researchers have not yet been able to come up with a plausible explanation of why employees apparently engage in so many job changes as is the case in Denmark. If we look at job turnover from the employers' perspective, it is hard to accept that Danish employers should be less interested in retaining workers than their European competitors who operate under a worker protection shield.

In this paper, we focus on individual worker gain from turnover. We present an empirical model that explains a part of worker between-firm mobility within

a country with its regulations and subsidies. The explanation, in this setting, is via quits and the search for new and better paid jobs.

2. The literature

Several theories have predictions regarding turnover. For example, Parsons (1977) applies a search model. The factors of importance in the job search model are the distribution of wage offers, the cost of search, the explicit or implicit job duration, workers state of knowledge of market conditions, the contracting terms and the flexibility of work hours on the current job. According to the search model, the worker searches and chooses the job where the expected total wage income is highest. For the employed searcher, this means that he/she will move whenever the expected lifetime wage in a new job is higher than the expected life time wage in the current job.

Search is also a central element in a model of wage growth and mobility by Borjas (1981). The earnings profile is influenced by a search premium and experience. He assumes that the earnings profile is discontinuous across jobs because job mobility results in a wage premium if the job switch has been voluntary. The argument is that there is a gain in connection to job mobility representing the return to the investment in search. Furthermore, the path of investment in own training over time will also tend to have discontinuities across jobs because different jobs provide different learning opportunities and hence the fraction of time that can be invested is likely to vary among jobs. His main findings using data from the US "National Longitudinal Survey of Mature Men" are that labour turnover may lead to a significantly higher wage in the new job than in the old job. But by the time men reach their middle age, the short run advantages of labour mobility are less important, leaving immobile men with significantly higher wage rates. Furthermore, individuals who have experienced a substantial amount of job mobility over their working lives tend to have smaller rates of growth of earnings within each job.

Now, turning to the employer side, the mechanisms described by the search model suggest that firms will use the wage rate as a policy instrument that can regulate how many workers leave the firm. Thus, increasing the wage rate of a particular firm will accordingly mean that fewer receive wage offers motivating them to move. We might expect that higher pay actually reduces worker turnover. However, even if this is observed as an average effect, it is more likely that the firm uses this wage policy selectively in order to retain key workers. This is exactly what happens in the case where a firm decides to match outside wage offers. Each time a worker comes to his superior and tells her that he has received a wage offer above the current wage, the supervisor has to decide if she wants to match it or not. The guideline will be the value of the productivity of this worker compared to the potentially increased wage. Thus, the equilibrium wage that will come out of this process will depend on the productivity in the

incumbent and the competing firms. Of course, the firm will only use the wage instrument to retain workers if it expects this to be profitable.

For firms there is another issue at stake, since they face the cost of recruiting and training new workers. At the incumbent firm, the costs are recruitment and training of the replacement for the lost worker. Furthermore, human capital related to experience in that particular firm, firm-specific human capital, is destroyed. At the raiding firm the costs are those of recruitment and training. The costs of hiring are usually substantial, averaging 1/3 of an annual income according to consultancy firms and Bingley and Westergaard-Nielsen (2003). Of course it varies with the type of job, the person, etc.

The gain for firms from raiding is the future value of marginal productivity minus the future wage. One of the important elements may be that the person hired may carry valuable human capital with him or her. Allowing this mechanism to work contributes to keeping a society on the efficient production frontier, because it allocates workers to jobs where they are most cost effective.

However, this offer matching process may not be as smooth as described above. General concerns about the overall wage distribution at the firm and the reluctance of the local Trade Union to accept more unequal wages may constrain the willingness of firms to give higher wages even to workers who might be profitable, in expectation, to retain. This is the subject of Hall and Lazear (1984) where it is shown that worker turnover may become sub-optimal due to the fact that firms cannot pay each individual worker a wage so that they can retain them because of trade unions (wage compression). The claim is that there are too many inefficient layoffs when conditions are poor in the firm but even worse in the market, and that there are too many (inefficient) quits when conditions in the market are good but even better in the firm. The consequence is that some degree of wage compression results in excessive layoffs in bad times and excessive quits in good times.

However, it is not clear whether we can meaningfully distinguish between layoffs and quits. The classification depends on whether the demand for a wage revision is initiated by the worker or the firm. In the model of McLaughlin (1991), separations are censored wage revisions, where the worker knows his outside wage offer but does not know his productivity with his incumbent employer. Wages are governed by a counter-offer-matching contract. If productivity in the incumbent firm exceeds the outside offer, then new pay is equal to the value of productivity, if not the worker quits, due to a censored wage increase. If the firm observes that worker productivity falls, then it initiates a wage cut. If the new wage is below the value of productivity and the worker rejects it, there is what McLaughlin calls a censored wage cut.

This has an empirically testable hypothesis, which McLaughlin tests on data about self-reported reasons for separations. First, it is found that the effect of wages prior to separations is zero in a separation probit, but the quit rate conditional on separation is falling in the same wage. Second, higher alternative wages are predicted to increase both separations and the fraction of separations

labelled as quits. He finds that high predicted wages in the current job reduce separations and that lower wages prior to the separation increase the quit probability compared to the layoff probability. These are in accordance with the predictions of the model. At the same time, he finds that wages prior to separation are negatively correlated with the separation probability, contrary to the prediction of his model. He reasons that this is because the model neglects match-specific capital. His main conclusion is that the distinction between quits and layoffs is not economically meaningful since a simple story about wages and expected wages actually seems to account for the difference.

The same view was supported in Becker *et al.* (1977), the conclusion being that turnover (in a different market) is always efficient or joint wealth maximizing and the voluntary/involuntary distinction is inappropriate. The firm and worker dissolve their match if and only if their total value as separated exceeds the combined value of the match. In this world, potentially inefficient separations result in wage adjustments or side payments to preserve optimal assignments.

The focus of our paper is on wage growth within job and job-to-job. The importance of job-to-non-employment transitions is illustrated in Royalty (1998), and between-firm wage growth ignoring growth within the firm is Christensen *et al.* (2005). The latter is particularly relevant because it also uses Danish data. The descriptive work in Topel and Ward (1992) is closest to our contribution here. Their main empirical finding was that job-specific wage is a key determinant of mobility. Our contribution is to extend this empirical insight to include alternative job-specific wages. It is the measurement of this alternative wage, made possible because of the exhaustive nature of our longitudinal employer-employee data, which is the novelty of our paper.

3. The descriptive model

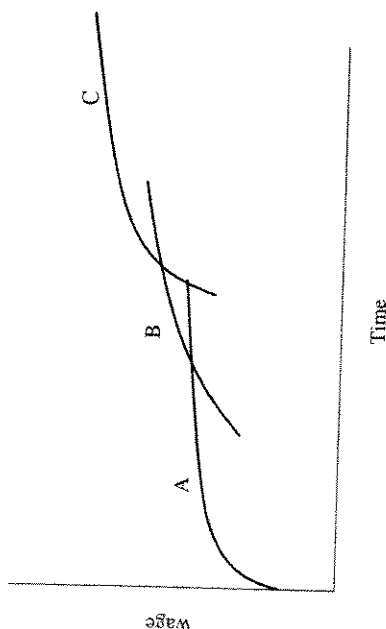
In our descriptive model, motivated by the previous discussion, we do not attempt to distinguish between quits and layoffs. The model is formulated within the option value tradition. The idea in the model is that people maximize their expected future earnings so that they will change job if they are offered a job with a higher expected future wage. We will allow for different wage trajectories at different employers by estimating a wage function for each employer.

The problem is how to model the wage offers, which are only rarely observed. Instead, we usually observe the wages accepted. In the search literature, this problem has been addressed by assuming that the accepted wage offers follow a censored wage distribution where we only observe the accepted wage offers (see Jensen and Westergaard-Nielsen, 1987).

Each wage trajectory can be characterized by the wage level for the first year of employment and a wage growth element for each year of tenure, as illustrated in Figure 1.

The alternative wage that a worker would receive if (s)he changed employer is not observed for workers who stay employed at the same firm. Yet, it is this

Figure 1. The choice between wage trajectories



counterfactual which may be an important determinant of the firm-to-firm mobility decision of a worker. In particular, the present discounted value of the income stream following from staying one more year with the current employer, compared with that from leaving.

The wage "premium" in the current job comprises, among other things, contributions from occupation, industry and firm during the relevant time period. Controlling for determinants of wage with the current employer along these dimensions is often assumed to characterize the alternative wage in labour market models (see, for example, contributions in the rent sharing literature due to Blanchflower and Oswald, 1996 and Estevao and Tevlin, 2003).

Recent work by Abowd *et al.* (2004) and Beffy *et al.* (2004) models worker mobility and current wages as a simultaneous process. Firm heterogeneity in terms of wages and mobility is taken seriously in these papers, which extends the work of Abowd *et al.* (1999) on identifying firm wage heterogeneity. The relevant contribution of these papers is modelling the mobility as a function of current wage, where both are simultaneously determined. Still, as is the case in all previous firm-to-firm mobility literature, the wage "premium" of the current employment is calculated regardless of the set of alternative employers. These models are silent with regard to the identity of possible destination firms, which are offering alternative wages. Wage "premium" are relative to the population as a whole.

The achievement of the above-sited simultaneous heterogeneity papers is important, and modelling choice of destination even at the 1-digit industry level together with wages and general heterogeneity is beyond the scope of current computational capacity. The contribution of our paper is to characterize alternative employers and alternative wages in an informative and novel way. We allow for firm heterogeneity in wages and mobility, but we do not model this as a simultaneous process.

In our model, potential alternative employers (F') for each firm (F) are assumed to comprise next destination employers of all previously separated workers from the firm (F). These employers are weighted according to their relative frequency as a destination for workers leaving each firm (F). This characterization of alternative employers, in turn, provides weights for the firm-specific effect of alternative wages. Thus, the wage "premium" of each worker-firm match is a function of current wage over and above the alternative wage, so characterized. These current and alternative wage terms are included as separate determinants of the firm-to-firm mobility function, in order to distinguish their contribution.

In contrast to Abowd *et al.* (2004) and Beffy *et al.* (2004), we do not allow for individual heterogeneity in wages. One criticism of our approach is that our "firm effects" are biased by the composition of the workforce because we do not simultaneously account for firm and worker heterogeneity (this is the contribution of Abowd *et al.* (1999)). However, in lieu of a simultaneous wage and mobility model, we argue that these "exogenous mobility" estimates of firm and worker effects could also be biased, and as such would not present an unambiguous improvement in our context. These person effects in wages are not of interest in their own right for our model, since they would, by definition, be differenced out in a comparison of current and alternative wages.

However, we do allow for idiosyncratic person effects in wages to have a distinct effect on the firm mobility decision. A positive wage residual for the current person-firm-year suggests that the worker has a productivity level (which is recognized by the employer, and corresponds to a higher wage level) different than would be predicted by the researcher on the basis of observed individual characteristics and unobserved firm heterogeneity (firm fixed effects). So the worker is observed to be more productive by the employer than (s)he is predicted to be by the researcher based on observable (to the researcher) characteristics. The empirical question that our mobility model answers is as follows: Is this productivity, which is unobserved to us, but observed to the current employer, associated with greater mobility, i.e. do other (potentially alternative) employers recognize this too? Our prior is no (negative sign on the estimated coefficient) simply because what the potential alternative employer can observe is likely to be somewhere in between what we the researcher can observe (not very much) and what the current employer can observe (somewhat more). The test of the model is whether people actually tend to move according to our priors about the relative value of present wage level and growth compared to outside wage offers and potential wage growth.

4. Data

The data consist of the population of residents in Denmark who have been employed in the private sector at some time during the period 1980–2000. This originates from the Centre for Corporate Performance extract of Statistics Denmark's Integrated Database for Labour Market Research (IDA) The raw

data give a number of insights into the mobility decision which are worthy of mention.

The link between firms and individuals is established on a specific day in November. Consequently, we have excluded some non-November employments from our analysis. Furthermore, we have excluded persons characterized as unemployed at the November census point.

The great virtue of this data set is that we can track all workers moving from firm-to-firm at these annual census points. In the following descriptive analysis, we have used this feature to describe mobility and its consequences for individual wages. Although we are using a window of 21 years, we have full information on the elapsed tenure since the start of the mandatory supplementary pension (ATP) registers in 1964.

Descriptive statistics are presented in Table 1.

Lrwage is log of hourly wage in January 2004 DKK. This is calculated by Statistics Denmark as labour earnings associated with a work attachment divided by hours worked in the attachment. Observations of wages in the top 0.1% in each year are dropped from the sample.

Figures 2 and 3 show the elapsed firm tenure represented by the mean and by the 25th and the 75th percentile for different ages. The mean curve shows that a 34-year-old has on average held 5 jobs since (s)he started a career. However, a person on the 25th percentile is just about to start his/her 2nd job, while the person on the 75th percentile is about moving from his/her 7th to the 8th job in as many different firms.

Tenure increases with age. The counterpart of this is the probability of changing firms. Figure 4 shows that the probability of changing firms declines over the lifecycle. It starts high in the 20s and drops down to 15 and 12% for 38 year old men and women, respectively. The mobility probability for women is

Table 1. Descriptive statistics for observations entering the wage function estimation

	Males		Females	
	Mean	Std.	Mean	Std.
lrwage	5.184	0.391	4.910	0.333
educ	13.064	2.642	12.512	2.420
Exper	19.069	10.509	17.337	10.353
tenu	6.145	5.778	5.660	4.988
age	39.132	10.050	36.848	9.782
no of observation per person	7.586	5.437	7.737	5.315
no of person-years	6536.683		7119.813	
number of firms	All firms			
average firm size	231.383			
average number of observation of same firm	11.669			
	5.025			

Figure 2. Distribution of elapsed firm tenure and age for women

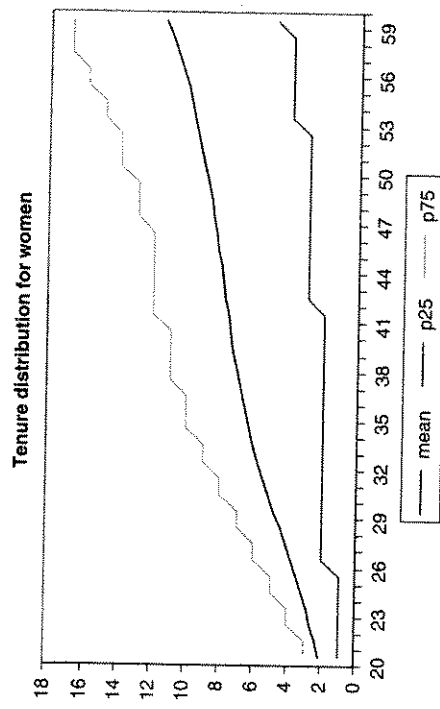
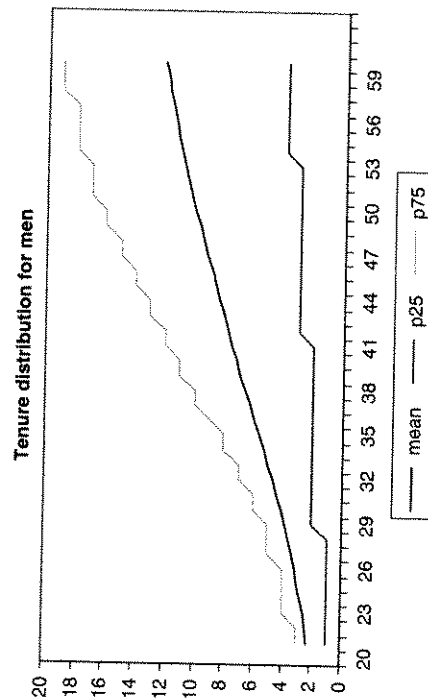


Figure 3. Distribution of elapsed firm tenure and age for men



almost 5% lower at the beginning of the labour market career and it is almost the same from the age of 41.

The empirical mobility pattern can also be described as the mean number of jobs held so far for a specific age group as in Figure 5.

Figure 6 shows that the mean average earnings gain from moving to a different firm is about twice the earnings growth obtained by staying with the same firm for a young person. This gain should be understood as the immediate

Figure 4. The probability of changing firm for men and women as a function of age

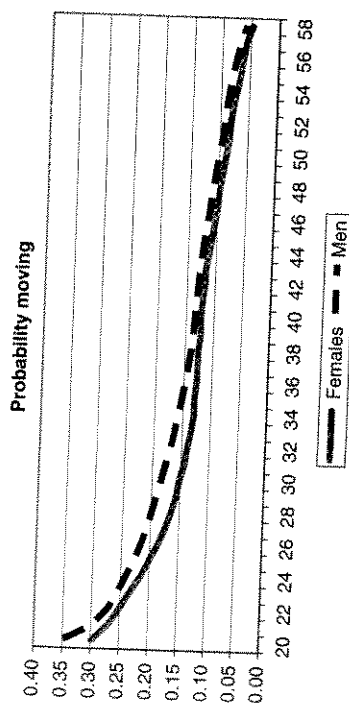
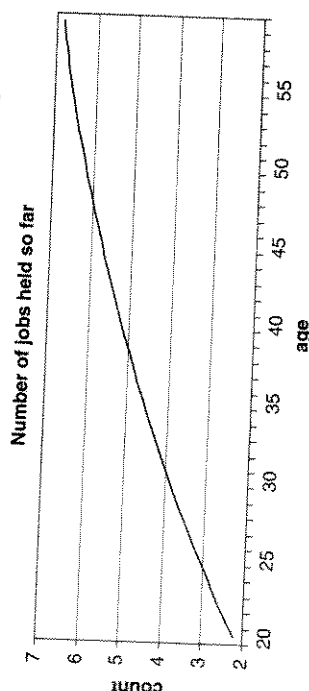


Figure 5. Mean number of jobs held until a given age



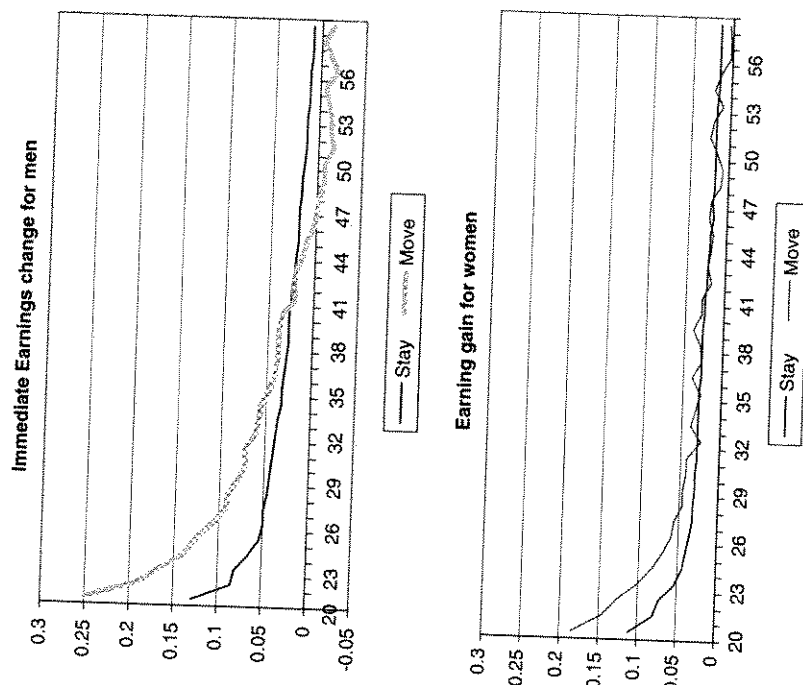
earnings gain from one year to the next, but it says nothing about the wage growth in the periods following a move.

Earnings changes are highly related to age. For men and women up to a certain age there are, on average, substantial wage gain from moving between employers.

Furthermore, women stop gaining from job changes already from age 30, but there is no direct loss compared to stayers. For men the gains continue until 40, but thereafter they face a relative loss in wage compared to stayers. After 47 this turns into an absolute loss in wage. The latter result could be due to the build-up of firm-specific human capital with age, or a layoff.

Finally, we have in Figure 7a described the distributions of these gains. These show that mobility is not always related to higher wages. The curves for the low gainers at the 25th percentile demonstrate that there are a number of people who take wage cuts by changing employers. There are several potential explanations

Figure 6. Mean immediate earning gain from mobility between firms, by age and gender



for this: the person was laid off (unobserved to the researcher), or she takes a current wage cut in order to obtain a higher wage later due to specific training as indicated in Figure 1.

In Figure 7b, we show the full dispersion of wage gains for a 35-year-old employee. The Graph is censored with respect to the top and bottom 1%, where outliers probably dominate.

One could easily get the impression that most of the wage gain is actually obtained in connection with job shifts. This is of course not correct because after all people do not change job every year and because they also get raises by staying with the same firm. Figure 8 summarizes the sources of the cumulative wage gain for different age groups. This is calculated as the expected wage increase over time, if the person follows the mobility patterns seen in the data and

Figure 7. (a) Distribution of wage gains by moving depending on age; (b) Distribution of wage gains for movers among 35 years olds. (10% sample)

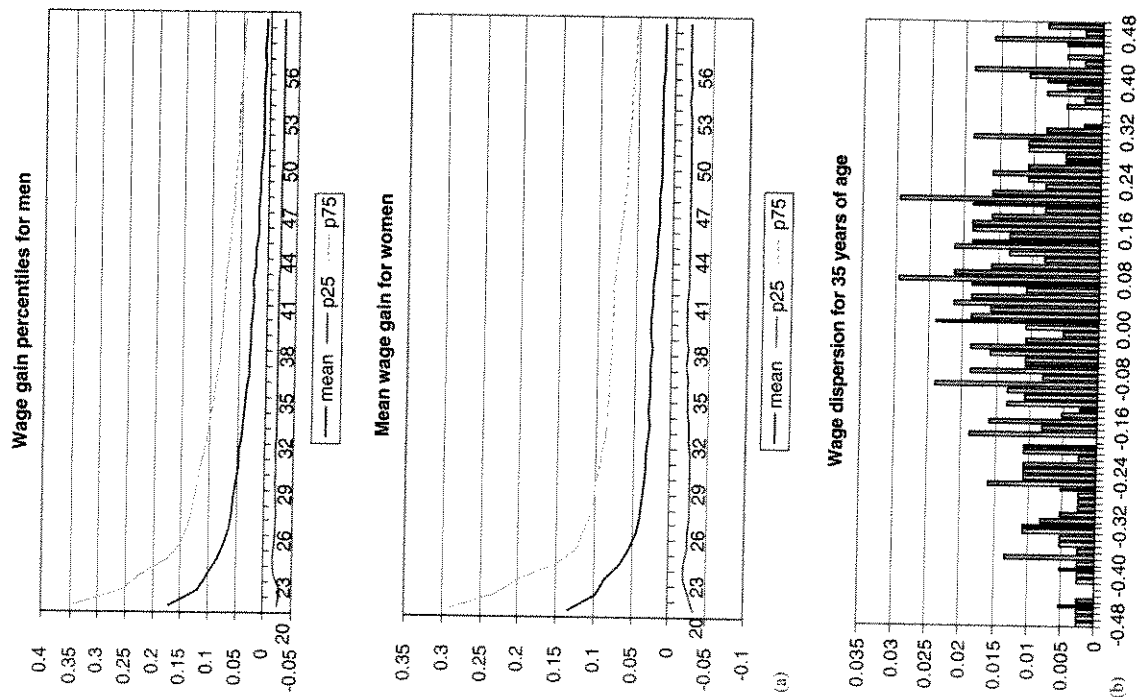
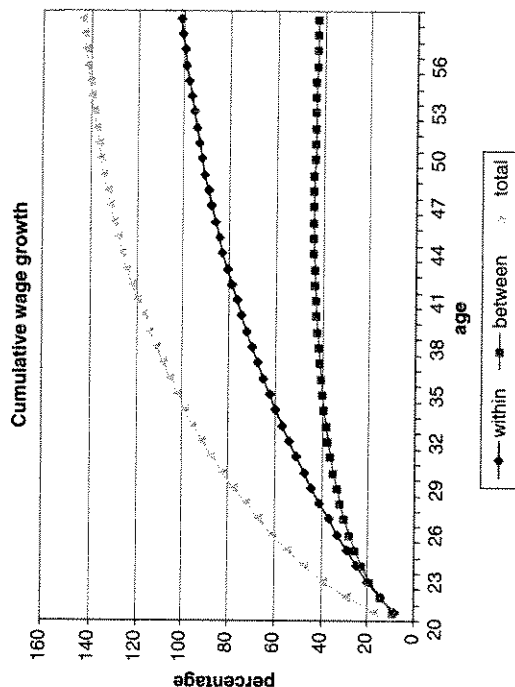


Figure 8. Accumulated wages related to job mobility and on-the-job wage growth



stays as long as the average person etc. This answers the following question: How large a proportion of the total wage growth for an average person, of a given age, is related to job changes and how much is related to on-the-job wage growth?

Figure 8 shows that high wage growth in years with mobility is still outweighed by slow, but steady growth in wages over the years when the person stays with the same employer. It also illustrates that the gain from moving becomes less and the wage growth related to staying becomes greater. This pattern could be explained by the accumulation of firm-specific human capital. Figure 6 shows that the older the person is (which is correlated with high tenure), the less wage is gained by mobility. Above 47 years of age, there is even a short run loss for men. This can also be explained by the firm-specific human capital hypothesis, because the initial loss of firm-specific human capital at the time of a job shift becomes larger and larger with age. This initial loss does not preclude subsequent wage growth in the new job.

These findings are in accordance with the results in George J. Borjas (1981). We find, as he does, that labour turnover may lead to a significantly higher wage in the new job, and that this short run effect is reduced with age. Our result – that there is an increasing return to staying at the current firm compared to moving – is also in accordance with his results.

5. Estimation

The first step in the estimation process is to obtain estimates of the wage functions. We have estimated two sets of wage functions. First, we have estimated a

Table 2. The wage functions

Irwage	Wage level		Wage growth	
	Coefficient	Std.	Coefficient	Std.
male	-0.2320	0.0084	0.0108	0.0059
meduc	-0.1028	0.0009	0.0008	0.0007
meduc2	0.0059	0.0000	0.0000	0.0000
mexper	0.0323	0.0001	-0.0032	0.0001
mexper2	-0.0006	0.0000	0.0000	0.0000
menu	0.0096	0.0002	0.0023	0.0001
menu2	0.0000	0.0000	-0.0001	0.0000
feduc	-0.1499	0.0010	0.0034	0.0007
feduc2	0.0077	0.0000	-0.0002	0.0000
fexper	0.0192	0.0001	-0.0027	0.0001
fexper2	-0.0004	0.0000	0.0000	0.0000
ftenu	0.0153	0.0002	0.0004	0.0001
ftenu2	-0.0003	0.0000	0.0000	0.0000
_cons	5.2951	0.0061	0.0407	0.0043
Number of firms	232,230		159,800	
Number of individual-years	16,104,630		11,512,370	
R ² (adj)	0.4304		0.0375	

wage function that explains the level of wages using all 16 million person-year observations. The wage function is specified with tenure, education and experience, these squared and with full gender interactions. Finally, we have estimated a firm fixed effects model. In this way, we have obtained a set of coefficients α to the X-vector of person characteristics. The firm effects are the β 's. There are altogether 232,000 different firm effects. All α coefficients are significant. The coefficients are conventional, with a lower intercept term for men but "compensated" by a higher coefficient to education, experience, but not tenure.

The second function is the wage growth function, where wage growth is regressed on the same set of variables. This is only estimated with persons who stayed in their firm in year t and $t-1$, which comprises 11.5 million observations. The wage growth equation has a set of coefficients γ to the person-specific vector X and a set of firm effects δ . There are 159,800 different firm effects (see Table 2).

In the next stage, we have used these estimates to look at several hypotheses which are in turn related to different wage concepts.

Hypothesis 1. A large wage residual gives a lower separation probability.

Thus, we define the individual wage element, *wageresidual*:

$$w_{ij} = X_{ij}\hat{\alpha} + \beta_j + \text{wageresidual}_{i,j} \\ \text{wageresidual}_{i,j} = w_{ij} - (X_{ij}\hat{\alpha} + \beta_j) \quad (5.1)$$

where w_{ij} is the currently observed wage. Thus, *wageresidual* _{i,j} is a match-specific element related to person i while employed in firm j . A high *wageresidual* means that the person gets a relatively high wage due to some unobserved match-specific characteristics. This may influence mobility in two ways: one will lower the probability of moving because he may not be able to get a similar wage at alternative employers.

Hypothesis 2. A firm that pays a higher wage than other firms will have a lower separation probability.

Here, we calculate the predicted wage in the current job which consists of the predicted wage for individual i plus the firm-specific element for firm j :

$$\text{firmwage}_{ij} = X_{ij}\hat{\alpha} + \beta_j \quad (5.2)$$

Thus, the hypothesis is that a high *firmwage* in the current (incumbent) job makes mobility less likely.

Hypothesis 3. If competing firms are paying more, separation probability is higher.

Here, we estimate the alternative wage for person i , who comes from firm j :

$$\text{alterwage}_{ij} = X_{ij}(\text{tenure} = 0)\hat{\alpha} + \hat{\beta}_j \quad (5.3)$$

where $\hat{\beta}_j$ is the weighted average of the firm effects in the firms j' , where employees in this particular firm have moved to in the past. Thus, *alterwage* expresses the wage level that a person with characteristics X_{ij} and with *tenure* = 0 can obtain in the firms where his former colleagues and their predecessors actually moved in previous years.

Hypothesis 4. Employees on fast tracks have lower separation probability.

The reason for this hypothesis is that a fast track (defined as rapid wage growth in the current firm) makes workers less likely to move because they have been selected for a speedy career. However, the converse could be true if wage compression within-firm dominates. In the latter and other cases, it is possible that high wage growth may be used as a signal for raiding employers.

Here, we estimate changes in *wageresidual*, calculated over the period $[t-1, t]$, called *dwageresidual*.

Hypothesis 5. Fast wage growing incumbent firms have less separations.

Firms with a high rate of wage growth are more attractive to stay in, because they offer better prospects. Here we calculate the change over $[t-1, t]$ in the current firm wage *dfirmwage*. Accordingly, we will expect a negative sign.

Hypothesis 6. Fast wage growth in alternative employers will increase separations.

Here we calculate the change in alternative wages from $t-1$ to t , *dalterwage*.

Finally, we have estimated two different specifications of a mobility function. Both estimations are made on a 10% sample of persons (see Table 3, Table 4.).

Table 3. Individual worker mobility probit (without firm random effects) – model estimates

	Males		Females		Males		Females	
	Coefficient	Std.	Coefficient	Std.	dF/dx	Std.	dF/dx	Std.
move	-0.2202	0.0034	-0.1391	0.0036	-0.0444	0.0007	-0.0275	0.0007
wageresidual	0.7730	0.0076	-0.6983	0.0077	-0.1558	0.0015	-0.1381	0.0015
alterwage	1.3557	0.0117	1.0886	0.0113	0.2733	0.0024	0.2152	0.0022
dwageresidual	-0.1782	0.0057	-0.2489	0.0049	-0.0359	0.0012	-0.0492	0.0010
dfirmwage	-0.0368	0.0241	0.2948	0.0237	-0.0074	0.0049	0.0583	0.0047
dalterwage	0.3719	0.0278	0.5032	0.0279	0.0750	0.0056	0.0995	0.0055
educ	0.0204	0.0024	0.0081	0.0027	0.0041	0.0005	0.0016	0.0005
educ2	-0.0018	0.0001	-0.0013	0.0001	-0.0004	0.0000	-0.0003	0.0000
exper	-0.0351	0.0005	-0.0171	0.0004	-0.0071	0.0001	-0.0034	0.0001
exper2	0.0004	0.0000	0.0001	0.0000	0.0001	0.0000	0.0000	0.0000
tenu	-0.0660	0.0005	-0.0967	0.0006	-0.0133	0.0001	-0.0191	0.0001
tenu2	0.0013	0.0000	0.0027	0.0000	0.0003	0.0000	0.0005	0.0000
_cons	-3.3377	0.0452	-2.3246	0.0466				
log likelihood	-1413778		-1520832		-1413778		-1520832	

Table 4. Individual worker mobility probit with firm random effects—model estimates

	Males		Females		Males		Females	
	Coefficient	Std.	Coefficient	Std.	dy/dx	Std.	dy/dx	Std.
wageresidual	-0.0800	0.0045	-0.1216	0.0050	-0.0206	0.0012	-0.0333	0.0014
firmwage	-0.2941	0.0146	-0.3931	0.0137	-0.0758	0.0037	-0.1076	0.0037
alterwage	0.3147	0.0224	0.0705	0.0214	0.0811	0.0058	0.0193	0.0059
dwageresidual	-0.3023	0.0073	-0.2679	0.0067	-0.0779	0.0019	-0.0733	0.0018
dfirmwage	-0.5119	0.0322	-0.3650	0.0301	-0.1320	0.0083	-0.0999	0.0083
dalterwage	0.1977	0.0430	0.2241	0.0402	0.0510	0.0111	0.0613	0.0110
educ	-0.0311	0.0040	-0.1102	0.0045	-0.0080	0.0010	-0.0302	0.0012
educ2	0.0009	0.0002	0.0052	0.0002	0.0002	0.0001	0.0025	0.0001
exper	-0.0202	0.0009	-0.0091	0.0006	-0.0052	0.0002	-0.0025	0.0002
exper2	0.0001	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
tenu	-0.0684	0.0008	-0.0588	0.0009	-0.0176	0.0002	0.0161	0.0002
tenu2	0.0018	0.0000	0.0016	0.0000	0.0005	0.0000	0.0004	0.0000
_cons	-0.0890	0.1005	1.7696	0.0960				
log likelihood	-944277.67		-945850		-944278		-945850	
N	3,796,464		4,155,230		3,796,464		4,155,230	
Number of groups	65,505		73,483		65,505		73,483	

6. Discussion

The first type of estimation is probit ignoring firm-specific heterogeneity (Table 3) whereas the second is a firm-wise random effect probit (Table 4). The latter

method takes account of the fact that we observe several workers in the same firm. Thus, we are in this method controlling for unobserved firm effects. Examples could be a pleasant working environment, subsidized leisure facilities, poor leadership, decent canteen, etc. But it could also be the use of different HRM methods, see Batt (2002). The main difference between the two methods is that the wage growth at the incumbent firm, $dfirmwage$ becomes negatively signed in the firm-wise random effect model according to priors, because we are now controlling for firm effects. This suggests that non-pecuniary elements may play an important role. Almost all of the variables are highly significant in both types of estimation and for both genders.

High wage level $firmwage$ and growth $dfirmwage$ help to retain workers.

Coefficients on match-specific effects $wageresidual$ and $dwageresidual$ both have negative signs, indicating that the “worker-firm unobserved component” explanation dominates the wage constraint hypothesis. Similarly, it is found that people on “fast track” are actually less likely to move than other employees.

The wage level and growth of the wage in competing firms has a positive sign in all specifications confirming our Hypotheses 3 and 6.

Finally, the individual control variables show that higher education induces more mobility, experience and tenure both diminish mobility.

Comparing these coefficients it is reassuring that the two most important factors are the incumbent firm effect, $firmwage$ and the wage level at the competing firm, $alterwage$ and corresponding growth variables. For women, these variables have almost numerically the same impact on the decision to move, but it is interesting that wage growth in competing jobs has a somewhat larger impact than the wage growth of incumbent firm. For men, the immediate wage difference in levels is most important and wage growth in competing firm has less impact than wage growth in incumbent firm. Comparing the marginal effects for men and women, it can be seen that females are generally less responsive to wage differentials. This probably reflects that other issues play a bigger role for women in their decision to stay or move. Thus, this adds to the factors that may result in lower wages for women compared to men.

Subsequently, we have run regressions on different subsets of data. In one case, we limited the sample to surviving firms since leaving a closing firm constitutes a different problem because there is no possibility staying on. Limiting the sample to surviving firms actually sharpens our results as we get more significant estimates with the expected signs. A similar situation arises, if the person is fired. See Kletzer (1998) for a survey of US work based on Displaced Worker Surveys. The problem here is, however, that we do not observe a firing. A simple but unjustified method would be to exclude from the estimation persons with a spell of unemployment between two jobs. The result here is also more significant, but without important changes in coefficients. Finally, we have run the probability functions for people belonging to different areas of wage bargaining. Here we are using Unemployment Insurance fund membership as a proxy for Trade Union and the bargaining procedure. Results are indicated with signs in Table 5.

Most of the signs are in accordance with our general results presented so far. The main reason for deviations seems to be differences in number of observations and size of groups.

7. Conclusions

We have shown that high job mobility in Denmark may be (partly) explained by a model, where workers seek the best pay schemes and they do this by jumping between wage trajectories of different firms. This explanation is compatible with a search explanation, though our hypothesis is that the main mechanism is by competing firms making offers through raiding.

We have proposed a model for mobility that for each period compares the wage obtained at the current firm with an assumed outside offer. Our task has been to test if the relative wage differential between the current job and the competing job is a determinant of the mobility decision. We have operationalized the wage differential into different elements, and these are defined according to the wage level of the current firm and the competing firm. Furthermore, we have defined concepts of wage growth in the current and the competing firm.

The main result is that people tend to move if they can get a higher wage level in other firms. Differences in wage growth are also important. Men are more likely to move than women due to a competing firm offering a slightly higher wage level than the incumbent firm. The reverse is true with regard to wage growth prospects inside and outside the current firm, whereby women are more responsive than men.

Our model shows that wage differentials play a key role in explaining the high level of labour turnover in Denmark. This does not exclude the possibility that other factors such as work environment, unobserved career opportunities and fringe benefits may play a role. Indeed, our intermediate results show that these firm related factors do indeed play a role. Only when controlling for these unobserved factors do we obtain sensible coefficients to all of the wage elements. The model also demonstrates that the wage policy of firms may be important in retaining key personnel.

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Table 5. Signs and significance in trade union probits (random firm effects)

Men	SID (workmen)	HK (office clerks)	FTF (salaried employees)	Kristelge (yellow)	Metal workers	Managers	Engineers	Professionals	Sales agents	Technicians	Non-insured	Other fund	Women	KAD (workers)	HK (office clerks)	Non-insured	Other funds	ns = non-significant at the 5% level.
	-	-	-	ns	-	-	-	-	+	-	-	-	-	+	-	+	-	
	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
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	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
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