Moving or Staying?
Job Mobility as a Sorting Process.

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Abstract

This thesis constists of three papers dealing with labour mobility. In paper [I], I study the effects of job change for wage growth. Job change is assumed to influence wage growth and productivity for both job movers and job stayers. I find that returns on work experience are higher for job movers, both before and after job change. This contradicts the hypothesis that job stayers have higher returns to work experience as an effect of investing time in aqcuiring job-specific skills. In addition, I find that the returns on work experience do not improve for job stayers, when job changers quit. This means that productivity among job stayers is not affected by selective termination of bad matches. I find no evidence to support that job mobility increases productivity for job movers, which indicates that job mobility acts mainly as a sorting device, sorting workers into jobs they are most suited for.

In paper [II], I study the effect of job change on wages and income, as well as on wage and income growth, allowing for multiple job changes. I assume that match quality is partly due to outcome of the individual's career decisions up until the time of observation. The individual's career history can signal to the employer the quality of current and previous matches, which may affect the wage path. I find that each job change increases wage and income growth between 1981 and 1991, but that there is no evidence to suggest that job changers have higher wage and income levels in 1991. This result is constistent with a scenario where job changers, through mobility, catch up the higher wages earned by job stayers. I also find some evidence to suggest that job movers are adversely selected, i.e. that job changers are drawn from a pool of workers who were predominantly 'bad matches' in 1981.

In paper [III] I study the determinants of long and short distance migration. I estimate a multinomial logit model, to ascertain whether the determinants of migration differ between the choices of migrating long or short distances. I find that increases in pre-migration income decreases probability of migrating a long distance, while pre-migration income has no effect on the decision to move a short distance. The higher the education level, the higher the probability of long distance migration,

while education level has no effect on the probability of short distance migration. Dependence on unemployment benefits increases the probability of both short and long distance migration. I find no effect of local fiscal characteristics or local labour market characteristics on the probability of either long or short distance migration.

Keywords: Labour mobility, migration, wage growth, job match quality

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Umeå 22 April 1998

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The thesis consists of this summary and the following three papers:

[**I**] Job Mobility, Wage Growth and Match Quality in Sweden.

[**II**] Multiple Job Changes and Adverse Selection in the Swedish Labour Market.

[**III**] Determinants of Long and Short Distance Migration in Sweden.

1 Introduction

An efficient allocation of labour is important, partly for productivity and general welfare, but it is also important for the individual worker, as labour income constitutes the largest source of income for the majority of households. Job mobility is necessary as new economic opportunities appear, and old ones disappear continuously, and reallocation of labour may be necessary to achieve and maintain a desired level of welfare.

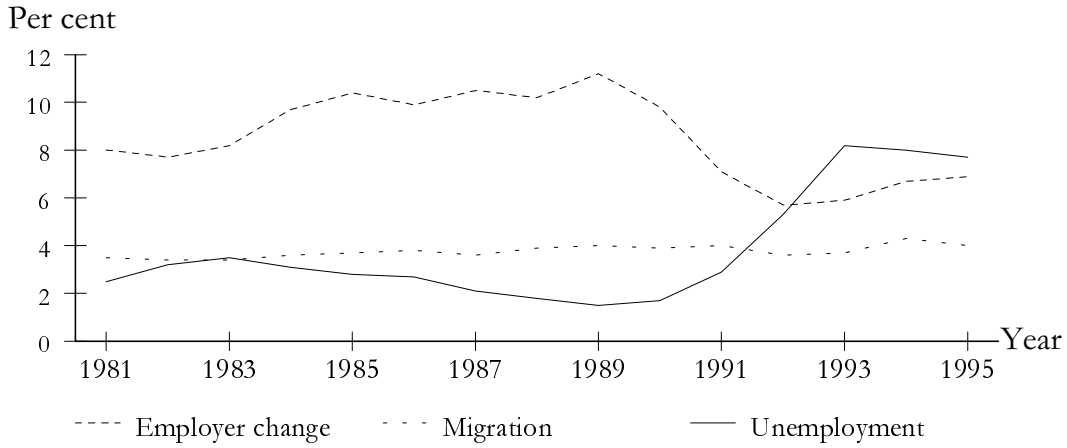
Between five and ten per cent of the labour force change employer and approximately four per cent of the population migrate each year in Sweden.[1] Migration is fairly stable, while employer change is more common during periods of high economic activity and low unemployment. Figure 1 shows the frequency of employer change, migration and the unemployment rate. During the second half of the 1980's - a period of economic boom and low unemployment - employer change was high and reached a peak in 1989, when 11.2 per cent of the employed changed employer. During the recession of the 1990's, the rate of employer change decreased drastically, and was at a low of 5.7 per cent in 1992.

This thesis deals with individual choices concerning job mobility and migration. Research within these categories has covered a large field of topics. Some recent examples are Groot and Verberne (1997), who study the effects of ageing and job characteristics on the probability of job change. Keith and McWilliams (1997) study mobility and wage growth patterns for men and women. Westerlund and Wyzan (1995) study the importance of local fiscal characteristics on the migration decision. Lundborg (1995) studies the effects of tax reductions on job mobility. In this thesis, I concentrate on how mobility decisions are generated, and the consequences this might have for the interpretation of the gains and determinants of mobility. Below, I discuss how to view mobility decisions, and the implications for the expected gains from mobility.

Labour reallocation is an action taken by the individual in the hope of increasing

[1] Migration is defined as a move across municipality border.

Figure 1: Frequency of employer change, migration and unemployment in Sweden 1981-1995.



Source: Statistics Sweden.

earnings capacity. Labour mobility can be seen as an investment in human capital; the worker invests in mobility, with the expected payoff being the higher earnings associated with a move. This idea dates back to Sjaastad (1962), who studied migration as investment in human capital.[2] Another way of looking at the mobility decision is to see mobility as the outcome of a search and sorting process. An individual can learn about where his comparative advantage is by trying different kinds of jobs. During his working life, an individual may change jobs several times - in Sweden, one can estimate that an individual will have on average three to five employers. Job mobility is more common among the young, and as more time is spent in the labour market, the frequency of job change falls. The individual invests time in search for a new job, and the outcome of this investment (should it pay off)

[2]Other studies have followed since, see e.g. Greenwood (1985) for a survey of studies where migration is seen as investment in human capital, or Osberg (1991) and Kidd (1991) for studies on job change. For Sweden, Holmlund (1984) is an extensive study of both migration and job change.

is the mobility decision.[3]

If mobility is the outcome of a search and sorting process, it may be necessary to slightly adjust the way we look at mobility decisions, and how to measure the gains from mobility. Firstly, which factors are important to the decision to change job or to migrate? Secondly, how should the gains from labour mobility be measured and interpreted? Mobility may affect not only wage levels, but also the way in which wages grow. Mobility may also have effects on wage levels and wage growth for those who choose to stay. The first two papers in this study deal with how to measure and interpret wage effects due to mobility, and the third paper deals with how determinants of migration might differ for long and short distance migration, hypothesising that long distance migrations are more often related to labour market reasons than short distance migrations.

Career decisions, i.e. decisions to move or stay, and wages are determined simultaneously, and at the time the individual is observed, a number of career choices have been made up to the time of observation. Since this is the case, the effects of both job mobility and job duration should be acknowledged, when the gains from mobility are estimated. A central point in this thesis is, that the decision to stay is of importance when studying the gains from mobility. Some earlier studies have pointed out this fact, while in this thesis, the decision to stay is studied simultaneously with the decision to move.[4]

The main question associated with the decision to stay is whether and how wages rise with job duration. Wages can rise with job duration if workers build up job-specific skills which raises their productivity.[5] Other reasons for wages to rise with job duration are e.g. that an upward sloping wage-seniority structure can act as

[3]Herzog et. al. (1993) is a survey of studies where migration is seen as the outcome of search, and Hartog and van Ophem (1994) study employer change as the outcome of search.

[4]Altonji and Williams (1993), acknowledge that job change and job duration are connected.

[5]Mincer and Jovanovic (1981) and Bartel and Borjas (1981) point out that if some workers invest time in acquiring job-specific skills, their productivity should increase relative to other workers in the firm. As a consequence, workers who invest in job-specific skills should be less likely to quit, and wages will rise with job seniority.

a screening device to ensure low employee turnover,[6] or that this gives employees an incentive not to shirk.[7] On the other hand, the empirically observed positive relationship between wages and job duration may be due to the fact that mainly 'good matches' stay.[8]

Wages and productivity for the individual can be explained partly by observable characteristics, e.g. education and labour market experience. However, part of the wage is due to unobservable components such as the individual's ability and how well individual skills match the requirements of the job, a component that may be called 'match quality'. Burdett (1978) argues, from a theoretical standpoint, that employed search is more common at low income levels, and that search activity decreases as income increases.[9] Jovanovic (1979) argues that match quality will have an impact not only on wages and wage growth, it will also affect mobility decisions made by the individual. Since a person is assumed to change jobs because changing jobs will increase his earnings capacity, labour mobility can be seen as a process where workers are sorted into jobs where their productivity is high - see e.g. Topel and Ward (1992).[10] This 'search and sorting' way of looking at the mobility decision will have an impact not only on the determinants of mobility, it also has implications for how the gains from mobility should be measured.

[6] Salop and Salop (1976).

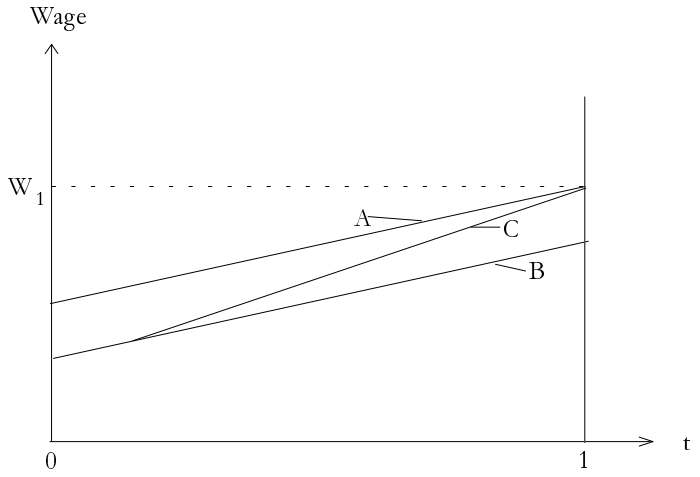
[7] Lazear (1981).

[8] Abraham and Farber (1987) and Altonji and Shakotko (1987) argue that if 'good matches' stay, and 'bad matches' quit, there may be a positive correlation between unobserved factors in the decision to stay (i.e. match quality) and observed wages. This means that a positive relationship between job duration and wages does not necessarily mean that individuals build up job-specific skills.

[9] Antel (1988), in an empirical paper, tests the implications of utility maximising behaviour, allowing for employed search, and finds that workers who engage in employed search are less likely to quit again, since they get higher utility jobs.

[10] Most models of the individual's job change decision predict that bad matches will quit. Lazear (1986) argue the opposite, that predominantly 'good matches' will change jobs. Rival firms will spot high productivity employees and 'raid' them. Support for this hypothesis is found in e.g. Garen (1989).

Figure 2: Catching up.



An individual earning a low wage (in relation to his skills) can, through mobility, 'catch up' to the wage level earned by others. Assume that two individuals are observed at $t = 1$. We would like to know whether job change increases earnings. Consider Figure 2. Path A is the wage path for the 'good match', the job stayer employee, from $t = 0$ to $t = 1$. Path B is the wage path for the job mover, if he would have stayed and assuming that he would have the same growth rate as the job stayer,[11] while path C is the wage path for an individual who moves, given that he moves after $t = 0$. Now assume that the job mover in all observable characteristics is like the job stayer, the only observable difference is, that he earns a lower wage than the job stayer at $t = 0$, i.e. he is not as good a match at the job held at $t = 0$. If the wage levels at $t = 1$ are compared, there will be no difference in wage levels

[11]This could be an overstatement. Antel (1986), for example, argues that if workers specialise in investments, so that those who invest in job specific skills choose to stay, and those who invest in job search are more likely to move, the growth rate for those who invest in search might well be lower than the growth rate for those who invest in job specific skills, if they do not find a better job offer and move.

between the job mover and the job stayer, both will earn W_1, and the only observable difference would be that one has changed jobs, the other has not. Some unobservable factors decide who moves and who stays, and one of those unobservable factors is match quality at $t = 0$.[12] If job movers have lower average match quality than job stayers, at some earlier date, they will be more likely to change jobs. Hence, even if there is no difference in wage levels between job movers and job stayers at a specific point in time, job change may have a positive effect on wages and productivity, since mobility has 'sorted' workers into the jobs where their wages are highest. Sorting would imply that individuals change jobs as long as wage levels and wage growth are lower than wage levels and wage growth for observably similar job stayers (who are assumed to have found their best match). Topel (1991) suggests that if we observe individuals at a given point in time, differences in observed job duration depend on whether or not the individuals have found the best wage offer. Workers with long job durations have found their best offer earlier than workers with short job durations - or, job changers had, at $t = 0$, not found the offer that was the best in $t = 1$.

There is no straightforward definition of match quality. A useful interpretation could be differences in wages not explained by observable factors like education and labour market experience, a definition used in paper [II]. Another measure of match quality can be obtained by allowing the returns on human capital to differ between groups. In this case, match quality could be interpreted as the difference in returns on human capital between groups. This definition of match quality is used in paper [I]. Which definition to use is not obvious - if job stayers and job movers are forced to follow the same wage growth pattern, calculation of the gains of mobility is easy. On the other hand, by recognising that job movers and job stayers may have different wage growth structures, and that these growth structures may be affected by mobility, there is no simple way to calculate the gains from mobility. The choice

[12] An empirical observation of the effect of this phenomenon (however not explained this way) can be found in e.g. Björklund and Holmlund (1989). They find that job change has no effect on wage levels in 1986, while job change has a positive effect on wage growth between 1984 and 1986.

of which definition to use depends on the problem to be studied, and is a matter of convenience for the problem at hand.

The first two papers deal with how to measure and interpret wage gains due to mobility, while the third paper deals explicitly with the determinants of migration. Long distance migration is most likely associated with a change of jobs, and is more often made for labour market related reasons.[13] Short distance migrations, on the other hand, might be motivated by other reasons, e.g. local taxes, housing standard and costs, the quality of publicly provided services, or other characteristics of the community of residence. Therefore, income prospects, pre-migration income and labour market characteristics might be more important in explaining long distance migration than short distance migration, while short distance migration might be explained by differences in e.g. local fiscal characteristics, or intangible qualities of the communities.

2 A Summary of the Papers

In the first and second papers, I have chosen to study employed individuals in gainful employment in both 1981 and 1991. In the third paper, the chosen sample consists of males aged 20 to 40 years old in 1981 who had taxable income from gainful employment every year from 1979 to 1990. The data set used in all three papers this study is the Level of Living Survey. The Level of Living Survey is a longitudinal survey of a cross-section of the Swedish population. For a presentation of this survey, see Eriksson and Åberg (1987).

Paper [I]: Job Mobility, Wage Growth and Match Quality in Sweden

In studies on employer change, it is commonly assumed that productivity and wages are affected by job change only for those who actually change employer. In paper [I], I assume that productivity for workers remaining with their employer may

[13] Harkman (1988) found that, in a set of young unemployed, almost fifty per cent of migrations across county border were made for labour market reasons.

also be affected by mobility.

The model in paper [I] has two sources of wage growth; wages grow because (a) the worker accumulates additional human capital, and (b) because the returns change on earlier accumulated human capital. The change in returns on earlier accumulated human capital is interpreted as productivity effects of job mobility. If matches with low returns on human capital, i.e. 'bad matches', are terminated, the returns on earlier accumulated human capital could increase for job stayers, as marginal productivity increases when bad matches quit. Conversely, if the 'good matches' quit, returns on earlier accumulated human capital should decrease for those who stay. Workers who change employer do so because the expected wage growth is higher with the new employer - he expects to be a better match at the new job. If turnover does not improve productivity, turnover may be seen as a sorting mechanism which ensures high wage growth to highly productive workers.

The general model in paper [I] is based on mobility affecting the average match quality for *both* job movers and job stayers, i.e. returns on human capital are allowed to change over time (with mobility) for both job movers and job stayers. The assumption that mobility has no effect on match quality, i.e. returns on earlier accumulated human capital is constant over time, is tested as a first special case. The assumption that mobility affects average match quality for job movers, but not for job stayers, is tested as a second special case. This is accomplished by allowing returns to earlier accumulated human capital to change for job movers, but not for job stayers.

I find that job movers have higher returns on human capital than job stayers, both before and after job switch. This would imply that job movers are generally better matches. If staying workers invest in job-specific skills, the returns on work experience should be higher for staying workers. Since there is no empirical evidence that returns on investment in work experience are higher for job stayers, I conclude that skills accumulated through work experience are transferable across firms. Improvements in match quality due to mobility is measured by increased

returns on earlier accumulated human capital. I find that returns on human capital do not improve as a consequence of mobility. As returns on human capital do not improve either for job movers or for job stayers, I cannot refute that productivity is unaffected by labour market turnover. This means that wage growth patterns for job movers and job stayers are accurately described by wage paths A and C in Figure 2, while path B remains unidentified. Identifying path B in Figure 2, which is necessary to calculate individual gains from mobility, is left to paper [II].

Paper [II]: Multiple Job Changes and Adverse Selection in the Swedish Labour Market

If individuals at the bottom end of the wage distribution are more likely to change jobs, this may have consequences for estimating the wage gain due to job mobility. In paper [II], I extend previous studies by assuming that the individual's career history may signal to an employer the quality of the current and previous matches. Consequently, I simultaneously consider the effect of job change and job duration on wages and wage growth, while taking into account that these observed indicators of match quality partly depend on the individual's past career decisions. I also acknowledge the fact that each job change should have an impact on wages, by allowing for multiple job changes.

I start by noting that wages and productivity are partly determined by an unobservable factor, match quality, that describes the productivity of a specific employee at a specific job. Match quality depends on the characteristics of the employer and of the job, as well as on the individual's career history.

At the same time, the individual's career history may signal to an employer the quality of the current and previous matches. If an individual has a career history of many employer changes, and short job duration, this may signal to a prospective employer that the employee is 'low quality' or unreliable. The employer wants to construct a payment scheme which increases the likelihood for good quality matches to survive, and bad quality matches to dissolve. A high wage and high wage growth will make fewer outside wage offers favourable for good quality matches, and hence

good quality matches are not so likely to dissolve. A 'poor quality' match is more likely to dissolve; employers may be more likely to lay off and/or withhold wage growth or other perks to poor quality matches, which makes more outside wage offers favourable. Match quality depends on career choices, which are the outcome of the utility maximising individual's choices, and these career choices signals to the employer the quality of previous and current matches. As the employer's assessment of match quality partly determines wages, both job change and job duration are treated as potentially endogenous. If low ability workers quit, this might mean that the potential wage gain from mobility is underestimated and the potential wage gain due to job duration might be overestimated, if potential endogeneity is not considered.

I find that each job change increases wage and income growth substantially. By comparing the estimates of parameters in a wage equation corrected for endogeneity, with the parameter estimates in a wage equation which is not corrected for endogeneity, I also find that there is some evidence that job changers were adversely selected. Job duration has no effect on wage growth. There is no evidence that the returns to job duration are overestimated as a consequence of job stayers being mainly 'good matches'. I find no effect of job change on wage levels in 1991, i.e. other factors held constant, there is no difference in wage levels which is explained by the individual's career history. In other words, the wage paths for job movers and job stayers look much like those in Figure 2.

Paper [III]: Determinants of Long and Short Distance Migration in Sweden

Paper [III] is a study of the importance of pre-migration characteristics, such as income, demographic factors and characteristics of the current municipality of residence, on the decision to migrate from a municipality. The question to be answered is whether the determinants of migration differ between those who choose to migrate a short distance (within the county) and those who migrate long distances (across county border).

In this paper, I study what factors determine long and short distance migration by using a ten year panel with individual observations on migratory behaviour, personal characteristics and information about the municipality of residence. These data allow me to assess the impact of personal characteristics, local labour market conditions and the local fiscal structure on long and short distance migration, while recognising the simultaneous and mutually exclusive nature of migratory choices.

Long distance migration is to a greater extent associated with job change. Foregone consumption possibilities if one moves is the income foregone at the current place of residence. Hence, pre-migration income should be important for the decision to migrate across county border. Long distance migration is thought to be determined by income and personal characteristics, and characteristics of the local labour market. Short distance migration, on the other hand, may be viewed as the household choosing a set of characteristics of the municipality of residence.

I find that a one per cent increase in pre-migration income decreases the probability of long distance migration substantially. Pre-migration income has no effect on the probability of short distance migration. The degree of dependence on unemployment benefits is of importance for the probability of both long and short distance migration; the likelihood of migration increases as the dependence on unemployment benefits increases. Despite this, local labour market characteristics, such as the number of unemployed per vacancy or the availability of labour market programs, have no explanatory power for the decision to migrate. Number of years in school has a positive effect on long distance migration; a one per cent increase in schooling increases the probability of long distance migration by approximately three per cent. These results may be interpreted as if long distance migration is an action taken to increase earnings potential, while short distance migration is mainly done for other reasons, not due to perceived gains in earnings potential.

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Job Mobility, Wage Growth and Match Quality in Sweden

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Abstract

In this paper, I study the impact of mobility on wage growth. Mobility is thought to influence wage growth for both job movers and job stayers. I find that returns on labour market experience are higher for job movers than for job stayers, both before and after job switch. This contradicts the conclusion that job stayers have steeper wage profiles as a consequence of investing in firm specific training. Furthermore, terminations do not improve the returns on human capital for job stayers. This contradicts the assumption of improved average job match quality as an effect of selective termination of bad matches. I find no evidence to support that average job match quality improves over working life, and average job match quality is unaffected by job mobility.

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1 Introduction

In labour turnover studies, the effect of turnover is usually studied for either job movers or job stayers. Voluntary labour mobility can be seen as the outcome of a search process, where job movers receive a mobility premium exceeding mobility cost, necessary to induce mobility. But when some workers quit, this may effect the wage growth of job stayers.

In this paper I study the wage growth behaviour for both job movers and job stayers among a set of Swedish workers employed in 1981 and 1991. Job mobility is defined as a change of employer between 1981 and 1990. The hypothesis that mobility decisions affect wage growth and average job match quality for both job movers and job stayers is tested and rejected.

Jovanovic (1979) concludes that if job match quality is unobserved before a match is entered into, job tenure and quits are affected by the quality of the job match, since bad matches are more likely to dissolve. If wages reflect individual productivity, bad matches have low returns on their human capital, which means that a greater number of alternative wage offers are deemed favorable. An employer could also be more inclined to lay off bad matches.

If job match quality influences quit behaviour, wage growth for job stayers should be affected by the rate and composition of quits. Altonji and Shakotko (1987) and Abraham and Farber (1987) hypothesise that selective quits could be the reason for the commonly observed positive relationship between job tenure and wage growth. They find that when job match heterogeneity is taken into consideration, the effect of tenure *per se* on wage growth is substantially reduced.

Another problem when comparing wage growth for job stayers and job movers is, that workers may tend to specialise in investments. Mincer and Jovanovic (1981) and Bartel and Borjas (1981) find that if some workers invest in firm-specific human capital, their productivity increases relative to other workers within the firm, and hence they are less likely to quit. Different investment behaviour could indicate that there are differences in the slope of the wage equation between job stayers

and job movers. Job movers, who invest in job search, should have a flatter wage-experience profile, i.e. lower returns on work experience, than job stayers, who invest in firm-specific human capital. Wage growth for job movers, who invest only in job search, is later compared to wage growth for job stayers, who specialise in investments in firm-specific human capital. Consequently the mobility premium could be underestimated, since the alternative wage, i.e. the wage recieved had the worker not moved, is determined by the investment behaviour. Antel (1986) studies and tests the above hypothesis. He finds that when investment specialisation is taken into account, the gains from mobility are significantly positive, although earlier studies showed the gains of mobility to be negligible.

If employer change is voluntary, the moving worker should have higher wage growth if she changes employer than if she stays. The standard human capital investment approach to labour mobility implies that mobility is driven by improved returns to human capital. The worker invests in job search in order to find a better job match, i.e. a job where skills are valued more highly than in the current job. However, most models of wage growth due to mobility only allow for an increase in average productivity. As job mobility may affect the slope and curvature of the wage equation, the effect of mobility on average productivity may be indeterminate. Liu (1986) studies the effect of job mobility within and between firms, and finds that the rate of return on investments in schooling increases with time, indicating that a series of matches which raises productivity take place within and between firms.

Mortensen (1988), in a theoretical paper, compares job match quality and the accumulation of firm-specific human capital as determinants of quits, and concludes that these two hypotheses lead to similar quit behaviour. On the other hand, the wage growth patterns should be different for the two models; this makes it possible to create testable hypotheses. As an example, if job stayers invest in firm-specific human capital more than job movers, the returns on investments in work experience should be greater for job stayers. On the other hand, if wage growth for job stayers is due to selective termination of bad matches, returns on all skills should increase

for job stayers.

Labour mobility is expected to improve wage growth for both job stayers and job movers. For a set of employed workers, the returns on investment in human capital - interpreted as average job match quality - are expected to increase over time.

In this paper, a general model of wage growth will be estimated under three different assumptions about the impact of mobility on match quality. The general assumption is that mobility affects the average match quality for both job movers and job stayers. The assumption that mobility has no effect on match quality, is estimated and tested as a first special case. Finally, the assumption that mobility affects average match quality for job movers, but not for job stayers, is tested as a second special case. In section 2, I present the wage growth equations to be estimated and the hypotheses to be tested in each special case. Section 3 contains a short description of data and the econometric specification of the wage growth equation. Estimations and the results of the hypothesis tests are presented in section 4. Conclusions are found in section 5.

2 Theoretical Discussion

In this section, I describe the wage level and wage growth equations which are used to compare wage growth behaviour between job movers and job stayers. I also present two special cases of the model and the hypotheses which are to be tested in greater detail.

2.1 The Wage Equation

In a standard human capital model, used here as a point of departure, wages depend on the amount of schooling and labour market experience or on-the-job training. The natural log wage, $\ln w$, for individual i at time t is given by:

$$\ln w_{it} = (\alpha_{ct} + \alpha_{ci}) + \alpha_{st} SCHOOL_{it} + \alpha_{xt} EXP_{it} \tag{1}$$

where $SCHOOL$ represents years of schooling and EXP is a measure of labour market experience. The intercept in the wage equation consists of a part common to all individuals (α_{ct}) and an idiosyncratic component (α_{ci}). The individual part of the intercept captures time invariant unobserved heterogeneity between individuals, e.g. ability and ambition. The part of the intercept common to all individuals captures productivity changes and changes in demographic structure, and is therefore allowed to change over time.

Additional schooling affects log wages linearly, each additional year of schooling raising wages α_{st} per cent at time t. This percentage is called the returns on schooling.

In empirical studies, it is commonly observed that additional labour market experience is valued higher at the beginning of one's working life, and that the value of additional labour market experience decreases with working age. The conventional way of modelling the effect of labour market experience is to incorporate years in gainful employment and the square of this measure. This method has some drawbacks: 1) If labour market experience is measured in years in gainful employment absence from the workforce does not reduce wage growth and earlier experience is never depreciated, and (2) when we study wage growth for economically active workers, the growth of labour market experience EXP is almost fully explained by time elapsed, and variation in the change of EXP is low, which may create statistical problems.

The method used in this paper to deal with the expected wage - experience profile is to measure experience as the proportion of life spent in gainful employment. This way, one additional year in employment will have a declining influence on wage growth as workers grow older, as one additional unit of experience takes longer to achieve. The value of each additional "unit of experience" is assumed to be constant - each additional "unit of experience" (literally lifetime spent in gainful employment) raises log wages α_{xt} per cent. This is called the returns on experience. Higher returns means that the wage - experience profile is steeper.

Consider a worker i employed at two points in time $t = 0$ and $t = 1$. Mobility status $j = \{s, m\}$, where s represents a job stayer and m a job mover, is observed at $t = 1$. The move may have occurred at any time between $t = 0$ and $t = 1$. Wage growth between the two points in time, G_i^j, may be measured by a growth factor and the wage growth for individual i, given mobility status j is described by:

$$\begin{aligned} G_i^j &= \ln\left(\frac{w_1^j}{w_0^j}\right) = \ln w_1^j - \ln w_0^j \\ &= \left(\alpha_{ci}^j + \alpha_{c1}^j\right) + \alpha_{s1}^j SCHOOL_{i1} + \alpha_{x1}^j EXP_{i1} \\ &\qquad - \left[\left(\alpha_{ci}^j + \alpha_{c0}^j\right) + \alpha_{s0}^j SCHOOL_{i0} + \alpha_{x0}^j EXP_{i0}\right] \qquad (2) \\ &= C^j + \alpha_{s1}^j \Delta SCHOOL_i + \alpha_{x1}^j \Delta EXP_i + \beta_s^j SCHOOL_{i0} + \beta_x^j EXP_{i0} \end{aligned}$$

where α_{s1}^j and α_{x1}^j are the returns to additional schooling and experience at $t = 1$, and $\beta_s^j = \left(\alpha_{s1}^j - \alpha_{s0}^j\right)$ and $\beta_x^j = \left(\alpha_{x1}^j - \alpha_{x0}^j\right)$ are the changes in returns on the initial human capital endowment between periods. $\Delta SCHOOL$ and ΔEXP represent the change in the human capital endowment between $t = 0$ and $t = 1$. The intercept captures changes in the average productivity specific to each mobility choice j: time invariant unobserved heterogeneity between individuals is cancelled out, so the constant C captures wage growth due to improvements in general productivity. The intercept is $C^j = \left(\left(\alpha_{ci}^j + \alpha_{c1}^j\right) - \left(\alpha_{ci}^j + \alpha_{c0}^j\right)\right) = \left(\alpha_{c1}^j - \alpha_{c0}^j\right)$.

There are three sources of wage growth in this formulation. Wages grow (i) because general productivity increases, (ii) because the worker has improved her skills by investing in schooling or on-the-job training, and (iii) because the returns on earlier accumulated human capital have improved, which is interpreted as improved matching.

Workers can influence their wage growth by investing in human capital - additional schooling and labour market experience. Wage growth arising from investments made during the studied period are measured by α_{s1}^j and α_{x1}^j, which are the slopes of the wage equation at $t = 1$.

Wages also grow because the returns on the worker's human capital improve. For job movers, this improvement in returns may be due to the workers finding a job

with higher returns to their human capital endowment, that is a better match. Improvements in returns on human capital for job stayers are assumed to be the effect of improved average matching, when poor matches quit. Improvements in returns between $t = 0$ and $t = 1$ are measured by β_s^j, which is the improvement in returns on investments in schooling (given mobility choice j), and β_x^j is the improvement in returns on labour market experience. As can be seen in equation (2), the returns at $t = 0$ are nested in the model. It is possible to compute the returns on skills at $t = 0$, and test hypotheses about them.

2.2 Hypotheses

In a general model of wage growth, job mobility influences match quality for both job movers and job stayers. In this section, I describe the hypotheses of the general model, and two special cases of this model. The first special case is that match quality is unaffected by mobility choice. In the second special case, mobility influences match quality for job movers, but the average match quality for job stayers is unchanged.

No Improvement in Match Quality

Assume that returns on human capital differ between job stayers and job movers, and that returns do not change as a consequence of the worker's mobility choice ($\beta_s^j = \beta_x^j = 0$). The model is described by:

$$G_i^j = C^j + \alpha_{s1}^j \Delta SCHOOL_i + \alpha_{x1}^j \Delta EXP_i \tag{3}$$

If we observe higher returns for job movers the returns were higher before the job switch and vice versa. If average match quality is measured by returns on the human capital endowment, average match quality is unaffected by mobility choice for both job movers and job stayers. If, for instance, job movers have higher returns on their human capital endowment, they are better matches both before and after mobility. The factor influencing mobility in this case is the average productivity growth, which is allowed to vary between job movers and job stayers.

The theory of firm-specific human capital build-up for job stayers implies that returns to work experience should be higher for job stayers, as job stayers invest in firm-specific human capital, which moving workers do to a lesser extent. Moving workers, on the other hand, invest in job search to improve average productivity growth. Average productivity growth is captured by mobility specific intercepts C^j. However, the groupwise differences in average productivity growth cannot be used to evaluate mobility gains, as differences in wage growth may depend on period length and the timing of observations.[2]

Improved Match Quality for Job Movers

In this special case, returns are allowed to change for job movers, but returns are unchanged for job stayers. The implicit assumption is that wage growth for job stayers is unaffected by the job movers' quits. Job movers invest in job search to improve match quality and/or average productivity growth. The equation to be estimated is:

$$\begin{aligned} G_i^j &= C^j + \alpha_{s1}^j \Delta SCHOOL_i + \alpha_{x1}^j \Delta EXP_i + \beta_s^m \cdot m \cdot SCHOOL_{i0} \\ &\quad + \beta_x^m \cdot m \cdot EXP_{i0} \end{aligned} \tag{4}$$

where m is a dummy, which takes the value 1 if the individual has changed jobs, and 0 otherwise. β_s^s and β_x^s are zero by assumption.

We may conclude that mobility improves the match quality for job movers if β_s^m and β_x^m are greater than zero. If returns on skills were the same before observed mobility, and job match quality improves for job movers, average productivity increases with mobility. This special case is equivalent to the human capital investment approach to wage growth due to mobility.

Improved Match Quality for both Job Movers and Job Stayers

[2] If returns are wrongly assumed to be the same for both groups, the same problem occurs. To evaluate the gains from mobility we need the expected present value of lifetime income. Theoretically, at the market level, the present value of lifetime income is independent of the slope of the wage equation. See e.g. Neumark and Taubman (1995) for a test of this hypothesis.

Labour turnover is expected to have a positive effect on wage growth for both movers and stayers. If selective job mobility affects wage growth for staying workers by improving average job match quality, this could mean that returns on investments in human capital change for both job movers and job stayers. The wage growth equation to be estimated is:

$$G_i^j = C^j + \alpha_{s1}^j \Delta SCHOOL_i + \alpha_{x1}^j \Delta EXP_i + \beta_s^j SCHOOL_{i0} + \beta_x^j EXP_{i0} \quad (5)$$

The implication of the human capital investment approach is that returns to human capital increase with mobility. The job matching approach implies that returns should grow for job stayers, as the average job match quality improves with the quits of the bad matches.

When returns are allowed to change with mobility, we may also test returns on human capital before the job switch, which may be different than the returns after job switch. In this way, we may infer the slope of the wage equation, and hence average match quality before mobility is observed.

If workers begin in jobs not suited to their skills, and the accumulation of additional skills have a relatively low impact on wage growth, they might, through job mobility, find jobs where their skills are valued more highly, i.e. a better match. This is measured by an improvement in the returns to the human capital endowment. This could be called a "stepping-stone" hypothesis, where the improvements in productivity and wages are the effects of better employee - job match. In this way the worker improves wage growth through successive moves between employers, and for the individual worker match quality improves over their working life. Job mobility equalises returns, so the returns on skills should be equal for job movers and job stayers at $t = 1$. If the job movers are on average younger and have less labour market experience, this could be a partial explanation for their higher wage growth.

If returns on skills were higher for job movers before job switch and returns on skills improves more for job stayers than for job movers, we may conclude that good matches find even better jobs. This can be interpreted as job mobility occurs more

often for career minded workers - given that job match quality is in some way a measure of career-mindedness.

If returns on skills were equal for job movers and job stayers before mobility, that is $\alpha_{s0}^m = \alpha_{s0}^s$ and $\alpha_{x0}^m = \alpha_{x0}^s$, a larger improvement in returns for job movers, i.e. $\beta_s^m > \beta_s^s$ and $\beta_x^m > \beta_x^s$, would indicate that the job movers find positions where their skills are valued more highly than the average for job stayers. The explanation for this could be that high-productivity employers attract workers from average productivity employers by offering higher than average returns on the worker's human capital endowment.

If job stayers invest in firm-specific skills, while mobile workers mainly invest in job search, the returns on work experience should be higher for job stayers both at $t = 0$ and $t = 1$. Returns are expected to improve for both job movers and job stayers, which would indicate that average match quality improves over the working life. If returns on skills improves more for job stayers than for job movers, this indicates selective termination of bad matches if job movers on average are bad matches in the job held at $t = 0$.

3 Data and Specification

The data set is constructed from the Level of Living Surveys (LNU) 1981 and 1991. The Level of Living Surveys constitute a panel data survey of a sample of people living in Sweden. For a description of the Level of Living Surveys, see Eriksson and Åberg (1987). The data set used consists of 1198 individuals in gainful employment in 1981 and 1991. Some thirty obviously inconsistent observations were omitted.

The wage measure used is constructed from reported wages and salaries for 1981 and 1991, respectively. Gross hourly wages are used instead of earnings, as the choice of work hours is assumed to be irrelevant in the present study. Variable definitions are found in Table 1.

By inspection of group means, presented in Table 2, we find that those who change employer ($EM = 1$) are on average a few years younger and have less labour

market experience than job stayers ($EM = 0$). The differences between groups seem to reflect the relative youth of the job movers: Job movers are single to a greater extent, and fewer of them had dependent children in 1981. They have shorter tenure, invest more in additional schooling and the incidence of unemployment is more common among job movers. The wage is slightly lower for job movers than for job stayers, but the rate of wage growth is higher.

3.1 Econometric Specification of the Wage Equation

The question is whether the returns on human capital change as a consequence of job mobility. The wage growth equation (2) may be formulated:

$$\begin{aligned}\Delta \ln w_i &= C + \alpha_m EM_i + EM_i \left[\alpha^m_{s1}\Delta SCHOOL_i + \alpha^m_{x1}\Delta EXP_i \right. \\ &\quad \left. + \beta^m_s SCHOOL_{i0} + \beta^m_x EXP_{i0}\right] \\ &\quad + (1 - EM_i)\left[\alpha^s_{s1}\Delta SCHOOL_i + \alpha^s_{x1}\Delta EXP_i \right. \\ &\quad \left. + \beta^s_s SCHOOL_{i0} + \beta^s_x EXP_{i0}\right] + \mathbf{Q}_i\boldsymbol{\gamma} + \varepsilon_i \qquad (6)\end{aligned}$$

where EM_i represents mobility status - $EM_i = 1$ if the person has changed employer between 1981 and 1990.

In this formulation the wage growth equations for job movers and job stayers are merged into one equation. We observe the dependent variables according to mobility choice. This formulation makes it possible to test for differences in the returns on investments in human capital for job movers and job stayers by testing the parameter restrictions described in section 2.2.[3] The wage equation for both movers and stayers at $t = 0$ and $t = 1$ are nested in the model, which makes it possible to evaluate returns on human capital for both groups at two points in time.

The returns on additional schooling at $t = 1$ is given by α^j_{s1} for each mobility choice $j = \{s, m\}$, and the returns on additional labour market experience after mo-

[3] This specification will, however, make it impossible to compute the gains from mobility in the normal sense, i.e. 'job movers have x per cent higher wage growth after mobility, than they would have, had they stayed'.

Table 1: Variable Definitions.

Variable	Description
$AGE81$	Age in years in 1981.
$SCHOOL81$	School in years in 1981.
$SCHOOL91$	School in years in 1981.
$\Delta SCHOOL$	$SCHOOL91 - SCHOOL81$.
$EXPY81$	Years in gainful employment in 1981.
$EXPY91$	Years in gainful employment in 1991.
$\Delta EXPY$	$EXPY91 - EXPY81$.
$EXP81$	$EXPY81/AGE81$.
$EXP91$	$EXPY91/AGE91$.
ΔEXP	$EXP91 - EXP81$.
$MARRIED80$	Dummy variable:1 if married or cohabiting in 1980, 0 otherwise.
SEX	Dummy variable: 1 if female, 0 if male.
$W81$	Gross hourly wage rate 1981, in 1991 prices, in Swedish Kronor.
$W91$	Gross hourly wage rate 1991, in Swedish Kronor.
$\Delta W/W$	$(W91 - W81)/W81$, wage growth in per cent.
$\Delta \ln W$	$\ln W91 - \ln W81$.
EM	Dummy variable: 1 if changed employer between 1981 and 1990, 0 otherwise.
$AGESQ$	$AGE81^2/100$.
$KIDS81$	Dummy variable: 1 if dependent children in household in 1981, 0 otherwise.
$SGCN$	Dummy variable: 1 if single with children in 1981, 0 otherwise.
$RESTR81$	Dummy variable: 1 if desired weekly work hours are not actual weekly work hours, 0 otherwise.
$TEN81$	Tenure with current employer in 1981.
$TENSQ$	$TEN81^2/100$.
$UNEMP$	Dummy variable: 1 if unemployed more than one month during the period 1981 to 1990, 0 otherwise.

Table 2: Descriptive statistics, means (standard deviation in parentheses).

	$EM = 1$		$EM = 0$		*All*	
Variable	*Mean*	*StDev*	*Mean*	*StDev*	*Mean*	*StDev*
$AGE81^*$	30.37	(8.98)	35.26	(9.31)	33.65	(9.48)
$SCHOOL81$	10.87	(2.67)	10.82	(3.04)	10.83	(2.92)
$SCHOOL91$	11.69	(2.99)	11.41	(3.24)	11.50	(3.16)
$\Delta SCHOOL^*$	0.82	(1.26)	0.59	(1.12)	0.66	(1.17)
$EXPY81^*$	10.71	(8.49)	15.58	(9.66)	13.98	(9.56)
$EXPY91^*$	18.70	(9.00)	24.08	(9.79)	22.31	(9.86)
$\Delta EXPY^*$	7.99	(2.19)	8.50	(2.07)	8.33	(2.12)
$EXP80^*$	0.31	(0.18)	0.41	(0.18)	0.37	(0.19)
ΔEXP^*	0.13	(0.09)	0.11	(0.08)	0.12	(0.08)
$MARRIED80^*$	0.58	(0.49)	0.74	(0.44)	0.69	(0.46)
SEX	0.52	(0.50)	0.51	(0.50)	0.51	(0.50)
$W81$	75.46	(25.42)	78.36	(25.30)	77.41	(25.36)
$W91$	84.44	(32.55)	85.21	(28.59)	84.96	(29.94)
$\Delta W/W^*$	17.96	(45.50)	12.79	(33.78)	14.49	(38.09)
$KIDS81^*$	0.43	(0.50)	0.60	(0.49)	0.55	(0.19)
$SGCN$	0.04	(0.19)	0.03	(0.18)	0.04	(0.19)
$RESTR81$	0.20	(0.40)	0.18	(0.38)	0.18	(0.39)
$TEN81^*$	4.61	(5.09)	8.83	(7.57)	7.44	(7.13)
$UNEMP^*$	0.13	(0.33)	0.01	(0.10)	0.05	(0.21)
EM					0.33	(0.47)
n	394		804		1198	

* Difference in group means significant at 5% level.

$EM = 1$ if the individual has changed employer between 1981 and 1990, 0 otherwise

bility is α_{x1}^j. The change in returns on schooling is given by β_s^j, and β_m^j is the change in returns on experience. The returns at $t = 0$ are calculated as $\alpha_{s0}^j = \left(\alpha_{s1}^j - \beta_s^j\right)$ for schooling and $\alpha_{x0}^j = \left(\alpha_{x1}^j - \beta_x^j\right)$ for work experience. Wage growth is also assumed to be influenced by a vector of personal characteristics $\mathbf{Q}_i$, which contains information about sex, age and marital status. The effects of these characteristics are assumed to be the same for both groups.

3.2 Self-selection and the Model of Mobility Choice

When we want to conclude whether mobility improves matching, we encounter a potential problem of self-selection. Those who choose to change employer might well be those who benefit from changing employer. The observed mobility status depends on expected wages after mobility, and we expect that mobility will occur if the person is better off as a mover than as a stayer. If all job movers have higher wage growth as movers than as job stayers, they may not be representative for the group as a whole. Job stayers, on the other hand, are job stayers because they have not found attractive wage offers. If wage growth influences the way individuals choose whether to change employer or not, there will be a sample selection bias in the subsequent estimations of wage growth - the error will be correlated with the observed mobility status.

The method used to reduce the self-selection problem is to create an instrument for the observed mobility status. I estimate a probit model of individual choice, and use the predicted probabilities of a job switch as an instrument for the job mobility dummy in the subsequent wage equation. The wage equation is estimated by ordinary least squares, with the predicted probabilities of a move as an instrument for job mobility. Inference regarding the parameters of the wage equation is made using the estimated asymptotic variance matrix for an instrumental variable.[4] The

[4] $Est.Var\left(\boldsymbol{\beta}_z\right) = \left(\mathbf{X}'\mathbf{Z}\right)^{-1}\left(\sum_i \eta_i \mathbf{z}_i \mathbf{z}_i'\right)\left(\mathbf{Z}'\mathbf{X}\right)^{-1}$
where $\eta_i = y_i - \mathbf{x}_i\boldsymbol{\beta}_z$, $\mathbf{X}$ =Actual independent variables and $\mathbf{Z}$ =Instrumental independent variables. See e.g. Greene (1993), p 285.

model of mobility choice used to create the instruments is described below.

The individual will move if the move improves the current situation:

$$M_i^* = W_i^m - W_i^s - K_i > 0 \tag{7}$$

where $W_i^j = \int_0^\infty w_{0i}^m \cdot e^{-r_i t} dt$ is the present value of the expected wage growth of mobility choice j, and K_i is the mobility cost.

Wages are discounted at an idiosyncratic discount rate, r_i, described by a vector of personal characteristics $\boldsymbol{\rho_i} = \{AGE81, AGESQ, TEN81, TENSQ\}$.[5] Age is assumed to influence death risk - the risk of death increases with age at a decreasing rate. Tenure is assumed to influence layoff risk - the risk of layoff decreases with tenure, at a decreasing rate.

Given that the discount rate r_i is determined by the same factor for both job movers and job stayers the mobility criterion is:

$$\begin{aligned} M_i^* &= \int_0^\infty (w_{0i}^m - w_{0i}^s)\, e^{-r_i t} dt - K_i \\ &= (w_{0i}^m - w_{0i}^s)\, \frac{1}{r_i} - K_i \end{aligned} \tag{8}$$

The wage at $t = 0$ is described by the wage level equation (1). Substituting this into the mobility criterion equation (6) yields:

$$\begin{aligned} M_i^* &= (w_{i0}^m - w_{i0}^s)\, \frac{1}{r_i} - K_i \\ &= \frac{1}{r_i} \left[\alpha_{ci} + (\alpha_{si0}^m - \alpha_{si0}^s)\, SCHOOL_{i0} + (\alpha_{xi0}^m - \alpha_{xi0}^s)\, EXP_{i0}\right] - K_i \end{aligned} \tag{9}$$

As we can see in (9), mobility is driven by differences in returns on the human capital endowment.

[5] Part of the reason for including an idiosyncratic discount rate is to increase the number of variables included in the mobility choice model that are *not* included in the wage growth equation. If the variables in the wage growth equation explain the mobility choice, an indentification problem arises. However, many of the resulting variables are heavily linearly dependent, so some of the variables must be excluded for convergence.

Let the human capital endowment at $t = 0$ be $\mathbf{w}_{i0} = \{SCHOOL_{i0}, EXP_{i0}\}$. Mobility cost is assumed to be proportional to $\boldsymbol{\kappa}_i$, a vector of personal characteristics; $\boldsymbol{\kappa}_i = \{MARRIED80, SGCN, SEX, UNEMP, RESTR81\}$. The cost vector $\boldsymbol{\kappa}_i$ is discounted at the same discount rate, r_i, as wages.

The econometric formulation of the mobility choice is:

$$M^* = \boldsymbol{\theta}_i \mathbf{A} + e_i \tag{10}$$

where $\boldsymbol{\theta}$ is a parameter vector, and e_i is the error component. The results of the estimation are found in Table 3.

A criterion for successful estimation of the second step, the wage equation, is that the first step is not fully explained by the variables in the second step. A likelihood ratio test for whether the decision model in equation (10) is an improvement on a model in which the decision to change employer is determined solely by the variables in the wage growth equation leads us to reject the hypothesis of no improvement, as the likelihood ratio $LR = 133.54\chi^2_{(26)}$ is highly significant.

Now let the predicted probability of a move, $\widehat{P}_i = \Phi\left(\boldsymbol{\theta}_i \hat{\mathbf{A}}\right)$, where $\Phi(\cdot)$ is the standard normal density distribution. $\widehat{P}_i$ serves as an instrument for mobility in the wage equations of section 4.

4 Estimation and Results

In accordance with the discussion in section 2, the wage growth equation is estimated under three different assumptions of changing returns. In the first equation, the returns do not change as a consequence of mobility, although returns are allowed to vary between those who change employer and those who stay. The second equation allows for the returns to change for job movers, but the returns for job stayers is assumed to be unchanged. In the third equation, returns are allowed to change for both job movers and job stayers.

Column (1) in Table 2 is the wage equation estimated under the assumption that returns are unchanged for both job movers and job stayers. With this assumption

Table 3: Probit model estimation results.

Variable	Coefficient	t-ratio	Variable	Coefficient	t-ratio
CONSTANT	-1.6170	-0.62			
SCHOOL81	0.2324	0.94	TENSQ·RESTR81	-0.0406	-1.17
EXP81	-1.7332	-2.33	AGE81·SGCN	-0.1543	-0.37
MARRIED80	-0.0644	-0.50	AGESQ·SGCN	0.0012	0.20
SEX	-0.1151	-1.24	TEN81·SGCN	0.2534	1.57
AGE81	0.2121	1.42	TENSQ·SGCN	-0.0132	-1.42
AGESQ	-0.0031	-1.49	AGE81·UNEMP	0.0439	0.17
TEN81	-0.4616	-3.08	AGESQ·UNEMP	0.0010	0.22
TENSQ81	0.0214	2.49	TEN81·UNEMP	0.0144	0.11
UNEMP	-0.4883	-0.14	TENSQ·UNEMP	-0.0028	-0.48
RESTR81	1.4319	1.00	AGE81·SCHOOL81	-0.0177	-1.26
SGCN	3.1947	0.44	AGESQ·SCHOOL81	0.0002	1.23
KIDS81	-0.1287	-1.06	TEN81·SCHOOL81	0.0189	2.56
AGE81·RESTR81	-0.1204	-1.32	TENSQ·SCHOOL81	-0.0007	-2.08
AGESQ·RESTR81	0.0022	1.67	TEN81·EXP81	0.3088	1.79
TEN81·RESTR81	0.0402	0.63	TENSQ·EXP81	-0.0198	-2.00
Log-Likelihood	-642.69				
RestrictedLog-L.	-758.79				
LR:$\chi^2_{(34)}$	232.21				

Table of observed and predicted outcomes:

	predicted		
observed	EM=0	EM=1	Total
EM=0	722	82	804
EM=1	253	141	394
Total	975	223	1198

Table 4: Wage growth equations. Dependent variable $\Delta \ln w$.

	(1)	(2)	(3)
Const	0.3363	0.3145	0.2740
	(4.33)	(3.98)	(1.79)
SEX	−0.0538	−0.0543	−0.0556
	(−3.33)	(−3.12)	(−3.10)
$MARRIED80$	0.0082	0.0082	0.0071
	(0.40)	(0.40)	(0.34)
$AGE81$	−0.0061	−0.0056	−0.0056
	(−4.24)	(−3.81)	(−3.67)
EM	−0.2122	−0.3208	−0.1854
	(−2.19)	(−1.44)	(−0.54)
Job Movers			
$\Delta SCHOOL$	0.0776	0.0698	0.0733
	(2.18)	(1.96)	(2.02)
ΔEXP	1.3001	1.0954	1.2377
	(3.12)	(1.91)	(1.98)
$SCHOOL81$		0.0185	0.0063
		(1.51)	(0.35)
$EXP81$		−0.0965	−0.0942
		(−0.41)	(−0.36)
Job Stayers			
$\Delta SCHOOL$	−0.0197	−0.0183	−0.0201
	(−1.00)	(−0.93)	(−1.03)
ΔEXP	−0.2620	−0.2937	−0.4300
	(−1.01)	(−1.09)	(−1.03)
$SCHOOL81$			0.0069
			(1.14)
$EXP81$			−0.0350
			(−0.19)
R^2	0.10	0.10	0.10

Estimations corrected for heteroskedasticity. t-statistics in parentheses.

Table 5: F-statistics for tested linear restrictions.

H_0	(1)	(2)	(3)
$\alpha_{s1}^m = \alpha_{x1}^s$	$F = 3.58$	$F = 2.93$	$F = 3.25$
$\alpha_{x1}^m = \alpha_{x1}^s$	$F = 7.15^*$	$F = 3.43$	$F = 3.18$
$\alpha_{s0}^m = \alpha_{s0}^s$		$F = 1.62$	$F = 2.31$
$\alpha_x^{m0} = \alpha_{x0}^s$		$F = 5.60^*$	$F = 5.99^*$
$\beta_s^m = \beta_s^s$		$F = 2.28$	$F = 0.00$
$\beta_x^m = \beta_x^s$		$F = 0.17$	$F = 0.02$
$\beta_s^j = \beta_x^j = 0$		$F = 1.82$	$F = 1.78$

F is F-distributed with $(r, n-k)$ degrees of freedom, where r is the number of restrictions and k the number of regressors in the equation.
$^*H_0$ is rejected at 95% significance level.

imposed, we see that job movers experience a smaller increase in general productivity than do job stayers. Job movers have positive returns on investments in both additional schooling and work experience. For job stayers, there is no significant relationship between investments in additional human capital and wage growth.

As can be seen in Table 2, returns on additional investments in labour market experience are higher for job movers than for job stayers. The result is confirmed by the F-statistic found in Table 4. Higher returns on work experience for job movers contradict the hypothesis that job stayers invest more heavily in job specific training, and that job movers have lower returns on labour market experience, since they invest in other than firm-specific human capital - most notably job search.

In column (2), I estimate the wage equation while allowing the rate of return on the human capital endowment to change due to mobility for job movers, but assume the returns to be unchanged for job stayers.

For job movers, there is a positive relationship between investments in additional labour market experience. In Table 2, we see that returns on labour market experi-

ence were higher for job movers than for job stayers in 1981. As can be confirmed by the test statistic in Table 4, we cannot reject the hypothesis that returns on additional work experience were the same in 1991, which indicates that job stayers "catch up" the initially higher returns of job movers. However, the returns on work experience are not higher for job stayers, neither before nor after observed mobility, which contradicts the expected implications of firm-specific human capital investments made by job stayers, but supports the conclusion that job movers are better matches both before and after mobility. The returns on schooling are unchanged and the same for both job movers and job stayers. We cannot reject the hypothesis that returns on skills are unchanged for job movers, which leads us to conclude that mobility does not improve match quality.

Column (3) in Table 2 is estimated allowing returns on the human capital endowment to change for both job movers and job stayers. Job movers have positive returns on additional investments in human capital. We cannot reject the hypothesis that returns on all human capital is unchanged for both job movers and job stayers. This suggests that average job match quality is not affected by job movers' quits. For job movers, mobility does not improve job match quality. Returns on work experience were higher for job movers in 1981, but we cannot reject the hypothesis that returns to additional labour market experience was the same for both job movers and job stayers in 1991.

The models are nested, and a test of whether special case (2), where returns on skills are allowed to change for job movers, is an improvement on case (1) may be carried out by an F-test of the joint hypothesis that $\beta_s^m = \beta_x^m = 0$, that is testing whether we may reject the hypothesis of unchanging returns for job movers. The F-statistic for this test is $F = 1.82$, which means we cannot reject the hypothesis of unchanging returns. Comparing the general model (3) and special case (1) by testing if $\beta_s^j = \beta_x^j = 0$ for both job movers and job stayers, gives the test statistic $F = 1.78$, which means we cannot reject the hypothesis of unchanging returns for both job movers and job stayers. This leads us to prefer the model with unchanging returns

in equation (1), where returns on work experience are higher for job movers than for job stayers, indicating that job movers are overall better matches, both before and after mobility. On the other hand, job movers experience smaller increases in average productivity.

5 Conclusions

The effects of job mobility on wages in Sweden have been estimated by e.g. Holmlund (1984), who finds that job movers have 7 to 9 per cent higher wages than job stayers in 1968 and 1974. Björklund and Holmlund (1988) study the wage effect of voluntary and involuntary quits, and find that wage levels in 1986 are unaffected by job mobility, but wage growth between 1984 and 1986 is positively affected by job mobility, especially for voluntary quits. Zetterberg (1990) studies wage effects of mobility between sectors, and finds for females a strong positive effect of mobility on wage growth between 1974 and 1980, but for males job mobility has no effect on wage growth. Lundborg (1995) studies the effect of taxes on job mobility, and finds, among other things, that after-tax wage growth is higher for staying workers than for moving workers between 1980 and 1990.

In this paper, I have formulated and tested some hypotheses regarding how job mobility influences returns on human capital and job match quality. For a cohort of employed workers, I find that returns on labour market experience are higher for job movers, both before and after job switch, contradicting the hypothesis of firm-specific human capital build-up, but implying that job movers are generally better matches. Returns on human capital do not change as a consequence of mobility, which implies that average job match quality is unaffected by quits and mobility. This would lead to the conclusion that average job match quality is unaffected by labour market turnover, and does not improve over the working life.

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Multiple Job Change and Adverse Selection in the Swedish Labour Market

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Abstract

An individual will choose a career strategy in order to maximise utility. The individual's career history may also signal to the employer the quality of previous and current job matches. As match quality partly determines wages, the dependence of match quality on past career decisions causes an endogeneity problem relevant for econometric analysis of wage determination. In this paper, I estimate the effect of multiple job changes on wages and income, as well as on wage and income growth, while taking into account that both job change and job duration are potentially endogenous. I find that each job change increases wage growth between 1981 and 1991 by approximately twelve per cent, and income growth by approximately seventeen per cent. However, job change appears to have no effect on wage and income levels in 1991. The results also imply a negative correlation between unobserved factors in the job change decision and wage/income growth, which suggests that workers who have made multiple job changes are adversely selected.

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1 Introduction

A common starting point for studying turnover in the labour market is that individuals change jobs because they benefit from it, e.g. through higher wages. Individuals can increase their earnings capacity and productivity by investing in skills or by changing jobs, finding a job where their particular skills are more valuable. Burdett (1978) argues, from a theoretical standpoint, that job search while employed is more common at the bottom end of the wage distribution and that job search activity decreases with income. Jovanovic (1979) argues that wages are partly determined by a component unobservable to those outside the firm, a factor we can call 'match quality'. Hence, the quality of a specific job match will not only affect wages and wage growth, it will also have an impact on job duration and quitting behaviour.

Job match quality at a specific point in time partly depends on career decisions made by the individual up to the time of observation. At the same time, the individual's career history signals to the employer the quality of previous and current matches. As match quality partly determines wages, the dependence of match quality on past career decisions causes a potential endogeneity problem relevant for empirical analysis. To identify the effect of job change and job duration on wages and wage growth, it is necessary to consider that *both* job change and job duration are part of the individual's career choice. In this paper, I study the effect of job change and job duration on wages and income, as well as wage and income growth, taking into account that both job duration and job change are potentially endogenous. In addition, each employer change should have an impact on wages and wage growth. Hence, I allow for more than one employer change.

As mentioned above, the status of the employee's career history can signal to a prospective employer the quality of previous matches. If the employee has a career history consisting of many employer changes and short job durations, the employer may conclude that the employee is of 'poor quality' or disloyal. Greenwald (1986) argues that a work history consisting of many employer changes may signal to a prospective employer that the employee is of 'poor' quality, which could influence

wages at the new job. Gibbons and Katz (1991) argue that employers have an incentive to lay off poor quality matches. If an individual has been laid off, this could signal to a future employer that the employee was a 'poor quality' match at the last job. Hence a layoff could have a negative effect on subsequent wages. There is perhaps no need to make a distinction between layoffs and voluntary job change - if employers can withhold pay rises, bonuses or other perks, more outside wage offers will be deemed favourable by the poor quality match, and consequently the poor quality match will be more likely to quit voluntarily. If the career history of a prospective employee suggests that he was a poor quality match at previous job, the employer might want to adjust the wage offered at the beginning of the match downwards, and successively raise wages as information about the quality of this specific match increases. If job changers are adversely selected, i.e. drawn from a pool of predominantly 'poor' matches, we could underestimate the effect of job change on wages.

A completely different scenario is suggested by Lazear (1986). He argues that rival firms may spot high productivity employees and 'raid' the high productivity employee. If this was the case, we would overestimate the gains from mobility, since job quits would be more common among the good quality matches. However, this scenario seems more plausible for a particular segment of the labour market for highly specialised employees, such as managers or professors. Indirect support for this theory is found in e.g. Garen (1989), who takes the variation in wages not explained by observable characteristics to be a measure of match quality, and finds that match quality is negatively correlated with job duration. He concludes that the effect of job duration on wages is underestimated, especially for individuals with short job durations.

As mentioned earlier, career choice is not solely a question of job change, it is also a choice to stay at the current job. We observe the wage for those who do not change job, given the career choice, which means that the value of staying for an employee who stays is higher than the value of changing jobs. In addition,

if predominantly 'good matches' stay, there is a positive correlation between the decision to stay and wages, and we could overestimate the effect of job duration on wages. Abraham and Farber (1987) and Altonji and Shakotko (1987) takes job match quality as a starting point to study whether the empirically observed phenomenon that wages rise with job duration is due to unobserved heterogeneity. They find that the effect of job duration on wages is overestimated because of the positive correlation between unobserved heterogeneity and job duration. This result is challenged by Topel (1991), who argues that in cross-section studies on wages, current job tenure reflect mainly at what point in time the individual received his best wage offer. If there is a positive effect of job tenure on wages, there will be fewer quits, since the new wage must compensate for the loss of specific capital at the old job. This reduces the average wage among job stayers. Furthermore, the wages of job stayers are compared with the wages of job movers, who are assumed to change jobs because it increases their wages.

The fact that these studies come to different conclusions about the effect of job duration on tenure suggest that to correctly estimate the wage effects of job duration and job change on wages, *both* these choices should be included in the wage equation. It also suggests that *how* job changers and job stayers are selected from the pool of all employees (if predominantly good or bad matches quit) is of importance to the effect of job duration on wages. This motivates me to treat both job duration and job change as potentially endogenous.

The paper is structured as follows: In section 2, I describe the wage equation and the wage growth equation. The data set used for the empirical tests, and the econometric specification are presented in section 3. Section 4 contains estimation results, and conclusions are found in section 5.

2 The Wage Equation

Let the log wage for individual i at time t be described by:

$$\ln w_{it} = \alpha_0 + \mathbf{x}_{it}\boldsymbol{\alpha}_1 + \alpha_2 m_{it} + \eta_{it} \tag{1}$$

where $\mathbf{x}_{it}$ is a vector of variables describing the individual's human capital endowment at time t, specifically schooling and labour market experience. Variations in wages unexplained by the human capital endowment constists of a systematic component describing match quality, m_{it}, and a stochastic component, η_{it}, which captures unobserved individual heterogeneity.

Career choices are not human capital, and if we want to estimate the effect of career choices on wages, we must assume something about how the individual's career history was generated. Job mobility can be seen as a sorting process, where individuals are sorted into jobs where they are good matches, and out of jobs where they are poor matches. If there are unobserved factors explaining career choices, and match quality at a specific job partly depends on career choices made before we observe the individual, we can explain a part of match quality by the individual's career history.

2.1 The Employer's Choice

Match quality is unknown to both the employee and the employer at the time a new match is entered into. The only way for the employer to assess the quality of a specific match is to observe the employee on the job. At the time a match is entered into, the prospective employer wants to form an expectation of the employee's likely performance.

In accordance with Jovanovic (1979), Greenwald (1986) and Gibbons and Katz (1991), it can be argued that those who have changed jobs may be adversely selected from the pool of all matches. Bad matches are more likely to dissolve, either because they are more likely to find outside favourable wage offers, or because they are more likely to be laid off. Because of this, employers may have a negative expectation of

the employee's performance at a new job, if the employee has a history of many job changes and short job durations.

Assume that the employer can offer two wage packages with equal present value. One payment scheme offers the same wage over the whole duration of the match, the other offers a low initial wage, and promises wage increases conditional on performance. Which one will the employer prefer? A payment scheme that pays all workers the same (the wage equal to productivity at average match quality), regardless of productivity, would mean that low quality matches were payed above their performance for the entire duration of the match, and high quality matches were payed below performance the entire duration of the match.[2] In this case the high quality matches would be likely to quit, and the low quality matches would want to stay. However, the employer prefers employing good matches. By offering a payment scheme with a low initial wage, and wage increases conditional on performance,[3] the employer can assess the quality of the match while the employee is on the job. Hence the employer can reduce the potential loss associated with hiring a bad match. A good match will have to stay with the employer for a longer period, to receive the high wage associated with his performance, and if he changes jobs he will lose the investment he made in showing the employer he is a good match.

So, at time t, when the employee has been employed D years at the current job, the match quality component can be described by:

$$m_{it} = a_0 + a_1 D_{it} + a_2 E_{it} + e_{it} \tag{2}$$

where D_{it} is the duration of the job held at time t, and E_{it} is the number of job

[2]The employer wants to construct a payment scheme that makes good quality matches stay, and bad quality matches should not be payed too much. Other incentive effects of an upward sloping wage-tenure profile are discussed in e.g. Salop and Salop (1976), who argue that an upward sloping wage-tenure profile can act as a screening device to ensure low turnover. Lazear (1981, 1995) and Carmichael (1989) discuss how a payment scheme with an upward sloping wage profile offer the right incentives for workers not to shirk.

[3]This wage increase can take the form of e.g. internal promotion, bonuses or perks, if the wage level is heavily controlled by regulations or set by collective agreement.

changes *before* the current match; E_{it} is a constant for the current employer over the entire duration of the match. e_{it} is a random error term, capturing e.g. unobserved match specific heterogeneity at the current job. I expect $a_1 > 0$, because of the structure of the desired payment scheme - that employers would like to offer an upwards sloping payment scheme to offer the right incentives to employees. If job change signals to the employer that the prospective employee has previously been a poor quality match, I expect that $a_2 < 0$.

2.2 The Individual's Choice

We assume that the individual's career history is generated by income maximisation. The individual will change jobs if the net benefit of doing so is positive, i.e.:

$$M_i = \begin{cases} 1 & \text{if} \quad W_i^m - W_i^s - C_i > 0 \\ 0 & \text{if} \quad W_i^m - W_i^s - C_i \leq 0 \end{cases} \tag{3}$$

where $M_i = 1$ if we observe a job change, and $M_i = 0$ if the individual does not change jobs. W_i^m is the present value of the expected income stream if the individual changes jobs, and W_i^s is the present value of the expected income stream with the current employer. C_i is the mobility cost. The individual will change jobs if the present value of the expected income stream at the new job is higher than the present value of the income stream at the current job, and this difference must be large enough to cover mobility cost.

The individual will choose a strategy for which the expected present value is the highest, which means that for an income maximising individual the value of the observed career strategy would be higher than the value of all other strategies. As we observe the wages given the chosen career strategy, we have a potential problem of self-selection. An individual who has not changed jobs, has stayed with his current employer because this strategy has a higher value than changing jobs - he has not found a better match. An individual who has changed employer, has done so because he has found a better match.

2.3 The Wage Growth Equation

Assuming that returns on the standard human capital variables ($\mathbf{x}_i$) are constant ($\boldsymbol{\alpha}_{11} = \boldsymbol{\alpha}_{10} = \boldsymbol{\alpha}_1$), while the returns on match quality is time (or match) specific, the wage growth for individual i between two points in time $t = 0$ and $t = 1$ is described by:

$$\begin{aligned} \Delta \ln w_i &= \alpha_{01} + \boldsymbol{\alpha}_{11}\mathbf{x}_{i1} + \alpha_{21}m_{i1} + \eta_{i1} - [\alpha_{00} + \boldsymbol{\alpha}_{10}\mathbf{x}_{i0} + \alpha_{20}m_{i0} + \eta_{i0}] \\ &= (\alpha_{01} - \alpha_{00}) + \boldsymbol{\alpha}_1\Delta\mathbf{x}_i + \alpha_{21}\Delta m_i + (\alpha_{21} - \alpha_{20})\, m_{i0} + (\eta_{i1} - \eta_{i0}) \quad (4) \\ &= \tilde{\alpha}_0 + \boldsymbol{\alpha}_1\Delta\mathbf{X}_i + \alpha_{21}\Delta m_i + \gamma m_{i0} + \mu_i \end{aligned}$$

where $\Delta m_i = m_{i1} - m_{i0}$. In equation (4), $\tilde{\alpha}_0$ is a constant capturing changes in general productivity, $\Delta\mathbf{x}_i$ is a vector describing changes in the individual's human capital endowment and m_{i0} is the match quality at the job held at $t = 0$. Time invariant unobserved individual heterogeneity is cancelled out.

Δm_i is the change in match quality, which can be described by the changes in career history, so that:

$$\begin{aligned} &\text{if } \Delta E > 0 \quad \Delta m_i = a_1\Delta D_i + a_2\Delta E_i + \nu_i \\ &\text{if } \Delta E = 0 \quad \Delta m_i = a_1\Delta D_i + \nu_i \end{aligned} \quad (5)$$

Changes in match quality will come about as an effect of employer change or because workers get better matches on the job. For the individual, we would expect that given changes in the human capital endowment, and the loss of investment if he changes employer (which is measured by loss of job duration) he would have a higher wage growth than if he stayed with his employer - otherwise he would not move. The error term, $(\nu_i = e_{i1} - e_{i0})$, reflects the change in the match specific error between $t = 0$ and $t = 1$. The employee can accept a wage level cut when a new match is entered into, provided that he expects a sufficiently high wage growth. The wage level at the beginning of a new job match is thus not necessarily *higher* than the current wage.

3 Data and Econometric Specification

The data set is constructed from the Level of Living Surveys 1981 and 1991. The Level of Living Surveys constitute a panel data survey of individuals living in Sweden. For a description of the Level of Living Surveys, see Eriksson and Åberg (1987). The sample used is a subset of the complete data set, consisting of 1172 individuals who were in gainful employment both in 1981 and 1991, and had a taxable income in both years. Variable descriptions are found in Table 1 and descriptive statistics are found in Table 2. 716 individuals in the sample have not changed employer, and 456 individuals have changed employer at least once between 1981 and 1991. However, we do not know the number of employer changes between 1981 and 1991 (ΔE) for those who changed jobs. The number of employer changes between 1981 and 1991 is computed using other information about the career history. A description of how this variable was constructed is found in Appendix A.

The estimations are done with two different income measures - gross hourly wages and gross income from gainful employment. The gross hourly wage rate is computed from reported wages and salaries at the time of the surveys. Gross income from gainful employment are taken from the tax assessment files for income years 1981 and 1991.[4]

If we study Table 2, we see that those who have changed jobs at least once between 1981 and 1991 ($\Delta E > 0$) are on average younger and have shorter career histories than those who did not change jobs. Those who have changed jobs have also invested more in additional schooling between 1981 and 1991. They also have shorter job durations in 1981.

As can be seen in Table 2, job changers have lower wages and lower incomes in 1981, while there is no significant difference in wage levels in 1991. Average yearly income is higher both in 1981 and 1991 for those who did not change employer.

[4] A tax reform in 1991 has led to redefinitions of income definitions. In this study, gross income from gainful employment is the sum of income from employment, self-employment and farming, minus deductions for deficit in a source of income.

Table 1: Variable description and descriptive statistics. Entry is sample mean.

Variable	Description
AGE	Age in years in 1981.
SEX	Dummy variable. Female=1.
$M81$	Dummy variable. 1 if married or cohabiting in 1981.
$M91$	Dummy variable. 1 if married or cohabiting in 1991.
ΔM	Dummy variable. $\Delta M = 1$ if $M81 \neq M91$.
$S81$	Number of years in schooling, 1981.
$S91$	Number of years in schooling, 1991.
ΔS	$S91 - S81$.
$X81$	Number of years in gainful employment, 1981.
$X91$	Number of years in gainful employment, 1991.
ΔX	$X91 - X81$.
$D81$	Seniority with the current employer in 1981.
$D91$	Seniority with the current employer in 1991.
ΔD	$D91 - D81$.
E	Number of employer changes (total).
ΔE	Number of employer changes 1981 to 1991.
$w81$	Gross hourly wage rate 1981, SEK, 1991 prices.
$w91$	Gross hourly wage rate 1991, SEK, 1991 prices.
Δw	$(w91 - w81)/w81$.
$I81$	Gross yearly income from gainful employment 1981, SEK, 1991 prices.
$I91$	Gross yearly income from gainful employment 1991, SEK, 1991 prices.
ΔI	$(I91 - I81)/I81$.

Table 2: Descriptive statistics. Entry is sample mean.

Variable	*All*	$\Delta E = 0$	$\Delta E > 0$	
AGE	33.51	35.97	29.63	*
SEX	0.51	0.51	0.51	
$M81$	0.69	0.77	0.56	*
$M91$	0.82	0.82	0.82	
ΔM	0.26	0.19	0.36	*
$S81$	10.88	10.83	10.95	*
$S91$	11.53	11.32	11.86	*
ΔS	0.65	0.49	0.91	*
$X81$	13.77	16.13	10.06	*
$X91$	22.11	24.73	18.00	*
ΔX	8.34	8.60	7.94	*
$D81$	7.28	9.11	4.41	*
$D91$	13.13	19.16	3.66	*
ΔD	5.84	10.05	-0.75	*
E	2.61	1.95	3.65	*
ΔE	0.97	-	1.94	*
$w81$	83.11	84.97	80.18	*
$w91$	85.14	85.85	84.03	
Δw	0.07	0.04	0.13	*
$I81$	140 200	150 600	123 900	*
$I91$	176 700	181 600	171 500	*
ΔI	0.63	0.46	0.90	*
n	1172	716	456	

* - Difference in group means are significant at the five per cent level.

Table 3: Wage, income and wage and income growth by number of job changes between 1981 and 1991. Entry is sample median.

ΔE	$W81$	$W91$	Δw	$I81$	$I91$	ΔI	n
0	77.95	77.00	-0.01	150 100	163 600	0.13	716
1	75.72	77.00	0.01	134 100	153 400	0.33	203
2	75.72	77.00	0.02	133 200	160 000	0.25	148
3	71.27	75.00	0.13	122 300	156 100	0.47	61
4	66.82	71.00	0.17	94 400	125 300	0.68	25
5	71.27	66.00	0.03	119 400	158 100	0.00	19
All	75.72	76.5	0.00	140 100	160 500	0.19	1172

Wage and income growth, however, is substantially higher for job changers than for those who did not change jobs between 1981 and 1991. The growth in average income between 1981 and 1991 is substantially lower than the average income growth - growth in average income is 27 per cent, compared with an average income growth of 63 per cent. The reason for this may be that some individuals have increased their annual work hours substantially.[5]

In Table 3, we find gross hourly wage rates and gross income by the number of job changes between 1981 and 1991.[6] There is a tendency that the number of job changes between 1981 and 1991 declines with the wage level in 1981, at least for those with relatively few job changes, which indicates that job changes are more common at the bottom end of the wage distribution. The same trend is seen for income levels in 1981. Wage and income growth increases with the number of job changes at first, but as the number of job changes increase, the wage and income

[5] Average income growth would be $\overline{\Delta I} = \frac{1}{n}\sum_i \frac{I_{1i}-I_{0i}}{I_{0i}}$, while growth in average income is $\widetilde{\Delta I} = \frac{\frac{1}{n}\left(\sum_i I_{1i} - \sum_i I_{0i}\right)}{\frac{1}{n}\sum_i I_{0i}}$. The discrepancy between these measures is mainly due to the fact that some individuals have very low incomes in 1981.

[6] In Table 3, I have chosen to report the median, since the means are heavily influenced by a few observations with very low incomes in 1981.

growth decreases.

3.1 Econometric Specification of the Wage Equation

The Wage Level Equation

The choice of employer change and job duration is endogenous to the observed wage level and wage growth, which complicates any attempt to obtain unbiased estimates of the effect of number of job changes and job duration on wages. The actual human capital and personal characteristics are substituted for the vector describing human capital, so that $\mathbf{x}_{it} = \{SEX_{it}, M_{it}, S_{it}, X_{it}, X_{it}^2\}$; where the elements are defined in Table 1.

The wage equation is:

$$\begin{aligned} \ln w_{it} &= (\alpha_0 + \alpha_2 \cdot a_0) + \beta_1 SEX_{it} + \beta_2 M_{it} + \beta_3 S_{it} + \beta_4 X_{it} + \beta_5 X_{it}^2 \\ &\quad + (\alpha_2 \cdot a_1) D_{it} + (\alpha_2 \cdot a_2) E_{it} + (\eta_{it} + \alpha_2 e_{it}) \qquad (6) \\ &= \beta_0 + \beta_1 SEX_{it} + \beta_2 M_{it} + \beta_3 S_{it} + \beta_3 X_{it} + \beta_4 X_{it}^2 + \beta_5 D \\ &\quad + \beta_6 E_{it} + \varepsilon_{it} \end{aligned}$$

where $\beta_1 - \beta_5$ are elements of the vector $\boldsymbol{\alpha}_1$ in equation (1) . The random error term ε_{it} will capture both individual heterogeneity and match specific heterogeneity. An ordinary least squares estimation of the wage equation (6), with the career variables E_{it} and D_{it} would bias the effect of match quality on wages, since the variables related to career choice are likely to be correlated with the error term.

By instrumenting the career choice variables in question E and D, we can control for the influence of individual and match specific heterogeneity in the career choice variables, and hence get unbiased estimates of the effect of career choice on wages.

The wage equation is rewritten:

$$\begin{aligned} \ln w_{it} &= \beta_0 + \beta_1 SEX_{it} + \beta_2 M_{it} + \beta_3 S_{it} + \beta_4 X_{it} + \beta_5 X_{it}^2 + \beta_6 \widehat{D}_{it} \\ &\quad + \beta_7 \widehat{E}_{it} + \varepsilon_{it}^* \qquad (7) \end{aligned}$$

where $\widehat{D}_{it}$ and $\widehat{E}_{it}$ are instruments for job duration and the number of job changes over the career history. A description of how these instruments were created is found in Appendix A. The estimates of β_6 and β_7 in equation (7) should, in principle, not be biased from the existence of potential self-selection or adverse selection.

We can infer the existence of adverse selection by comparing estimates in equations (6) and (7). Let β_7^b be the biased (ordinary least squares) estimate of β_7 in the estimation of equation (6) , and β_7^u the unbiased estimate of β_7 in equation (7) . If $\beta_7^u > \beta_7^b$, there is a negative correlation between unobserved factors in the decision to change jobs and the wage level. Hence we conclude that individuals who change jobs are adversely selected from the pool of all matches. If, on the other hand, $\beta_7^u < \beta_7^b$, there would be a positive correlation between unobserved factors in the decision to move and wage levels, and the positive wage level effect of changing jobs would be larger than the expected negative effect of changing jobs. In this case, we have no support to conclude that job changers are adversely selected. Instead we would argue that job changers are primarily drawn from 'good' matches, in line with e.g. Topel (1986).

If $\beta_7^u < 0$, i.e. there is a negative effect of job change on wages after correcting for potential endogeneity, we would conclude that job change 'stigmatises' the employee, so that given the individual's abilities, the employer has a negative expectation of the individual's performance, and that this negative expectation increases with the number of job changes.

Since we argue that job changers may be drawn primarily from the 'bad' matches, job stayers should be the 'good' matches. If $\beta_6^u < \beta_6^b$, we would have a positive correlation between unobserved factors deciding job duration and wage levels, indicating that individuals who stay longer at their job are the 'good' matches. Finally, if $\beta_6^u > \beta_6^b$, we would conclude that there is a negative correlation between unobserved factors deciding job duration and wage levels, indicating that bad matches stay.

The Wage Growth Equation

Apart from the problems of endogeneity mentioned earlier, estimation of the wage

growth equation also involves some additional complications. The first problem is multicollinearity - linear dependence between explanatory variables. I have therefore excluded the square term on experience. I also need an estimate of job match quality in 1981, which is not available in the data. I have chosen the residual from an estimation of a cross-section wage level equation for 1981 as proxy for job match quality in 1981. The results from the estimation of the underlying wage equation is found in Appendix A.[7]

The proxy is:

$$\widehat{m81}_i = y_i - \mathbf{Z}_i\hat{\boldsymbol{\theta}} \tag{8}$$

where y_i is the dependent variable, $\ln w81$ and $\ln I81$ respectively, while $\mathbf{Z}_i$ is a vector which only contains human capital variables. This means that we can interpret $\widehat{m81}_i$ as a function of the determinants of match quality in 1981 (c.f. equation 2) and of unobserved individual factors.[8]

The wage growth equation is written

$$\Delta \ln w_i = \tilde{\alpha}_0 + \beta_1 SEX_i + \beta_2 \Delta M_i + \beta_3 \Delta S_i + \beta_4 \Delta X_i + \gamma \widehat{m81}_i + (\alpha_{21} \cdot a_1)\, \Delta D_i$$

[7] I have tested other possible proxies; the wage level in 1981, the human capital endowment and the (estimated) career choice variables in 1981. These proxies create severe problems of multicollinearity. A test for multicollinearity as suggested by Belsley et.al. (1980) suggests that the proxy given by equation (8) is less problematic.

[8] A potential problem is that the proxy might be biased by construction - the underlying wage equation is not corrected for possible endogeneity in the career choice. This means that we will reintroduce individual heterogeneity along with match specific heterogeneity at $t = 0$ into the wage growth equation. Since one can argue that initial match quality may be correlated with future career choices, there is a risk that the proxy is correlated with the error term of the subsequent wage growth equation. I have also estimated the wage growth equation without this proxy. Except for a substantial reduction in R^2, I also found that the parameter estimates for the human capital variables were slightly lower, and the parameter estimates for the career variables were slightly higher, in comparison with the results obtained when $\widehat{m81}$ is included in the regression. The latter resembles the bias one would expect from exclusion of (a correct measure of) initial match quality from the wage growth equation.

$$
\begin{aligned}
&+ (\alpha_{21} \cdot a_2)\, \Delta E_{it} + (\mu_i + \alpha_{21} \cdot \nu_i) \\
= \;& \tilde{\alpha}_0 + \beta_1 SEX_i + \beta_2 \Delta M_i + \beta_3 \Delta S_i + \beta_4 \Delta X_i + \gamma \widehat{m81}_i + \beta_6 \Delta D_i \\
&+ \beta_7 \Delta E_i + \varphi_i
\end{aligned} \tag{9}
$$

where $\widehat{m81}_i$ is the proxy for match quality in 1981, ΔD_i is the change in job duration and ΔE_i is the number of job changes between 1981 and 1991. $\beta_1 - \beta_4$ are the elements of the vector $\boldsymbol{\alpha}_1$ in equation (4). Again, the effect on wage growth of change in job duration and the number of job changes may be biased if we estimate equation (9) by ordinary least squares. Because of the potential problem of endogeneity, β_6 and β_7 may be biased, since unobserved match specific heterogeneity explaining career choices may be correlated with wages. We risk to undervalue the effect of job change on wage growth, since individuals with many job changes risk being adversely selected from the pool of all matches. The method followed to correct for the possible endogeneity is, as above, to create instruments for the career choice variables - number of job changes during the period and the change in job duration. The creation of these instrument variables is described in Appendix A.

Consequently we estimate a wage growth equation with fitted values:

$$
\begin{aligned}
\Delta \ln w_i \;=\; & \tilde{\alpha}_0 + \beta_1 SEX_i + \beta_2 \Delta M_i + \beta_3 \Delta S_i + \beta_4 \Delta X_i + \gamma \widehat{m81}_i \\
& + \beta_6 \widehat{\Delta D}_i + \beta_7 \widehat{\Delta E}_i + \varphi_i^*
\end{aligned} \tag{10}
$$

where $\widehat{\Delta D}_i$ is the instrument for change in job duration and $\widehat{\Delta E}_i$ instrument for the number of job changes. The estimates of the parameters β_6 and β_7 should in principle be unbiased estimates of the effect of job duration and number of job changes on wage growth.

We can infer adverse selection by comparing estimates in equations (9) and (10). Let β_7^b be the biased estimate of β_7 in the estimation of equation (9) , and β_7^u the unbiased estimate of β_7 in equation (10) . If $\beta_7^u > \beta_7^b$, we conclude that job changers are adversely selected. We can also test for self-selection in the decision to stay at the last job - if $\beta_6^u < \beta_6^b$, there is positive correlation between unobserved factors

deciding job duration and wage growth, indicating that those who do not change jobs do so because they benefit from it.

4 Estimation and Results

In this section, I describe the estimation results for the wage level and wage growth equations. All estimations are made with both gross hourly wages and gross yearly income as dependent variables. The estimation results for the career history estimations are found in Appendix A. Estimations are corrected for heteroskedasticity. Where I correct for endogeneity, the t-vector is also corrected for the use of instrumental variables.[9]

4.1 Estimation Results from the Wage Level Equation

Columns (1) and (2) in Table 4 are estimated with gross hourly wage rate $\ln w91$ as dependent variable, and columns (3) and (4) are estimated with gross yearly income $\ln I91$ as dependent variable. Columns (1) and (3) are estimated without correcting for endogeneity in career choice. In columns (2) and (4), I control for endogeneity in the way indicated earlier.

The standard human capital variables enter the wage equation in the expected way; each additional year of formal education raises gross hourly wages by approximately four per cent, and gross yearly income by approximately five per cent. Additional labour market experience raises gross hourly wages and income, though at a decreasing rate. Women have approximately twenty per cent lower wage levels than men, and approximately 38 per cent lower gross yearly income.[10]

Job change has no effect on wage levels in 1991. However, when comparing the results obtained in columns (1) and (2), I find that when endogeneity is not considered, the effect of job change on wage levels is underestimated. I conclude

[9] See e.g Greene (1993) p. 285.

[10] In this setting, I do not take into account the differences in occupational choice and the differences in choice of work hours (women more often work part time than men).

that there is a negative correlation between unobserved individual characteristics explaining career choice and the wage level. The most reasonable explanation is that job changers are adversely selected. A similar conclusion emerges from the income equation as the estimate of the effect of job change becomes insignificant when I control for endogeneity.

If employers have a negative expectation of the performance of individuals who have changed jobs, job change would have a negative effect on wages, even after taking endogeneity into account. Since job change has no effect on wage levels according to columns (2) and (4) in Table 4, I conclude that multiple job changes do not influence the employer's assessment of match quality.

Job duration has no effect on wage levels, and nothing indicates that there is a correlation between unobserved individual characteristics explaining the job duration and the wage level.

4.2 Estimation Results from the Wage Growth Equation

Columns (1) and (2) in Table 5 are estimated with growth in gross hourly wage rate as dependent variable and columns (3) and (4) with growth in gross yearly income as dependent variable. Columns (2) and (4) are corrected for possible endogeneity.

As can be seen in Table 5, each additional year of schooling raises wage growth by some two per cent and income growth by approximately three per cent. Each year of additional labour market experience raises wage growth by a little more than one per cent, and income growth by almost three per cent. We see that women have almost five per cent lower wage growth, and ten per cent lower income growth than men.

The better the initial match quality, measured by the residual from a wage level estimation for 1981, the lower the wage growth - returns on initial match quality have decreased over the period. In columns (1) and (3) , where I use the actual independent variables, the results imply that each additional job change raises wage growth by approximately three per cent. The effect is underestimated as a result of

Table 4: Wage level equations. Dependent variable is wage level 1991($\ln w91$) , and income level 1991 ($\ln I91$) .

Variable	(1)	(2)	(3)	(4)
$CONSTANT$	3.7398 (70.90)	3.7322 (57.02)	6.5811 (85.70)	6.60 (71.26)
SEX	− 0.2062 (14.50)	− 0.2075 (15.01)	− 0.3812 (18.42)	− 0.3833 (19.68)
M	− 0.0555 (3.05)	− 0.0552 (3.01)	0.0162 (0.61)	− 0.0149 (0.60)
$S91$	0.0429 (18.15)	0.0426 (14.21)	0.0514 (14.92)	0.0503 (13.06)
$X91$	0.0160 (4.90)	0.0143 (3.95)	0.0317 (6.68)	0.0313 (5.42)
$(X91)^2$	− 0.0002 (3.06)	− 0.0002 (3.26)	− 0.0004 (4.88)	−0.0004 (4.79)
$D91$	− 0.0001 (0.13)		− 0.0011 (0.72)	
$\widehat{D}$		0.0025 (1.32)		0.0026 (0.95)
E	− 0.0066 (1.75)		− 0.0122 (2.22)	
$\widehat{E}$		− 0.0004 (0.03)		− 0.0178 (0.88)
R^2 (adj)	0.36	0.36	0.38	0.38

t-statistics in parentheses.

Table 5: Wage growth equations. Dependent variable is growth in wage levels ($\Delta \ln w$), and growth in income levels ($\Delta \ln I$).

Variable	(1)	(2)	(3)	(4)
$CONSTANT$	− 0.1162 (3.28)	− 0.1697 (2.41)	− 0.8098 (0.15)	− 0.0859 (0.78)
SEX	− 0.0450 (3.27)	− 0.0445 (3.22)	− 0.0959 (4.58)	− 0.0950 (4.13)
ΔM	0.0790 (4.83)	0.0288 (0.45)	− 0.0769 (2.96)	− 0.0027 (0.05)
ΔS	0.0215 (2.59)	0.0205 (2.47)	0.0336 (3.30)	0.0317 (2.83)
ΔX	0.0118 (3.44)	0.0132 (3.14)	0.0270 (4.56)	0.0290 (4.27)
$\widehat{m81}^{w}$	− 0.6713 (19.39)	− 0.6618 (18.18)		
$\widehat{m81}^{I}$			− 0.8421 (27.70)	− 0.8401 (24.93)
ΔD	0.0018 (1.45)		0.0012 (0.62)	
$\widehat{\Delta D}$		− 0.0008 (0.03)		− 0.0008 (0.20)
ΔE	0.0271 (3.19)		0.0303 (2.17)	
$\widehat{\Delta E}$		0.1212 (2.26)		0.1741 (2.06)
R^2 (adj)	0.36	0.40	0.55	0.57

t-statistics in parentheses.

endogeneity. When I take endogeneity into account, I find that each additional job change raises wage growth some twelve per cent in the wage growth equation, and seventeen per cent in the income growth equation. Since the estimates are biased downwards in the estimation with the actual independent variables, I conclude that job changers are adversely selected from the pool of all workers.

5 Conclusions

In this paper, I have studied the effect of the individual's labour market history on wage levels and wage growth. The effect of job mobility on wages has two counteracting effects; the individual will have an incentive to change jobs if he expects a higher wage at a new job than at the current one. Hence, for a given individual, the wage should be higher for the observed labour market history than for all alternative possible histories. The employer, on the other hand, has a different set of priorities; an employee with a labour market history consisting of many job changes may, from the employer's point of view, be expected to be of low quality or unreliable - otherwise the individual would not want to change jobs. Consequently, the employer may want to depress the wage offered at the beginning of a match to correct for this negative expectation, and instead offer wage growth over the duration of the match given that the employee reaches a satisfactory performance level.

I find that the number of job changes has no effect on the wage level in 1991. Estimation of the wage equation without correcting for potential endogeneity will underestimate the effect of job change on wage levels, which indicates that there is a negative correlation between unobservable factors in the decision to change jobs and observed wage levels. This suggests that job changers are adversely selected. I also find that job mobility actually improves wage growth, and that each additional job change raises wage growth twelve per cent, and income growth approximately seventeen per cent. When employer change and job duration are treated as exogenous, I underestimate the effect of job change on wage growth, which further strengthens

the conclusion that job changers are adversely selected. Job duration has no effect on wages and wage growth, and there is no evidence to suggest that unobserved factors explaining job duration are correlated with wage levels and wage growth.[11]

[11]It is interesting to compare these results with what has been found in previous studies on wage determination and labour mobility in Sweden. For example, Holmlund (1984) finds that job changers have approximately nine per cent higher wage levels than job stayers in 1974. Björklund and Holmlund (1988) find that individuals who change jobs have approximately six per cent higher wage growth than job stayers between 1984 and 1986, while they find no difference in wage levels between job stayers and job movers in 1986. However, neither of these studies address multiple job changes, and information related to past career decisions are treated as exogenous in the estimations. Lundborg (1995) addresses endogeneity of job change decisions in the context of net wage growth, and finds that individuals who change jobs have higher growth in after tax wage rates between 1981 and 1991 than they would have had, if they had stayed with their 1981 employer.

Appendix A

This appendix describes how the variable ΔE is computed, and how the instruments for the variables E and ΔE (number of employer changes) and the job duration variables D and ΔD were created. Variable description for the variable used exclusively in this section are found in Table A.1.

The Creation of ΔE

The variable ΔE, the number of employer changes between 1981 and 1991 is not available in the data set for individuals whose labour market history started before 1980. For individuals who began their labour market history before 1980, the number of employer changes between 1981 and 1991 is approximated by assuming that all jobs before the current one had the same duration. Let H_0 be the year the individual was hired at the job held at the time of observation, which is known, and B is the average duration (in years) of the individual's matches before the current match. B is computed:

$$B = \frac{H_0 - H_e}{(E-1)} \tag{A.1}$$

where H_e is the year the individual entered the labour market, H_0 the year the individual was hired at the job held in 1991 and E is the number of employers over the individual's labour market history. This means that I compute ΔE :

Table A.1: Variable Description.

Variable	Description
$JC8081$	Number of job changes 1980-1981.
$CHcity$	Dummy variable. 1 if the individual grew up in a big city, 0 else.
$CMIGR$	Dummy variable. 1 if the individual migrated during childhood, 0 else.
$SSTHLM$	Dummy variable. 1 if the individual was living in the greater Stockholm area 1981, 0 else.

$$
\begin{array}{llll}
\text{if} & H_0 > 81 & H_1 = H_0 - B & \\
 & H_0 \leq 81 & & \Delta E = 0 \\
\text{if} & H_1 > 81 & H_2 = H_1 - B & \\
 & H_1 \leq 81 & & \Delta E = 1 \\
\text{if} & H_2 > 81 & H_3 = H_2 - B & \\
 & H_2 \leq 81 & & \Delta E = 2 \\
 & \vdots & \vdots & \vdots
\end{array}
\tag{A.2}
$$

This method can overstate the number of employer changes between 1981 and 1991, especially if job duration increases over the life cycle. However, this overstatement can only occur given that the individual has changed employer during the period. The loss of observations if I only select those whose labour market history starts after 1980 is severe, and this approach seems not to create unreasonable results.

Instruments for E and ΔE

The number of employer changes an individual has made is by it's nature a count variable, i.e. it can only take discrete values. Hence the instruments are created with a Poisson regression model.

The results from a Poisson regression of the number of job changes between 1981 and 1991 are found in Table A.2.[12] The results from a negative binomial regression of the number of job changes over the individual's whole labour market history is found in Table A.3. Predicted values from these regression are used as instruments for the number of job changes between 1981 and 1991, and number of job changes over the individual's labour market history, respectively.

[12] A regression test for overdispersion, as described in Cameron and Trivedi (1990), shows that I can reject the hypothesis of overdispersion.

Table A.2: Poisson regression of number of job changes between 1981 and 1991. Dependent variable is ΔE.

Variable	Coefficient	t-value	Variable	Coefficient	t-value
$Constant$	1.8979	3.12	$JC8081$	0.0379	0.87
SEX	-0.7673	2.22	$CHCITY$	0.0217	0.31
AGE	-0.0281	2.59	$SSTHLM$	0.2650	3.03
$M81$	-0.2118	2.64	$SEX \times D81$	0.0427	2.22
$S81$	-0.7861	0.89	$SEX \times X81$	-0.0211	1.76
$(S81)^2$	0.0006	0.18	$SEX \times S81$	0.0651	2.32
$X81$	0.0329	1.59			
$(X81)^2$	-0.0012	2.19			
$D81$	-0.1383	5.45			
$(D81)^2$	0.0019	1.73			

Log - Likelihood: -1302.70

Restricted Log-likelihood: -1530.52

Table A.3: Negative binomial regression of number of job changes. Dependent variable is E.

Variable	Coefficient	t-value	Variable	Coefficient	t-value
$Constant$	0.6474	0.92	$D81$	−0.0879	7.22
SEX	−0.1566	0.67	$(D81)^2$	0.0008	1.86
AGE	−0.0183	0.62	$JC8081$	0.0116	0.35
$(AGE)^2$	0.0003	0.79	$CHCITY$	0.0076	0.15
$M91$	0.0641	1.03	$SSTHLM$	0.0527	0.74
$S81$	−0.0310	0.56	$SEX \times D81$	−0.0046	0.48
$(S81)^2$	0.0001	0.04	$SEX \times X81$	0.0042	0.59
$\ln w81$	0.1313	1.35	$SEX \times S81$	0.0067	0.38
$(X81)$	0.0694	3.86	$\widehat{\alpha}$	0.2020	7.40
$(X81)^2$	−0.0008	1.99			

Log-Likelihood: -2271.02

Restricted Log-likelihood: -2325.79

Table A.4: OLS regression of change in job duration between 1981 and 1991. Dependent variable is ΔD.

Variable	Coefficient	t-value	Variable	Coefficient	t-value
$Constant$	9.3466	3.86	$JC8081$	0.7360	3.41
SEX	0.1571	0.10	$CHCITY$	−0.0257	0.08
AGE	0.03647	0.87	$SSTHLM$	0.2629	0.65
M	0.2138	0.56	$SEX \times D81$	0.0893	1.07
$S81$	0.1464	0.44	$SEX \times X81$	0.0093	0.20
$(S81)^2$	−0.0062	0.52	$SEX \times S81$	0.0033	0.03
$X81$	−0.1465	1.83	NRE	−4.0294	19.89
$(X81)^2$	0.0048	2.85			
$D81$	0.4186	3.58			
$(D81)^2$	0.0085	2.02			
$R^2\,(adj)$	0.43				

Instruments for $D91$ and ΔD

Job duration is also an outcome of the career strategy, and should be instrumented in the wage growth estimation.

The change in job duration between 1981 and 1991, ΔD, will obviously depend on the number of job changes the individual made during this period. For an individual who did not change jobs, this variable should take the value $\Delta D = 10$.[13] The variable will take a negative value if the individual has a shorter duration at the job held in 1991, than at the job held in 1981.

The results from the OLS regression of the change in job duration between 1981 and 1991 are found in Table A.4. The results from the OLS regression of job duration at the job held in 1991 are presented in Table A.5.

[13] Discrepancies occur when different hiring years are reported for the same job in 1981 and 1991.

Table A.5: OLS regression of job duration 1991. Dependent variable is $D91$.

Variable	Coefficient	t-value	Variable	Coefficient	t-value
$Constant$	-0.4863	0.08	$CMIGR$	-0.1367	0.38
SEX	1.4173	0.83	$CHCITY$	-0.1590	0.43
$AGE91$	0.0224	0.08	$M91$	-0.1711	0.37
$(AGE91)^2$	0.0005	0.14	$SSTHLM$	-0.9625	1.95
$S91$	0.4676	1.20	E	-1.5172	16.85
$(S91)^2$	0.0177	1.19	$SEX \times D81$	-0.1417	2.07
$X91$	0.5293	3.34	$SEX \times X81$	0.0031	0.06
$(X91)^2$	-0.0050	1.61	$SEX \times S81$	-0.0406	0.32
$D81$	0.1129	0.53	$AGE \times D81$	0.0106	1.34
$(D81)^2$	-0.0003	0.06	$D81 \times X81$	0.0028	0.35
$JC8081$	0.4243	1.65			
R^2 (adj)	0.62				

Table A.6: Wage Level equation 1981. Dep var is $\ln w81$ and $\ln I81$.

	(1)		(2)	
Variable	Coefficient	t-value	Coefficient	t-value
$Constant$	3.3865	24.92	6.3615	25.61
SEX	−0.1581	9.97	−0.2254	7.77
AGE	0.0067	3.31	−0.0041	1.12
$M81$	0.0326	1.81	−0.0641	1.95
$S81$	0.0801	4.36	0.0574	1.71
$(S81)^2$	−0.0016	2.42	−0.0003	0.23
$X81$	0.0191	3.33	0.0454	4.33
$(X81)^2$	−0.0003	3.91	−0.0005	3.29
$S81 \times X81$	−0.0001	−0.26	0.0000	0.03
R^2 (adj)	0.34		0.25	

A Proxy for Job Match Quality in 1981

In the estimation of the wage growth equation we need a proxy for job match quality in 1981, since the number of job changes before 1981 is not available in the data. The proxy for job match quality in 1981 is the residual from a wage level estimation:

$$\begin{aligned} \widehat{m81}_i^{\,w} &= \ln w81 - \mathbf{Z}_{81}\widehat{\boldsymbol{\theta}}_1 = \alpha_2 m_{i81}^w \\ \widehat{m81}_i^{\,I} &= \ln I81 - \mathbf{Z}_{81}\widehat{\boldsymbol{\theta}}_2 = \alpha_2 m_{i81}^I \end{aligned} \tag{A.3}$$

where $\mathbf{Z}_{81}$ is a vector of independent variables for 1981.

The results from the wage level estimation are presented in Table A.6. Column (1) is the wage equation estimated with gross hourly wages as dependent variable, and column (2) contains the results when the wage equation is estimated with gross yearly income as dependent variable. $\widehat{m81}_i^{\,w}$ is used as a proxy for job match quality in 1981 in the estimation of growth in gross hourly wage rate, and $\widehat{m81}_i^{\,I}$ is the proxy in the income growth equation.

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Determinants of Long and Short Distance Migration in Sweden

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Abstract

In this paper a multinomial model of migration is estimated to ascertain whether the determinants of outmigration differ for the choice of moving short or long distances. I find that premigration income is significant in explaining long distance migration, while it has no effect on short distance migration. The higher the level of education the more likely a person is to migrate a long distance. Dependence on unemployment benefits increases the likelihood of migrating both short and long distances. I find that labour market characteristics and local fiscal characteristics do not influence the decision to migrate.

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1 Introduction

Migration studies in economics have focused on two major issues. One has concerned migration as a labour market phenomenon, concentrating on the effect of unemployment and local labour market characteristics in determining migration. Another strand of literature has focused on the importance of local fiscal variables in determining migration. A survey of studies on the importance of local fiscal variables as determinants for migration can be found in Charney (1993), whereas Herzog et. al. (1993) is a survey of studies where migration is seen as the outcome of a spatial job search strategy.

Although earlier studies have pointed out the fact that the determinants of migration may vary with migratory distance, few studies have explicitly studied the differences in the determinants of long and short distance migration. The purpose of the present paper is to study the effect of economic and demographic factors on the decision to migrate, and how these factors differ with respect to their influence on long and short distance migration.

Long distance migration probably means that one has to change jobs, but with short distance migration, the old job may be within commuting distance. This could mean that the determinants of long distance migration and short distance migration may differ considerably.

In this study, long distance migration is defined as a move across the county boundary, and short distance migration is defined as a move between municipalities within the county. The distinction between migration across and within the county border is not ideal. In metropolitan areas and in municipalities located at the county border, cross border migration could be shorter than within county migration. However, in the Swedish case, Harkman (1988), in a survey of young unemployed, found that close to 50 per cent of across county border migrations, i.e. long distance migrations, were made for labour market reasons. Another way of dealing with the problem of defining labour related migration is used in Axelsson and Westerlund (1998). They use a distance parameter to select for the probability of labour related

migrations.

In this paper, the intention is to study the migration decision for an economically active population. The migration pattern is observed over a period of eleven years, from 1981 to 1991. All individuals in the sample are required to be active in the labour market and to have income from employment (gainful employment or self-employment) every year during the period 1979 to 1991. Accordingly, we have restricted the sample to young men, aged between 20 and 40 years old in 1981. Young women are less likely to be continuously active in the labour market, e.g. they may have breaks for maternity leave, even if they have income from employment every year during this period, since parental allowance is, for tax purposes, defined as income from gainful employment. Restricting the age group to those between 20 and 40 years old in 1981 means that all individuals in the sample are well below retirement age in 1991.

This paper is structured as follows. Section 2 contains a description of the migration model, while section 3 contains a description of the data set used. Estimation results are presented in section 4, and conclusions are found in section 5.

2 Migration Model

The individual must take one of three possible courses of action: stay within the municipality where he resides, migrate to another county; or migrate to another municipality within the same county. These decisions are mutually exclusive and simultaneous, so a multinomial decision model is used.

Assume that the net benefit M^* from migration choice j for individual i may be described by

$$M_{ij}^* = f\left(\mathbf{y}_i, \mathbf{Q}_i, \mathbf{L}_i\right) \tag{1}$$

where $\mathbf{y}_i$ is a vector containing information about net income and growth in net income the year before the migration choice is made. In addition to net income, personal characteristics and household attributes, $\mathbf{Q}_i$, also affect the net benefit

of migration. Some characteristics of the municipality of residence, $\mathbf{L}_i$, may also influence the net benefit of outmigration. The choice of variables in these vectors is discussed below.

The individual will choose migration choice j if the net benefit of that choice exceeds the net benefit of the other choices:

$$M_i = j \qquad \text{if} \quad M_{ij}^* > M_{ik}^* \qquad \text{for } j \neq k \tag{2}$$

where M_i is the observed migration choice for individual i. The individual can take one of three possible actions: not migrating ($j = 0$); migration across county border ($j = 1$); and migration within the county ($j = 2$).

For simplicity of notation let $\mathbf{X}_i = [\mathbf{y}_i \quad \mathbf{Q}_i \quad \mathbf{L}_i]$. The net benefit of mobility choice j, M_{ij}^*, depends on the observable characteristics $\mathbf{X}_i$ and on a vector $\boldsymbol{\beta}_j$, which is a vector of parameters influencing the expected net benefit of mobility choice j.

$$M_{ij}^* = \mathbf{X}_i \boldsymbol{\beta}_j + \varepsilon_i \tag{3}$$

The net benefit of each mobility choice is considered in comparison with the other alternatives. As a reference point, the net benefit of not migrating is set to 0, i.e. $\boldsymbol{\beta}_j = \mathbf{0}$ for $j = 0$, for the sake of computability.[2]

Given a logit model, the probability of observing mobility choice j is:

$$P(M = j) = \frac{\exp\left(\mathbf{X}_i \boldsymbol{\beta}_j\right)}{1 + \sum_{k=0}^{2} \exp\left(\mathbf{X}_i \boldsymbol{\beta}_k\right)} \tag{4}$$

Hence the probability of observing a mobility choice will depend on the net benefit of mobility choice j, and the net benefit of the other migration choices.

2.1 Personal and Income Variables

Net income from employment before migration may have an impact on the decision to migrate. The lower the net income, the lower the opportunity cost of moving,

[2] See e.g. Greene (1993), chapter 21, p 666.

as measured by forgone consumption. Another argument could be that the lower the income and income growth before mobility, the larger the number of attractive alternative income offers are likely to be. Net income rather than gross income is chosen, as the net income is more closely linked to consumption possibilities. Capital income is excluded from the measure, as it is not location specific. As income for the year migration takes place is endogenous, i.e. net income depends on whether or not one migrates, we use pre-migration income and income growth. This is because pre-migration income is exogenous in the year in which the decision to migrate is made.

It is often emphasised that the effect of income on migration is ambiguous - see e.g. Da Vanzo (1978) or Greenwood (1985). This is because, at very low levels of income, migration may be too costly. As income increases, migration becomes an affordable option, but the opportunity cost of forgone income is higher, which may deter migration. However, until 1988 starting assistance grants were given in Sweden to those migrating for labour market reasons, which would counteract the effect of not being able to afford to migrate for those with very low levels of income. An analysis of the effect of starting assistance grants on migration flows in Sweden may be found in Westerlund (1992).

Other personal and household characteristics that may influence the migration decision are marital status, whether or not the spouse has a regular income from employment at the current place of residence and whether this income consitutes a considerable portion of household income. If the spouse contributes a large share of the household income, the employment opportunities for her may also be important in the migration decision, and may deter at least long distance migration. Accordingly, I include the proportion of household income that is provided by the spouse. Another characteristic that may tie the individual to a community is having children, especially school-aged children. For a discussion of family migration decisions, see e.g. Mincer (1978).

The amount of schooling an individual has is expected to have a positive effect

on the decision to migrate. If more highly educated individuals are more specialised in their occupation, they may face "thinner" local labour markets, which may make migration necessary to increase their earning potential by changing jobs.

It is a commonly observed phenomenon in migration literature, that the probability of migrating decreases with age. One important explanation for this dates back to Sjaastad (1962), and the human capital investment model of migration. Migration is seen as an investment in human capital, and the shorter the pay-off period, the lower the net benefit of migration. Hence, the net benefit of migration should also decrease with age, since the potential gain from higher wages and lower taxes is discounted over a shorter remaining period.

Engagement in farming or business activities in the current place of residence may also deter migration. If income from farming is a substantial proportion of the household income, the household may be less likely to move, as migration may mean losing this source of income. A similar reason applies with regard to business activities. The income from business activity may decline if it is moved, as set-up costs in a new location may be high.

Unemployment, particularly long term unemployment could be an important factor in determining migration. The longer one has been unemployed, the more likely one may be to migrate for labour market reasons. The effect of unemployment on migration has been studied by e.g. Da Vanzo (1978), Schlottmann and Herzog (1981) and Goss and Paul (1990). They all find that unemployment increases the probability of migration.

Previous long distance migration may be an indicator of individual preferences for moving. If an individual has migrated before, he may have fewer ties to the community and hence be more likely to migrate again. A long distance migrator may also be more inclined to make a short distance migration shortly after the long distance migration. This because the attributes of closely situated municipalities might not be known before the long distance migration.

2.2 Variables Concerning the Municipality of Residence

Attributes of the municipality of residence also play a part in the decision to migrate. A person may prefer to live in a municipality with low local taxes, and a high local tax may induce migration to municipalities with lower local taxes, for a given the level and quality of local public services. Another factor is the guaranteed local tax base. For Sweden, Westerlund and Wyzan (1995) found that local taxes (in relation to the national average) influence short distance migration in metropolitan areas in Sweden. In non-metropolitan areas, the local tax base (in relation to the national average) influences the outmigration decision.[3] The guaranteed local tax base reflects the possibility of the municipality to offer publicly provided services. Therefore, a household may want to move to communities with a high guaranteed tax base, because communities with a low guaranteed tax base may have less, and a lower standard, of services.

Degree of urbanisation may also be a factor influencing migration. Densely populated urban areas may have a more varied economic structure, with more opportunities for employment. This could be expected to decrease the likelihood of long distance migration.

The number of unemployed per vacancy in the municipality is thought to capture local labour market conditions. This measure in preference to the local unemployment rate, as it means that the demand for labour is also taken into consideration; a high local unemployment rate may coexist with a large number of vacancies, which indicates that the unemployment is mainly of a frictional or structural nature. However, if the number of unemployed per vacancy is large compared with the national average, we may interpret this as a local business cycle slump. In such a case, we would expect that the probability of outmigration - especially long distance migration - would increase as the number of unemployed per vacancy increases.

The proportion of unemployed in labour market programs (relief work or labour

[3] See Westerlund and Wyzan (1995) for a discussion of tax base versus tax rates as push factors for migration.

market training) may also affect the migration decision. If labour market programs are readily available for the unemployed, they may prefer to stay, even when unemployed.

The location of the municipality may also be important. Stockholm is the largest city in Sweden. Stockholm county constitutes the largest metropolitan area in Sweden, which consists of a number of closely situated municipalities. The close proximity of municipalities, and the differences in characteristics of these municipalities should make short distance migration more likely, whereas the diversity of the economic structure should make migration from Stockholm county less likely. On the other hand, the north of Sweden is the most sparsely populated region in Sweden, and its few municipalities tend to be large in terms of area and small in terms of population. Accordingly, commuting between municipalities is relatively limited. An individual living in the northern part of Sweden could, therefore, be more likely to migrate both short and long distances.

3 Data

The sample studied consists of 537 men in the Level of Living Surveys. The Level of Living Surveys are a regurlarly recurring survey of a cross section of the Swedish population. For a description of this survey, see Eriksson and Åberg (1987). Income, marital status and place of residence for each year are found in the tax assessment files of the selected sample.

The sample selected were men aged between 20 and 40 years old in 1981. The mobility decisions are observed each year from 1981 to 1991. All in the chosen sample were required to have an assessed income high enough to be liable to pay taxes each year from 1979 to 1991. Variables concerning income and municipality of residence are available each year, but other information is taken from the Level of Living Survey 1981 and 1991, respectively. Information about the date of birth of children is taken from Level of Living Survey of 1991. The education level for the individual each year is calculated by linear extrapolation, i.e. if an individual

has recieved e.g. four years of schooling between 1981 and 1991, his education level rises by 0.4 each year. Information about the local labour market and local fiscal characteristics are gathered from official statistics.[4]

A description of the variables used in this study is found in Table 1. Descriptive statistics for selected years, by mobility choice, are presented in Table 2. As can be seen in Table 2, both short and long distance migrators are, on average, younger than non-migrators. It is more common for short distance movers to be married, than for both stayers and long distance movers. Long distance movers have a higher level of education than either short distance movers and stayers in both 1981 and 1991.[5] Long and short distance movers have no income from farming or business activities in either of the selected years.

In the sample, roughly 26 per cent of the individuals have migrated at some time during the period studied, and approximately 9 per cent have migrated more than once. A total of 219 migrations for 137 migrators were observed during the period. Moves across the county border constitute about 47 per cent of all observed migrations, and 55 per cent of all migrators have migrated across county line at least once during the period studied.

As can be seen in Table 3, close to 41 per cent of those whose latest recorded move was a move across county border (LM) stated that a new job (for either the man or his spouse) was the reason for the migration. Among short distance migrators (SM), 20 per cent named a new job as the reason for the move.

In more than half of the cases, reasons other than factors related to the labour market influence the decision to migrate. Hence demographic and social variables also play an important role in the decision to move as do attributes of the municipality of residence.

[4]Sources: the Swedish Labour Market Board and Statistics Sweden.

[5]Actually, long distance migrators have a higher level of education than either short distance migrators or stayers each year during the period, except 1985 and 1986.

Table 1: Variable description.

Variable	Description
y	Net income in year t-1, hundreds of SEK, 1990 prices.
$\ln y$	Natural logarithm of y.
GROWTH	y_{t-1}/y_{t-2}, growth in net income between year $t-2$ and $t-1$.
SINKP	Spouse's net income as proportion of total household net income year $t-1$.
AGE	Age in years: $t - \textit{birth year}$.
SCHOOL	Years in school.
UNPA	Proportion of household income from unemployment benefits and cash assistance in year $t-1$.
FARM	Proportion of household income from farming in year $t-1$.
BUSI	Proportion of household income from business activity year $t-1$.
SMCH	Number of children aged 0-6 in the household.
SCCH	Number of children aged 7-16 in the household.
ELM	Dummy variable: 1 if migrated across county border earlier during the period, 0 else.
TBAS	Tax base, per cent of national average year $t-1$.
LOCT	Local tax rate in MOR divided by the national average for this measure.
POPDEN	Population density in MOR, population aged 16-64 per square kilometres.
UNPVAC	Number of unemployed per vacancy in MOR divided by the national average for this measure.
LMP	Proportion of unemployed in labour market programs in MOR divided by the national average for this measure.
STHLM	Dummy variable: 1 if municipality of residence (MOR) is located in Stockholm County, 0 else.
NORTH	Dummy variable: 1 if MOR is located in the north of Sweden, 0 else.

MOR = Municipality of residence in $t-1$.

Table 2: Decriptive statistics for selected variables. Entry is sample mean for each year.

	1981			1985			1990		
	S	LM	SM	S	LM	SM	S	LM	SM
y	807.66	802.75	789.72	827.32	766.75	774.92	953.54	1070.62	951.67
GROWTH	0.01	0.20	0.25	0.03	0.18	0.05	0.05	0.14	0.04
SINKP	0.23	0.20	0.39	0.21	0.22	0.26	0.32	0.34	0.34
AGE	30.19	28.78	26.20	34.23	33.80	31.19	39.27	36.31	35.55
SCHOOL	11.35	13.22	12.20	11.65	11.64	11.86	11.97	13.45	11.57
UNPA	0.01	0.01	0.00	0.01	0.06	0.03	0.01	0.02	0.00
FARM	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00
BUSI	0.03	0.00	0.00	0.03	0.00	0.00	0.04	0.03	0.00
SMCH	0.45	0.22	0.00	0.44	0.40	0.31	0.45	0.69	0.82
SCCH	0.27	0.11	0.00	0.51	0.50	0.06	0.63	0.54	0.45
ELM	0.00	0.00	0.00	0.07	0.20	0.31	0.12	0.38	0.27
n	523	8	6	511	14	12	513	16	8

S = No migration

LM = Long distance migration

SM = Short distance migration

Table 3: Reasons for latest move. Per cent.

Reasons for moving	LM	SM	ALL
No answer	16.9	39.4	16.8
New job	40.8	19.7	30.7
Studies	1.4	0.0	0.7
Changes in family situation	15.5	24.2	19.7
Other	25.4	39.4	32.1
Total	100.0	100.0	100.0
n	71	66	137

Source: The Level of Living Survey 1991.

4 Estimation Results

The results of the multinomial logit choice equation are reported in Table 4. Marginal effects and elasticities of continuous variables are found in Table 5.

An individual with a high pre-migration income is less likely to make a long distance move than a person with low pre-migration income. A one per cent increase in income, decreases the probability of long distance migration by 3.5 per cent. For short distance migrators, pre-migration income has no effect on the probability of a move. This is in accordance with Da Vanzo (1978) who found a negative effect on pre-migration household income on the probability of interdivisional migration for the United States. This could be interpreted as low pre-migration income is a push factor for long distance migration, and that greater earnings potential is gained through long distance migration. Income and income growth have no effect on the probability of short distance migration.

As expected, an older person is less likely to migrate than a younger, and an individual who has more schooling is more likely to make a long distance move than a person with less schooling. A one percent increase in the number of years in education increases the probability of long distance migration by three per cent.

Schooling has no effect on the probability of short distance migration.

The dependence on unemployment benefits - measured by the proportion of income from unemployment benefits (UNPA) - has a positive effect on the probability of long distance migration. However, we cannot reject the hypothesis that the effect of the dependece on unemployment benefits on the probability of migration is the same for both long and short distance migration. A one per cent increase in the proportion of income from unemployment benefits increases the probability of long distance migration by 0.03 per cent.

The number of school-aged children in the family (SCCH) has a negative effect on the probability of long distance migration, and a person with more children is less likely to migrate than a person with fewer children. The effect of the number of children on the probability to migrate is the same for both long and short distance migration.

Local labour market characteristics do not seem to influence the migration decision. Local labour market activity as measured by the number of unemployed per vacancy (UNPVAC) has no effect on the decision to migrate either within or across the county border. An increase in the number of unemployed per vacancy has a positive (but insignificant) effect on the probability to migrate within the county, but (counterintuitively) a negative effect on the probability of cross-border migration. The availability of labour market programs (LMP) has a negative effect on the probability of migrating across the county border, but the effect is not significant.

As might be expected, previous long distance migration (ELM) has a positive effect on the probability of long distance migration. This could be a remigration effect, because those who are new to a community have less ties to that community and, therefore, have lower thresholds to overcome when making another migration decision. A person who has previously migrated a long distance during the period studied is almost three times more likely to migrate a short distance, than a person that has not migrated across the county border earlier during the period.[6]

[6]The odds ratio for dummy variables are computed as $\exp(\beta_i)$.

Table 4: Logit estimation results. Dependent variable is M.

	LM		SM	
Variable	Coefficient	t	Coefficient	t
Constant	1.2277	0.30	-3.2008	0.80
$\ln y$	-0.5433	2.47	0.3090	1.05
GROWTH	0.4201	1.93	-0.0194	0.07
lnAGE	-1.2108	2.00	-1.7073	3.13
lnSCHOOL	1.3207	2.89	0.1204	0.28
SINKP	0.4878	1.04	-0.1254	0.27
SMCH	0.0509	0.37	-0.0256	0.19
SCCH	-0.3683	1.91	-0.3491	1.91
FARM	-58.6170	0.72	-5.1653	0.76
BUSI	-3.4169	1.42	-0.1367	0.18
UNPA	3.1526	2.47	2.1443	1.44
TBAS	-0.0001	0.01	-0.0074	0.62
LOCT1	-0.6632	0.23	3.2799	1.20
POPDEN	0.0002	0.65	0.0002	0.79
UNPVAC1	-0.1559	1.11	0.0439	0.62
LMP1	-0.0022	0.01	0.2282	1.16
STHLM	-0.2201	0.50	0.5886	1.80
NORRL	0.1325	0.46	-0.0639	0.24
ELM	1.3144	5.34	1.1114	4.22

$\chi^2_{36} = 143.74$

Significance level: 0.00000

Table 5: Marginal effects and elasticities for continuous variables.

	LM			SM		
Variable	Derivative	$\|t\|$	Elasticity	Derivative	$\|t\|$	Elasticity
$\ln y$	-0.0042	2.28	-3.5256	0.00532	1.06	2.089
GROWTH	0.0032	1.18	0.0090	-0.00039	0.08	-0.001
lnAGE	-0.0091	0.32	-4.0072	-0.02884	2.59	-5.980
lnSCHOOL	0.0102	1.04	3.0792	0.00187	0.25	0.267
SINKP	0.0038	0.99	0.1300	-0.00220	0.28	-0.036
SMCH	0.0004	0.37	0.0219	-0.00044	0.19	-0.011
SCCH	-0.0028	0.42	-0.1723	-0.00588	1.68	-0.171
FARM	-0.4507	0.44	-0.5218	-0.07988	0.51	-0.044
BUSI	-0.0263	0.91	-0.1064	-0.00186	0.14	-0.004
UNPA	0.0240	0.52	0.0274	0.03600	1.34	0.019
TBAS	0.0000	0.00	0.0029	-0.00013	0.61	-0.734
LOCT1	-0.0055	0.13	-0.6948	0.05581	1.17	3.289
POPDEN	0.0000	0.34	0.0502	0.00000	0.77	0.055
UNPVAC1	-0.0012	1.06	-0.1894	0.00077	0.64	0.057
LMP1	0.0000	-0.01	-0.0067	0.00388	1.14	0.257

Derivatives and elasticities are computed at the mean vector.

As may be expected, the probability of short distance migration is higher for individuals living in Stockholm County. The local fiscal variables, the local tax rate and local tax base, have the expected signs for short distance migration, but the effect is not significant.

4.1 A Note on Migration Distance

One could argue that the definition of long and short distance migration could have some influence on the results. Therefore, I have reestimated the model with long distance migration defined with a distance parameter. The distance approach could well be seen as equally arbitrary to the approach used in this paper. I want long distance migration to be defined as a move to a new local labour market, i.e. the new municipality of residence should not be within commuting distance from the old job. Since commuting distance should be measured in time units, not in kilometres, what consitutes a long distance migration varies depending on where the individual lives. This is indirectly considered when I define long distance migration as a move across county border, since counties are fairly small in densely populated areas, where commuting distance may be shorter when measured in kilometres, and large in sparsely populated areas, where the viable commuting distance is longer.

I have varied the definition of long distance migration - from the definition that a long distance migration is a move more than 30 kilometres to a move more than 150 kilometres, with a successive increase of 5 kilometres. Migration distance is defined as the distance in kilometres from city centre to city centre. The number of recorded migrations in each category for various migration distances are found in Table 6.

The estimation results are not very different from the results presented in this paper. The variables that were important when long distance migration was defined as a move across county border, are important when long distance migration is defined with migratory distance. The parameter estimates have in general the same signs (at least for parameters with absolute t-ratios above 0.5). However, the significance level of the parameters varies slightly with the definition of distance. Generally, we

Table 6: Long and Short Distance Migration by Migratory Distance.

SM is defined as	LM	SM	SM is defined as	LM	SM
MD<30 km	158	61	MD<100 km	97	122
MD<40 km	144	75	MD<110 km	94	125
MD<50 km	124	95	MD<120 km	82	137
MD<60 km	114	105	MD<130 km	75	144
MD<70 km	107	112	MD<140 km	74	145
MD<80 km	103	116	MD<150 km	69	150
MD<90 km	102	117			

MD = Migration distance in kilometres.

can say that the magnitude and significance level of the income variable increases when I increase the distance required for a move to be considered a long distance migration.

Table 7 contains the estimation results from two such estimations - one where long distance migration is defined as a move more than 60 kilometres, and one where long distance migration is defined as a move more than 120 kilometres.

The variables describing the local labour market characteristics have very low t-ratios in all estimations. The variables describing the municipality of residence are still not significant.

5 Conclusions

The main finding in this study are that the higher the pre-migration income, the lower the probability of long distance migration. However, income has no effect on the probability of short distance migration. The length of unemployment increases the probability of long distance migration. I do not find evidence to support that local fiscal variables or local labour market characteristics increase the likelihood

Table 7: Estimation results with short distance migration defined as a move less than 60 kilometres and 120 kilometres.

	LM		SM		LM		SM	
Variable	Coefficient	t	Coefficient	t	Coefficient	t	Coefficient	t
Constant	-0.9372	0.24	-0.5208	0.13	0.5023	0.11	-1.9053	0.52
$\ln y$	-0.3068	1.31	-0.0205	0.08	-0.4970	2.02	0.1185	0.47
GROWTH	0.3058	1.31	0.1171	0.44	0.4940	2.12	-0.0113	0.05
lnAGE	-1.2661	2.20	-1.6340	2.87	-0.9362	1.42	-1.8144	3.53
lnSCHOOL	1.0047	2.32	0.3624	0.80	1.0586	2.15	0.4610	1.14
SINKP	0.2418	0.53	0.1145	0.24	0.6843	1.30	-0.1417	0.34
SMCH	-0.0294	0.22	0.0418	0.30	-0.0607	0.38	0.0509	0.42
SCCH	-0.2090	1.24	-0.5594	2.57	-0.3000	1.50	-0.4026	2.25
FARM	-26.9870	0.77	-5.3977	0.80	-37.0910	0.68	-5.7924	0.83
BUSI	-3.5657	1.49	0.1111	0.14	-3.1075	1.32	-0.2639	0.34
UNPA	2.6490	2.04	2.6472	1.82	2.8022	1.95	2.5253	1.92
TBAS	-0.0022	0.17	-0.0037	0.29	0.0039	0.27	0.0076	0.67
LOCT	0.8811	0.32	1.7474	0.61	-1.3013	0.41	3.0674	1.20
POPDEN	0.0001	0.19	0.0003	0.92	0.0000	0.11	0.0003	1.05
UNPVAC	-0.0029	0.04	-0.0293	0.27	0.0084	0.09	-0.0401	0.41
LMP	0.0549	0.25	0.1974	0.95	-0.1294	0.46	0.2550	1.39
STHLM	0.4139	1.11	0.1466	0.40	0.0766	0.16	0.3603	1.15
NORTH	0.4408	1.74	-0.6137	1.81	0.6366	2.22	-0.5082	1.75
ELM	1.5554	6.76	0.7590	2.57	1.1089	3.81	1.3046	5.72
	$\chi^2_{36} = 141.72$				$\chi^2_{36} = 144.09$			
	Significance level: 0.00000				Significance level: 0.00000			

for either short or long distance migration. We may interpret these results as if long distance migration is an action taken to increase earning potential, but that short distance migration is not due to perceived gains in earning potential. The significance of the dependence on unemployment benefits on long distance migration may be interpreted as an involuntary act to counteract unemployment at the current place of residence, although the effect of unemployment on the probability to migrate does not significantly differ for either short or long distance migration.

As expected, previous long distance migration has a positive effect on the probability of both long distance and short distance migration. Local labour market characteristics, that I expected to influence long distance migration, appear to have no effect on explaining long distance migration, neither on short distance migration. I expected local fiscal characteristics to influence the decision to make a short distance migration, but local fiscal characteristics do not explain neither short distance migration, nor long distance migration.

As the distinction between long and short distance migration is somewhat arbitrary in this paper, it could be a fruitful extension to make a better distinction between long and short distance migration, based on commuting distance measured in time, not distance in kilometres. Another development that could explain short distance migration is some measure of the quality of the publicly provided services in the municipalities, such as schools, child day-care, and recreational facilities.

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