Labour market mobility among senior workers in Norway

by

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Preface

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Work on the Master thesis has been the most challenging and most rewarding work I have done in my Economics degree. The work has given renewed interest in econometrics and working with large numbers.

Anne Marte Lunde Tobro, Bergen 02. februar 2015

Abstract

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As many developed countries, Norway has a growing elderly population and need to administer some policy change to cover the cost of the increasing number of pension recipients. One of the solutions to this problem is to give workers incentive to stay in the workforce longer. This thesis analyse the senior workers labour market mobility by studying the probability of leaving the workforce and the probability for senior workers to conduct a job change. Understanding job-to-nonemployment and job-to-job mobility give valuable information on the development of the labour market for senior workers, and with this information it is possible to better facilitate policy incentives.

Nonemployment and job-to-job mobility are both represented as binary variables in this thesis, and I have chosen to use the logit model to calculate the probabilities. The results from the probability of leaving the workforce conforms to the theory and show that lower educated individuals have a higher probability of leaving early. The probability of job change does also decline with age, but the age coefficients have a curvilinear shape. The probability of job change increase before declining, and this is more difficult to explain.

STATA 13.1 is the software used for the regression analysis and most graphical figures, EndNote has been used for sorting references and the Microsoft Office package for text, tables and the remaining figures.

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1. Introduction

The demographic pyramids of the western world are changing from a triangular to a more rectangular shape. As the numerous baby-boomers grow older, a shift will occur in the structure of the workforce, the superior numbers of the working population dwindles while the ratio receiving pensions will increase. The generation now entering the workforce are few and they will carry a heavy load, supporting both a large elderly population and an almost equally large young portion in school. As of 2013 there were 800 350 recipients of governmental retirement benefits from the National insurance scheme (NIS) (Statistisk Sentralbyrå, 2014a), and as of 2012 21 per cent of the population were more than 60 years old and this share will increase to 27 per cent the next thirty years (Haga, 2014).

The pension scheme in Norway is a "pay as you go" system, so the people currently in the workforce are the ones to cover the cost of pensions paid out now. With a diminishing ratio of working individuals this can create a financial gap. There are four typical ways to resolve the issue: I) Postpone the problem, plan for higher taxes in the future, II) pre-fund, by building up assets, III) Try to reduce government expenditure by executing pension reforms and preventive measures for better health in the population (and thus reducing costs in the health sector), and IV) raise future output enough to cover the cost (Bellone and Bibbee, 2006). Option one is not very good since it might stagnate future growth. Norway have a better chance at managing option II) than other countries because of the Government Pension Fund Global. Despite the name the fund is not an actual pension fund, and it is never good to keep paying on an unsustainable system anyway. The fourth option is one that every country should try to accomplish regardless of a specific challenge. Theoretically increased efficiency would be sufficient to increase output, but there is a risk that the efficiency will not go up fast enough for the permanent change in the ratio between working population and those in need of welfare support. That leaves the third option; execute pension and health reforms trying to reduce the cost. The aim is to get the expenses on a level where the current working population are able to cover the cost. One way for the state to approach both solutions is to give people incentives to stay in the workforce longer.

In 2011 a pension reform was implemented, among other things this reform aims to give people incentives to work longer. With Prop. 48 L (2014-2015) the government wants to facilitate for senior workers to continue working longer. One selected approach is to go

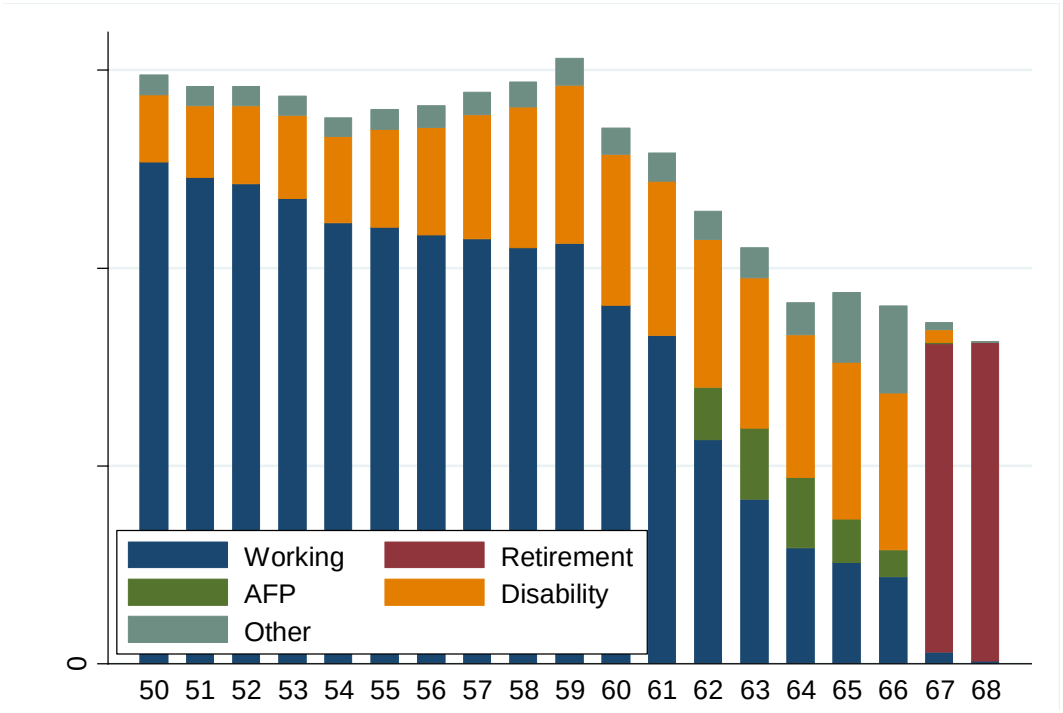
through all statutory age limits in the workforce. Current legislations give employers mandate to terminate an employment contract based on age when a worker turns 70 (or 67 if specified in employment contract at the beginning of the job spell). The government propose to extend this age limit to 72 (and 70). In Prop. 48 L (2014-2015) the government argues that an increase in mandatory retirement age will increase economic growth by allowing more people to work longer. Edward Lazear's (1979) theory on wage profiles gives another view on the matter of mandatory retirement age. Giving people incentives to stay in the workforce might create a conflict of interest between the state and the private businesses. The state naturally wants to diminish the expected expenses induced by a large group approaching retirement, but the private sector is not necessarily interested in hiring senior workers (Daniel and Heywood, 2007, Hutchens, 1986). Senior workers have through experience accumulated general human capital and usually wages increase to match these investments (Mincer, 1970, Mincer, 1997), but at some point the rate of accumulation flattens and then the productivity starts to decline with age (Skirbekk, 2004).

As productivity is reduced, but the wage stays the same, we get an increasing gap between productivity and wage level. Lazear's theory tells that an implicit contract between employers and employees, this contract lets individuals entering the workforce work with wages lower than productivity, so as their career progress wages will increase. Continuous increasing wages creates incentive to keep efforts high, and not shirk or leave. When the worker get older and the gap between productivity and wage increase there is no need to lower the wage level because this gap is already "paid for" by high productivity early in the career. However; for the contract to function it demands an end date, the mandatory retirement date.

The policy makers wish to give people incentives to continue working longer, but to manage this it is important to understand the foundation of the senior workers labour market mobility. I will make use of the knowledge of the productivity/wage gap, and why this demands a mandatory retirement age, to study the mobility of senior workers in the labour market. The workers are affected by Lazear's implicit contract by varying degree, and to identify the differences I will break down job mobility into two main aspects; mobility out of the workforce (job-to-nonemployment) and mobility between jobs (job-to-job). I will study the probability of mobility for individuals with different background characteristics.

It is already known that most leave the workforce *before* the retirement age at 67. Figure 1 below show the workforce allocated into 5 different groups, and only a glance at the figure confirms this statement. The figure also shows the rapid growth in elderly population that will take place in the next few years. In this thesis I will study the labour market mobility in the years before the retirement age.

Figure 1: Activity allocation of the sample population, by age. Cross section of year 2005. Frequency



The process of facilitating for senior workers is ongoing. The pension reform was implemented in 2011, and already there are indications that the reform has been able to change the trend (Bråthen and Bakken, 2012). I begin the thesis in chapter 2 by giving a brief introduction to the Norwegian pension system, both before and after the reform in 2011. The old system will hold the main focus here since it encompasses the individuals in my sample. I will still give a short introductions to the principal changes made by the reform and the new propositions to the Work Environment Act; Prop. 48 L (2014-2015) and Prop. 39 L (2014-2015).

In chapter 3 I will follow up with several general theories addressing labour market mobility. Lazear's discussion on the necessity of mandatory retirement age, and the implicit contract

between employer and employee will get most attention. I will also summarize empirical work done on different aspects of the theories.

There is little scientific work done on labour mobility among senior workers in Norway. In chapter 4 I will present two different empirical studies I have found on the topic: The first study (by Bråthen and Bakken (2012)) focus on the decision of leaving the workforce and the factors influencing this decision. The second study is a statistical overview on job-to-job mobility among senior workers in Norway by Johansen (2013) at Statistics Norway. The last one has proven to be a very good source of reference for the numbers from my own analysis.

Chapter 5 gives an overview of the dataset I use in the empirical analysis. The chapter gives a brief note on the origin of the data and a description how the sample was constructed. After that follows a more detailed listing of the sample individuals background characteristics and information on the explanatory variables. The two independent variables in the thesis will get special attention in the next sections with some descriptive statistics and a discussion of expected results.

Chapter 6 gives a brief introduction to the econometric theory relevant for the analysis.

Regression results will be presented in chapter 7. The first analysis will focus on job-to-nonemployment mobility. There I identify who has the largest (or smallest) probability of leaving, and looking at the effects by education level and age. Then I will study job-to-job mobility by looking at whether an individual has conducted a job change to a new enterprise during the last year. Enterprise is a higher classification of firms, and it is less frequent to conduct a job change between enterprises (municipality or chain of stores), than between the lower classification establishments (school or shop). The theory is that mobility within an enterprise will not affect pension and security, while shifting to a new enterprise might. In general I expect the both the probability of exiting the workforce and the probability of between job mobility to decrease with age.

The thesis is concluded with a summary discussion in chapter 8.

2. The Norwegian National retirement programme

The last decades several OECD countries, included Norway, have conducted reforms of their pension programmes. All the Western European countries face a common challenge, the increasing portion of ageing population. To keep fiscal sustainability; many OECD countries have, or need to, reform their pension programmes (Arbeidsdepartementet, 2007). Norway might be in a better position than most because of the petroleum fund, but the current system is still far from sustainable (Bellone and Bibbee, 2006).

The working participation rate is high, but this also imply that a great number of people earn the right to full pensions, and the ratio paying for this system will decrease in the years to come. With a continuance of the old pension programme, the expenses to pensions from the National Insurance scheme would raise form 6 per cent of GDP (mainland) to 14 per cent in 2050 (Arbeidsdepartementet, 2013a), and that is only part of the costs with an ageing population. The state can also expect large increase in expenses to the health sector, retirement homes etc.

The individuals in the dataset I use in the empirical section are all members of the old pension scheme and follow the rules applicable before the reform, so the pension programme before the provisions are most relevant to this paper. I describe some of the reform's key points despite of this, to shed light on actions already undertaken by the government to make the programme more sustainable by giving better incentives to stay in the workforce.

2.1. The Norwegian pension programme 1967-2010

2.1.1. A small summary on retirement age

There are many different rights concerning retirement benefit and retirement age. To clear up some possible confusion I have included small table summarizing the general rules regarding retirement age in the old system.

Table 1: Retirement age

<62	Some professions have the option of early retirement before 62 years. This usually concerns jobs with demanding physical- or hazardous work such as police and fire department.
62-67	This is called the flexible retirement age before age 67 (AFP). This option was intended as an alternative to disability benefit to individuals who are tired of working. The pension is calculated as if the person had continued working to 67.
67	This is the formal retirement age; at 67 any employee has the right to retire. According to the source it is anticipated that all individuals with normal health work until this age.
67-70	This is called the flexible retirement age. It is still possible to earn retirement points until you are 70 years old.
70	When the individual turns 70 the employer has the right by law to dismiss an employee based on his/her age.

Source: (NOU 2004: 1, 2004)

The official retirement age is set to 67 years; this is actually already high compared to many other European countries. But because of generous early retirement schemes and other national insurances, the actual effective age of labour market exit reached a low of 59-60 in 2004 (Bellone and Bibbee, 2006).

2.1.2. A threefold payment

The total of accumulated pension can be divided into three parts. As in many policies some of the main objectives in the pension programme are to strive for gender- and income equality. Nevertheless the pension is also going to reflect how much a person have worked and earned before retiring. The payment can be considered threefold: A basic pension, supplementary pension and in some cases a special supplement. All of the benefits are calculated using a basic amount (B.a.) that is adjusted annually by the parliament. The adjustment is in relation to cost of living and the general income level and per May 2014 one B.a. is NOK 88 370 (Norwegian Labour and Welfare Administration, 2014). The pension will be adjusted according to the time of drawing and whether it is drawn fully or partly.

Everyone have a right to the basic pension equal to 1 B.a., though this is not the minimum pension level, but the reminder of this amount is calculated with either the supplementary pension, the special pension or both. The minimum pension is typically 2 B.a.

One of the schemes aim is to maintain the standard of living that the recipient is accustomed to, and to accomplish this income based supplementary pension is added. This pension is calculated based on annual income and years in the workforce. To get full pension the recipient must have worked 40 years (thus earning the required pension points), any less than that and the pension will be reduced accordingly. The number of pension points earned when working decides the final payment and the points are calculated from pensionable income, though only up to a point. The first 6 B.a. gives full coverage (in B.a. 2014 this amount equals gross wage of NOK 530 220), but the next 6 only get 1/3 coverage. The National Insurance Scheme does not cover any wage above 12 B.a. (NOK 1 060 440 in 2014).

Pensionable income: $(X * B.a) + (\frac{1}{3}Y * B.a.)$

Where X is the number of B.a. the gross wage adds up to within the interval [0,6], and Y is the number of B.a. the income adds up to in the interval <6,12].

Calculation of supplementary pension:

Pension points: $\frac{Pensionable\ income - B.a}{B.a}$

Final pension points: Average of the 20 best income years

Supplementary pension: $B.a. \times Final\ pension\ points \times pension\ percentage$[1]

The third type of payment is the special supplement; this is targeted to those who have no or little supplementary pension (less than 20 years of work to earn pension points). The special supplement is there to cover the gap between the minimum pension and the B.a. Some have earned a little supplementary pension and the special addition is truncated against the earned amount. In 2006, 88 per cent of those with minimum pension were women (Arbeidsdepartementet, 2007) and the largest group receiving special supplement are typically

[1] The full annual basic supplementary pension is now set at 42 per cent; it was last changed in 1992 and was 45 per cent prior to that year.

widowed housewives. There are special provisions regarding married couples, people taking care of young children, the disabled and sick.

2.2. Short about the pension reform, Prop. 48 L (2014-2015) and Prop. 39 L (2014-2015)

From 2011 the new provisions came into effect. The most important change in the programme is that the payments now will to a larger degree reflect how many years a person will spend as retired and total work-related income. These changes introduce better incentives to work more over the course of working life.

It was decided that you could start receiving pension already from age 62, both in combination without or with work, still earning points while also receiving pension money. The amount paid out will be adjusted for age when the payment start and the current life expectancy for the recipients age group, all making it more attractive to continue working. Earlier AFP payment was reduced if combined with work, but this has now been remedied in the private sector. Additionally there are new tax regulations increasing the economic incentive to continue working (Bråthen and Bakken, 2012).

As mentioned above, with the old provisions the supplementary pension was calculated from the 20 best income years, after the reform all working years will be used. The pension is now income-based and there are no restrictions based on years in the workforce. All income up to 7,1 B.a. earned between age 13 and 75 counts and is used in the calculations. The annual pension earnings is equivalent to 18,1 per cent per cent of this income. The National Insurance Scheme does not cover any income above that.

In Prop. 48 L (2014-2015) the government propose (among other things) to change some of the age limits in the Work Environment Act. The first of these is the age limit where an employer can terminate a contract based on the age of the worker. Now an employer has the right to terminate a contract when the worker turns 70, with no need of proof of reduced productivity than the age of the worker. The government discussed removing the age limit entirely or changing it to age 72 or 75. After the official hearing they ended up proposing to change the age limit to 72. The second age limit proposed to change is the *possible* age limit a private employer might set in the contract of its employees. As of now a private firm might enclose in the contract an age limit down to 67. This is only allowed as long as the age limit is

universal for all employees in the firm and practiced consistently. The limit must be well known by all employees and combined with a satisfactory early retirement program. Prop. 48 L (2014-2015) suggest that this lower age limit should be raised to 70 instead for 67. The proposition also includes an ambiguous section stating that these changes in legislation should not incorporate the "special" age limits in the public sector. This could either mean all public sector employees or only those age limits for special positions such as police officers and fire fighters.

Prop. 39 L (2014-2015) also suggest changes in the Work Environment Act. This proposition is regarding temporary employment. The change suggested is roughly that it should be allowed to keep workers in a temporary contract for two years before the employer must offer a permanent contract.

3. Labour market mobility among senior workers

In this thesis I focus on two different types of labour market mobility; job-to-job mobility and job-to-nonemployment mobility. High labour mobility can be advantageous for a country, because it is a representation of swiftness in reactions to changes in product demand, which can give positive effects of the economic performance (Groot and Verberne 1997).

There are several theories on why mobility should decline with age, theories about human capital (Mincer, 1962), mobility cost (Groot and Verberne, 1997), job matching (Jovanovic, 1979) and an implicit wage development contract between employers and employees. (Lazear, 1979).

First I will view mobility from a human capital perspective and the question of productivity. An individual's productivity consists of cognitive abilities, education and job experience. General productivity is the part interesting to all employers, while firm specific productivity consist of productivity that can only be utilized within one firm. Long tenure can be beneficial both for the firm and the workers themselves since longer tenure gives more firm specific capital and thus increased productivity within the firm (Becker, 2009). A senior worker with long tenure will therefore face a bigger loss of relative productivity than one with shorter tenure when changing jobs, and with loss in productivity the worker cannot demand the same high wage level at a new job (Mincer, 1962).

The second theory considers the cost of mobility: There are other benefits with long tenure than attained abilities, for example job security and advantageous pension programs and changing job might remove these benefits. There can be more costs involved with changing job than security and pension. For example an actual monetary cost associated with moving to a new place or costs of a more psychological nature that follows a new work environment. A senior worker has fewer years in the new job to yield utilities that can make paying this cost worthwhile (Groot and Verberne, 1997). Aside from the material advantages, a utility aspect can also explain staying. Senior workers tend to have more stable relationships with their employers, long tenure can suggest that the worker like the present job and do not wish to change.

The job matching theory looks at the quality of the match between employer and employee. It is often impossible to judge this match *a prior* to the job, but if the match is good the employee might expect a bigger payoff *ex post*. With a good job match the employee will want to stay to await the rewards of actual observed productivity, and thus not change jobs (Jovanovic, 1979).

The fourth theory on mobility comes from Edward Lazear's renowned theory on implicit contracts between employers and employees. Such a contract involves an increasing wage profile steeper than the productivity slope. An individual engaged in an implicit contract with a firm will wish to stay with this firm, since the dividend of the implicit contract can only be utilised at the later stages of the contract.

All three theories listed above suggest that it is not advantageous for a senior worker with tenure to change job, and thus I expect the frequency of job change to decline with age. In the dataset used in this analysis I do not have information on the individuals' firm specific tenure, and it is therefore difficult to test both the human capital- and job matching theory directly.

In this chapter I will discuss in more detail Lazear's theory about the necessity of a mandatory retirement age, challenges with asymmetric information on productivity and shape and determination of the wage profile. The following sections are mainly from Edward Lazear's paper "Why Is There Mandatory Retirement?" (1979). The model explains how the firm choose the mandatory retirement age (T) and the employees wage W*(t) to maximize payment subject to the constraint that lifetime earnings should equal lifetime expected value of marginal product.

3.1. The determination of the wage profile

The labour market is not per se a free market and many variables contribute when the wage is decided. Had the labour market functioned as a spot market with perfect information, the wage would be decided directly by the value of the worker's productivity, but that is almost never the case. In a hypothetical world where the labour market is a spot market, the senior workers would have decreasing wage, since productivity decline with ageing (Skirbekk, 2004). This arrangement would imply that as people grow older the wage would be reduced proportional to productivity. But actually it is the other way around; the senior workers

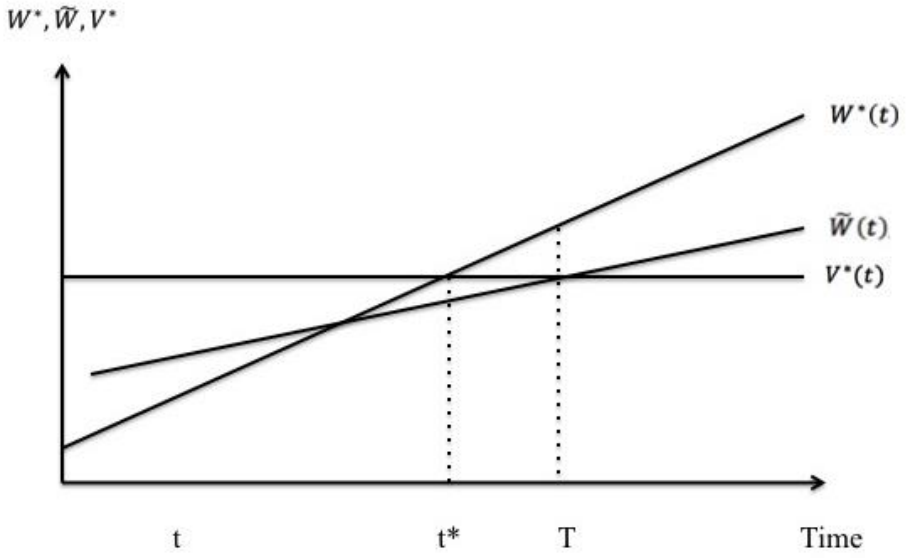
usually have the highest wages within their fields. When bargaining for the right wage the firm and the employee have contradictory incentives. The assumption is that a profit-maximizing firm will want to get the work done at minimal costs. The employee on the other hand will want to balance his preferred allocation between work and leisure against the offered wage (assuming the employee get more utility from leisure than work). Additionally the workforce is not homogenous and employees might possess firm specific or general skills that enhance their bargaining position. Employees are worth more to a firm if they have specific skills; the contract is a reflection of that value and the cost of investing in the workers abilities. Lazear (1979) presented the theory explaining how firms and employees design an implicit (or explicit) contract ex ante that describes an agreed wage profile throughout a workers career. We assume that when entering the contract the employee only care about the present value of the total wage, not necessarily the shape of the wage curve. The shape of the curve determines at what time during the employee's career he will receive the bulk of the payment agreed upon. The curve representing this amount will not be less than the sum the employee is willing to accept (lower bound) and not more than what the firm is willing to pay (upper bound). The lower bound, or the minimal wage, an employee will accept for one particular job is called the reservation wage. The worker will choose not to work or retire if he has no offer higher than the reservation wage. The upper bound is the maximum amount the firm is willing to pay; this amount will not exceed the present value of the employee's productivity.

Figure 2 show the restrictions in the bargaining process. $V^*(t)$ is the value of the workers total marginal productivity during their working life. $\widetilde{W}(t)$ represent the workers reservation wage and $W^*(t)$ is the wage profile. For both parties to agree to the contract the wage profile $W^*(t)$ must satisfy:

$$\int_0^T \widetilde{W}(t)\,dt \leq \int_0^T W^*(t)\,dt \leq \int_0^T V^*(t)\,dt$$

The firm will not hire the worker if wage exceeds the total present value of marginal productivity, and the worker will not accept any wage below the present value of his reservation wage.

Figure 2: Wage and productivity over time



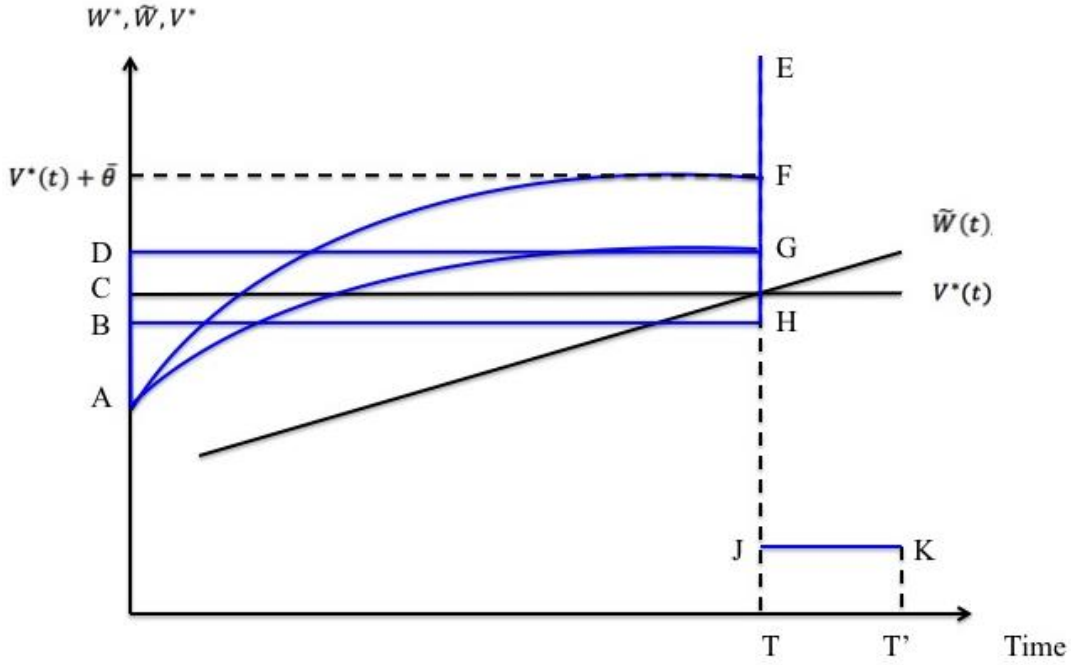
3.2.The shape of the wage profile

When deciding the shape of the wage profile the firm need to overcome the challenge of employees shirking. So to keep a continuous high productivity the firm must create incentives for the workers not to leave or shirk. If the employee sees that the present value of cheating exceeds the cost, he will shirk, and if he is caught cheating the firm will terminate the contract. The shape of the wage profile can give such incentives. The wage profile $W^*(t)$ in the figure above pays the worker less than his productivity at time $t < t^*$ and more than his productivity when $t > t^*$. This makes the worker avoid shirking because the risk of cheating is too high. The worker prefers to keep up productivity and thus increase his present value of wealth. This is one of the reasons why a spot market would be inefficient when deciding wage. When workers are only paid the reservation wage, the benefits of cheating usually supersedes the cost (Lazear, 1979).

It is also possible for the firm to cheat in this model. They do that either voluntary or not by dismissing workers before the ex-ante agreed time (involuntary dismissal comes in the form of bankruptcy). However, the firm have less incentive to cheat because they have a longer timeframe than workers, and cheating would make them less attractive to the next generation of workers. There are several different wage profiles that give the same present value, but

very different incentives. The blue lines in the figure below show some of these possibilities (AF, ADGF, AGJK and BHE).

Figure 3: Different possible wage profiles



One possibility is the path BHE, a constant wage lower than the value of marginal product during the whole career with a large lump sum received when retiring at time T, or ADGF which give the same present value but with a different distribution. No worker will cheat with any of these wage profiles. Another alternative with no cheating is to have a profile like AF, where wage is increasing at a diminishing rate throughout the career. All three alternatives require the worker to allocate his money for the remaining years of life after retiring. This can be quite challenging since people (for obvious reasons) do not know their own life span. This brings us to a fourth possibility; the curve AGJK which also is the one closest to an average wage profile in Norway. This is a wage rate that starts below marginal productivity level but is increasing (at a diminishing rate). The reminder of present value will be paid after retirement at T, so the worker receives a constant sum, a pension, from T to T'.

It was Lazear (1979) who first discussed the possible reasons behind the form of a typical wage profile. To function, the balanced contract like he described had to satisfy both employer and employee. His model suggest that a steep age-earning profile will give the worker continuous incentive to stay productive and not shirk throughout the career. Firms also gain in maintaining low turnover in workers, but in order to keep employees from leaving or

shirking they need to have an agreement promising higher payment than the marginal product sometime in the future. Thus the employees have both the incentive to keep up productivity and not shirk or leave. Unfortunately, as humans age their productivity will decline, this might be "stating the obvious", but even if it is not, much research support this statement (Skirbekk, 2008). Firms that seek to maximize profits are not interested in employing people with low productivity. All wage profiles in Figure 3 gives the worker some degree of incentive to stay working with high productivity throughout the contract period and not cheat or shirk. This will only work if the contract has an ex ante decided end date. Without such a date it is assumed that the workers will want to stay working after T since their wage at that point is well above their reservation wage. The ex-ante decided end date is the mandatory retirement age and this age is defined as the date the implicit or explicit contract between employer and employee ends. At this date there will be some workers who wish to remain with the firm because of the high wages even though they agreed to the time in the implicit contract made ex ante. The firm on the other hand will not be willing to keep the employee at that wage, and need the mandatory retirement age to be able to legally terminate workers that want to stay. The mandatory retirement date is therefore a needed consequence of the increasing wage profile. Without it the firm would need to pay the worker a wage that made him retire at T voluntary and the incentives to not shirk would be gone. Consequently, time T is the date of ex post mandatory, but ex ante voluntary, retirement.

3.3. Summary of the theories

Lazear's model explains the need of a mandatory retirement age and the need for increasing wage profiles. The theory predicts those with wage profiles steeper than productivity is the ones to stay in the workforce until mandatory retirement requires them to depart. A steep wage profile also makes it less likely for an employee to shirk. These workers will stay because the payment they receive at the end of the implicit contract is higher than their reservation wage and productivity.

Asymmetric information plays a significant role in the different wage profiles. Jobs that require higher education is often more difficult to monitor and it is impossible to measure the workers' productivity, effort or outcome. In more menial jobs, outcome is easier to measure, and productivity and effort can be observed and sanctioned. This is why there is more need of

an implicit contract for workers where it is difficult to observe effort, typically the higher educated individuals.

Research support that more general human capital leads to higher wages (Mincer, 1970, Mincer, 1997). General human capital is capital equally worth to all firms. It is expected to accumulate with job market experience, then diminish and eventually go down as depreciation of skill overcomes investments with age. Wages increase with investments to capture the returns of these investments, but will usually stagnate when the skill depreciate (Hek and Vuuren, 2011, Ghosh, 2007). The wage profile predicted by Lazear will increase trough the career at a diminishing rate and will eventually flatten. The levelling is partially caused by the productivity level and partially by firm specific capital. With long tenure in one firm a worker get increased firm specific capital. This is human capital that only affect the productivity at the firm where the individual is working, and cannot be transferred to another firm (Becker, 2009). For that reason this firm specific productivity is more valuable to this firm than any other. And consequently, with firm specific capital the worker is paid more here than at an alternative firm, but less than the marginal output. The worker is in other words; locked to this position.

Essentially, the individuals with professions difficult to observe are the highly educated. They have the largest gap between productivity and wage, but by the implicit contract their wage will stay high until retiring at the mandatory retirement[2]. I therefore expect them to stay longer in the workforce and have fewer job changes at the end of the working career.

3.4. Empirical testing of Lazear's theory

There are many empirical tests on the connection between wage and productivity. Hek and Vuuren (2011) have collected 70 different empirical papers in a literature review, summarizing and comparing the different results on this connection Many of the studies' findings conform with the theory to some degree, but there is also a sizeable minority which find no proof of a wage-productivity gap (Hek and Vuuren, 2011).

All are faced with the same issue: It is (usually) impossible to measure productivity and effort directly. The early empirical work use information on the individual to test the wage profile

[2] Some will of course value leisure higher than pay, or have other reasons for leaving the workforce earlier.

without any link to firm productivity. Later work use matched employer-employee data where the productivity of the firm can be measured. The long time frame is another issue when testing Lazear's theory since the wage profile covers the whole span of working years. It is rare to get data over that many years, so most papers use age cohorts. Tests on Lazear's theory often try to identify the slope of the wage profile and productivity (Lazear and Moore, 1984, Hutchens, 1987, Abowd et al., 1999). The difference between pay and productivity is highest in those professions where it is difficult to observe effort and productivity (Kotlikoff and Gokhale, 1992). This is typically job where high education (or high general human capital) is required. A majority of the papers compared by Hek and Vuuren (2011) conforms with Lazear's theory.

It is well established in the literature that productivity decline with age. Skirbekk (2004) have summarized literature confirming this statement. And others have studied age cohort more closely and found a strong decline in productivity after age 50 (Hægeland et al., 1999, Grund and Westergård-Nielsen, 2008, Dostie, 2006). However; An empirical study by Lallemand and Rycx (2009) on Belgium firms found that younger workers are more productive, but that the age structure effect have decreased over time.

Other studies are testing job-matching theory (Becker, 2009, Mincer, 1962). Barth (1997) found that those with high level of firm specific knowledge have less steep wage profiles. Parsons (1975), Mincer and Jovanovic (1982) found that the probability of separation declines with labour market experience and firm specific seniority. But when controlling for wage the relationship between the probability of separation and experience is positive (Topel and Ward, 1992).

Hek and Vuuren (2011) found it to be well established in the literature that employers are reluctant to hire senior workers (Hutchens, 1986, Daniel and Heywood, 2007). Employers are also more reluctant to invest in training for older workers since they have a shorter amount of time to reap the benefits from the investment (Brooke, 2003, Prskawetz and der Wissenschaften, 2006).

And more directly related to my topic, it has been found that the probability of job change is decrease with experience (Ghosh, 2007). The United Kingdom have a different pension system, and McCormick and Hughes (1984) found that individuals part of an occupational pension program have reduced probability of mobility. And similar results have been found in the USA; individuals in pension covered jobs have a lower level of job turnover than others (Gustman and Steinmeier, 1993).

Testing Lazear's theory is a vast process, and complex data is required to manage a measure on productivity. As described above, there are already many empirical studies done on the productivity/wage gap, but I will focus on the consequences of such a gap on labour market mobility among senior workers through studying the probability of leaving and the probability of job change.

4. Existing literature on labour market mobility among senior workers in Norway

There is not much literature on senior workers mobility in either domestic or international publications. In this chapter I will present in detail two empirical studies on mobility in Norway, one concerning the decision of leaving the workforce and one on job-to-job mobility.

There is more literature about the why/when senior workers depart the labour market than literature on job change. For this chapter I have chosen to present "Work or pension?" by Bråthen and Bakken (2012), but there are many other examples and lately especially studies concerning early effects of the pension reform. An example of this is Haga (2014) who looked at the development in expected retirement age. He finds that after the pension reform in 2011 workers are expected to leave the workforce one year earlier than before. Much of this decline is due to an increase in number with disability pensions, but the introduction of the new flexible retirement pension increased the probability of employment for those who turned 62 in 2011. This means that the first age cohort to be affected by the reform show promising results. Total time as an elderly pensioner has gone up from 17,6 years in 2001 to 20,2 years in 2013 as a result of decline in retirement age as well as an increase in life expectancy. Both this paper and others indicate that the pension reform already shows some of its desired effect, but only time will tell the full impact. Another example is a study on workforce participation before and after the reform by Nordby et al. (2013) . They found that an increase in work participation rate started before the reform, but that the change from 2011 to 2012 had a stronger growth than previous years. It is too early to confirm the underlying cause of this growth, but I am sure we will see many studies on this topic in the near future.

There is less literature concerning job-to-job mobility among senior workers in Norway. The first extensive work I have found on the topic is done by Johansen (2013) at Statistics Norway and the only earlier mentioning is a brief section in a report about "Seniors in the workforce" by Lohne and Næsheim (2006), also from Statistics Norway. After 2008 Statistics Norway has started collecting data on job change specifically, indicating that the topic is attributed increased importance in the future.

4.1. Work or pension? What influences the decision to continue working one more year (Bråthen and Bakken, 2012)

In this paper Bråthen and Bakken (2012) identify the factors with the greatest impact on a senior individual's decision to work another year. The paper follows individuals at the age 61-69 years over a ten year period from 2001 to 2010. Both genders are included in the study and work in both private and public sector. They use register data from this 10-year period on employment, income, demographic characteristics, education and health (measured as sick leave over the last 5 years). They use a business survey to control for economic fluctuations and shifting demand of workers. To test the probability of a worker staying on one more year they use a logistic regression, and sort the results by the "push, pull and jump" effect.

4.1.1. The decision of retiring

Bråthen and Bakken (2012) categorize the factors influencing the decision of retirement into three groups; "pull", "push" and "jump". The first category "pull" incorporates the decision maker's job satisfaction; with the work environment, the significance wellbeing between colleges, wages and tasks. The category can be compared with valuation of the balance between work and leisure. "Push" are the factors pushing seniors out of the workforce; for example health or structural changes in the labour market, both making the older fraction of the workforce less qualified and productive than the younger employees. Both "pull" and "push" contains the decision maker's own actions, while the last category "jump" includes third party decisions, mainly family considerations such as custody of a child and spouse retirement decisions. For the population as a whole there were three main factors contributing to the retirement decision; health, spouse's decision and the possibility of AFP (early retirement).

4.1.2. Results

Of the factors considered, Bråthen and Bakken (2012) found three variables with larger impact on the decision of retirement. Topmost of these, and much supported by common sense, is *health*. Bråthen and Bakken (2012) use the amount of sick leave the last 5 years as a measure for an individual's health condition. They find that a higher amount of sick leave increase the probability of leaving the workforce early. They also found that the health variable is sensitive to economic fluctuations and has a greater effect in economic downturns. *Spouses' decision on whether to continue working* has the second largest effects on the

decision of retirement. The spouses' effect is increasing with age and largest for the most senior workers. The third largest effect is whether the individual is employed in an AFP-firm in the private sector; this will increase the likelihood of early pension. The effect was much smaller for those employed in the public sector. The three variables with largest effect reduce the likelihood of working next year with 11, 10, and 9 percentage points respectively.

Certain factors influence the decision to a lesser degree and increase the likelihood of working another year, such as geographic centrality (+1 p.p.), having higher education and income (+5 p.p.) and being an immigrant (+1 p.p.). Other lesser factors influence in the opposite direction like working in a company with more than 30 employees (-4 p.p.) or working in the public sector (-3 p.p.).

Bråthen and Bakken (2012) also test for any impact by the new pension reform. They specify that it is still too early to give any definite results and the numbers they present is only an indication. The pension reform indicates a small increase in the probability of working one more year (+1p.p.)

4.2. Literature on job change; descriptive statistics by Johansen (2013)

Johansen (2013) at Statistics Norway have produced a report with descriptive statistics on job change among senior workers from 2008-2013. Johansen (2013) uses much of the same registered data as I do, but the construction of the data and the time period differ. This report is the first extensive work on job change done by Statistics Norway and I will use the results to compare with my own findings. In this report Johansen (2013) divides the sample population into age groups. She compares different classifications of senior workers and has a younger group as reference. The overall results of the statistics show a decline in job changes with the increase of age.

4.2.1. Constructing the variable on job change

Johansen (2013) defines job change two ways; either change of establishment or change of establishment across enterprises[3]. By the first definition a job change has occurred if a working individual has a change in the identification number of the employing establishment from one year to another. The second definition must have a change in both establishment-

[3] An illustration on the difference between establishment and enterprise can be found on page 35 (Figure 8).

and enterprise number to be registered as a job change. The other way around, with changes in enterprise but not establishment, is not registered as a job change because it usually only signifies change in company ownership (for example from personally owned to a limited company). All changes in establishment are registered as job change by the first definition, a change of establishment within an enterprise could for example be a teacher changing schools within a municipality or county. A change of position within an establishment, like for example a promotion, is not qualified as job change here. Naturally job change between all establishments is expected to be higher than those between enterprises, since all job changes in the second are incorporated in the first.

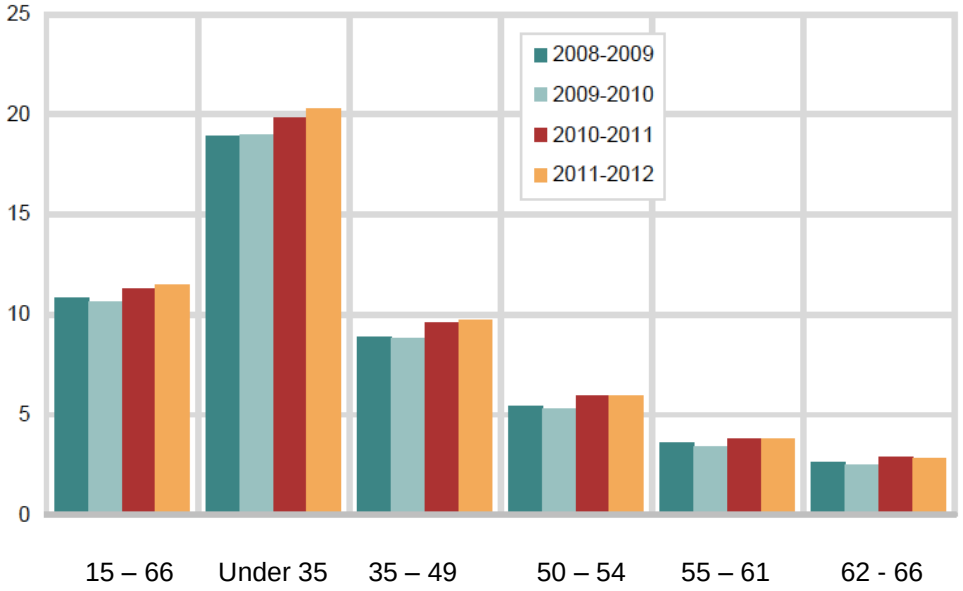
4.2.2. Results

The report by Johansen (2013) focus on senior workers and use results from other age groups to compare. She divides the population into the age groups <35 years, 35-49 years, 50-54 year, 55-61 years and 62-66 years. She uses the second group as a benchmark throughout the report while the youngest is mainly excluded. Workers older than 66 years are excluded because of low numbers.

The overall level of job change between establishments is about 15 per cent, though this is much pulled by the youngest category where approximately 1 in 4 change job in any year. The report found a decline in job change over age, respectively 13,3 per cent, 9,5 per cent, 7,4 per cent and 5,6 per cent for the remaining age groups (in year 2008-2009). The high number for the youngest group is probably connected with education.

The figure below show the level of job change between enterprises found by Johansen (2013). Approximately 10-11 per cent of working individuals conducts a job change between enterprises each year and the level decrease with age. It is the mobility between enterprises I will analyse in this thesis, and to more easily compare results I have created a bar chart using the same age groups as Figure 4, it can be found on page 37 (Figure 9).

Figure 4: Job change between enterprises, by age. 2008-20012. Per cent[4]



In addition to look at mobility across age groups the report looks at the level of job change by variables such as education level, gender, establishments and enterprises, sectors, industries and the centrality of the residence municipality. The results show that the level of job change is evenly spread across gender, education level and centrality of residence municipality. While the other categories show more differences. The level of job changes between industries is the most diverse. Frequency is rather low in manufacturing, retail and teaching with an average between 3 to 5 per cent for the senior employees, while business service has twice as many job changes, closely followed by transport and health.

When looking at job change in establishments versus enterprises Johansen (2013) finds a lower rate in the latter. This is because changes in establishments also incorporate most changes in enterprises. This is also the only variable with a distinctive gender difference, showing a higher proportion of men than women shifting between enterprises. This can be explained by the high frequency of women working in the public sector, employed for instance by municipalities or county-municipalities. Both are large enterprises and job changes undertaken by these employees will only be registered as a change between establishments and not between enterprises. The same reasoning can be used when looking at the differences between establishments and enterprises in public and private sector in general.

[4] Source: JOHANSEN, I. 2013. Jobbsikfter blant eldre arbeidstakere. *Reports.* Statistics Norway. Page 11

5. The dataset and descriptive statistics

This chapter contain an overview of the dataset I use in the empirical analysis. I will start by giving a brief note on the origin of the data. After that follows a more detailed listing of the sample individuals background characteristics and information on the explanatory variables. Than follow two subsections with information on the two independent variables

In the analysis I will use data from the database FD-Trygd. The dataset is composed for welfare studies and is collected and managed by Statistics Norway. FD-Trygd contains information on the entire Norwegian population on topics like demographic data, information on income, benefit schemes, employment information and education. All is gathered through different registers: Income variables through Certificate of Pay and Tax Deductions (LTO) and Norwegian Labour and Welfare Administration (NAV), work details by the employer/employee register (Aa) and education details through Norwegian National Education Database (NUDB)). All data are made anonymous through a common "key" connecting the individual's social security number so we can follow each individual over time. Additionally I have used information from Norwegian Social Sciences Data Service (NSD) to identify and sort municipality numbers into counties[5].

The panel sample used in this analysis is collected yearly from 2003-2008 and contains every individual between the age 50 to 68 years during these six years. There are a total of 1,183,520 unique individuals meeting these credentials, which gives a total of 5,668,798 observations. This is an unbalanced panel since I do not have observations for every person each year; 703,871 of the individuals are observed every year, the remaining 479,649 is observed less than six years and of those 94,406 individuals is only observed one year. This is not an issue since the missing variables are random and not systematically distributed. This panel is also classified as a short panel since we have observations of a large number of individuals over a few time periods. First generation immigrants were removed from the dataset so only individuals with Norway as birth country remain in the sample. All individuals who die during the observation period are also removed from the sample.

The income data available is gathered through the Norwegian Labour and Welfare Administration (NAV) and only contains the sum of pensionable income rounded to the

[5] NSD are not responsible for the interpretations done in this thesis.

nearest 100. Since only pensionable income is registered, all values are positive or 0 and no negative income displayed. For my sample this data is only available up to and including year 2006, which means that we are missing income data from 2007 and 2008. But I have data from before 2003, and to avoid reducing the number of years represented in the rest of the dataset all the NAV data is presented with a two year lag. Through the NAV register I also get the total number of years an individual has pensionable income higher than 1 B.a., which is a good measure on experience in the workforce. All income variables in this paper are represented in 2008 monetary value. The values were converted using Statistic Norway's consumer price index, which was deemed accurate enough for the purposes of this paper.

The employer/employee register (Aa) follow the International Labour Organization (ILO) in defining an employee as one who has worked at least 4 hours and is expected to work minimum 7 days. This will also include people with temporary leave because of sickness, vacation, military service or other paid leaves. Delays in registration by the companies could be a source of error in the data, but such an error should be evenly distributed over time. The register got new administration routines in 2005, which could potentially create another source of errors. The information on employment is divided into several different structures, and the sample used in this analysis makes use of two of these structures. A more detailed explanation of the sample construction will follow later in this chapter and in Appendix A.

In this chapter I will start by presenting some background characteristics for the individuals in the dataset. The focus of this analysis is mobility among senior workers and the variables included in the next section have been chosen from what best can identify their characteristics for our purposes. More specifically I will look at gender, education, occupational status, sector of work, marital status and eventual children. The next section will include explanations and descriptive statistics on the two dependent variables in this analysis.

5.1. Background characteristics

In the following tables the characteristics are displayed as a cross section of the panel, displaying only the year 2005. The year was picked randomly. The table show the distribution of the sample population by different variables. All values are presented as a percentage of the total population. Throughout the paper I will do separate regressions and analysis for men and women, and have therefore chosen to display all the descriptive statistics separately as well. The panel have an even number of men and women.

5.1.1. Age, education and family life

Table 2: Background characteristics (year 2005), per cent

	Women	**Men**
Gender	49,56	50,44
Age		
50-55 years	35,91	36,68
56-61 years	35,57	36,02
62-66 years	21,17	20,53
67-68 years	7,36	6,76
Education		
No education	0,30	0,35
Mandatory primary education	26,75	21,98
Upper secondary school	50,06	50,83
Bachelor	18,92	16,48
Master/PHD	2,66	8,86
No information on education	1,32	1,50
Marital status		
Not married	33,87	31,54
Married	66,13	68,46
Spouse status (if married)		
Working	52,80	59,39
Social insurance/pension	7,47	5,34
Occupational pension	8,37	4,80
Disability benefit	16,08	20,44
Other	15,28	10,03
Children		
No child under 18	91,90	85,00
One or more children	8,10	14,90

Note: Each cell sums up to 100 percent

The second variable listed is *Age*, which is one of the most important explanatory variables in the analysis. By the mean age of the population, we can see that women are slightly older than

men, which is to be expected because of the difference in life expectancy. In the table I have divided age into four groups to give an indication of the age distribution in the sample.

The next section concerns the individuals' highest achieved education level. The largest share of individuals (50 per cent) has *upper secondary* as highest achieved education level and is almost equally distributed among men and women. *Upper secondary school* also includes Craft certificates and apprenticeships. It is a bit more likely for women than men to have *mandatory primary school* as highest education level (26,77 per cent for women and 21,98 per cent for men). There are two categories of higher education and I have named them *Bachelor* and *Master/PHD* for simplicity (though the titles were not used in Norway until later). *Bachelor* represents 3 years of higher education, while *Master/PHD* represent 3+ years. The *Bachelor* category will typically include teachers, nurses and engineers, and this category hold a slightly higher percentage of women (18,92 per cent) than men (16,48 per cent). The *Master/PHD* category is the academics, doctors and civil engineers with 2,66 percent women and 8,86 per cent of the men. A small fraction of the data is categorized under *No information on education*, this might be individuals who have received part or all of their education abroad. And the last 0,32 per cent of the individuals in the dataset is registered under *No education*, and include those who have not completed mandatory primary school.

Totally 67,30 per cent of the individuals in the sample are married, while the remaining individuals are characterized as "not married", though there is no distinction between those who are single, partners, widowed, engaged etc.

According to Bråthen and Bakken (2012) the spouses decision on whether to stay or leave the workforce, is one of the three variables with greatest impact on an individual's decision to early retirement. The sample allows me to distinguish between who is married to whom, and I also have information on spouse's income and whether it is from working, social insurance or disability benefit.

The spouses' status shows the occupation the individuals' spouse is situated in (only those who are married are included). These categories differ a bit from the status categories for the individuals in the sample, because of the information we have available. The spouses' activity status is generated similarly to the main sample individuals' activity status, and is also presented as a categorical variable made up from several binary variables. The different

categories are based on *income*, *social insurance/pension* and *year of disability benefit*. The excess is sorted into a residual category named "other". The working category of men's spouses (usually women) are larger than that of women's spouses, the reason for this is probably a combination of women's longer life expectancy and men often marry women a few years younger. Many of the women's spouses are already retired, which also explain the higher percentage receiving social insurance/pension.

Less than 12 per cent of the individuals have children younger than 18 years old. This is not very surprising considering the age distribution in the sample. Children older than 18 years and eventual grandchildren are not registered here. This is probably not an issue since Bråthen and Bakken (2012) found no correlation between having children or grandchildren and the diction to stay in the workforce longer. My sample does not have data on children in the years 2007-2008.

5.1.2. Working life

Throughout the thesis I will operate with two different definitions of the individuals working. One definition will be used when studying those who leave the workforce and the other will be used when studying job changes. The reason for this distinction is that not all who work are represented in the Aa-register, and many are sifted away when customising the job-change dataset. The largest group not present in the Aa-register is the self-employed, but I still want to keep them when studying those who exit. The other reason for different definitions is that exiting the workforce is sorted on individuals whole job change is sorted on job spell (since I wish to capture individuals with more than one job change. To better distinguish between the two definitions I have named the first definition "working" and the second "employed".

Table 3: Descriptive, working and employed (2005), per cent[6]

	Women	**Men**
Status		
Working	56,97	68,29
Retirement benefit	7,02	6,30
AFP (early retirement)	2,62	3,00
Disability benefit	26,26	18,10
Other	7,13	4,18
Employed		
Registered employed	49,55	56,85
Not registered employed	50,45	43,15
Industry		
Private businesses	36,43	62,21
Governmental enterprise[7]	2,88	6,41
Municipality	35,66	14,16
County	3,80	3,49
Private financial institution	2,93	2,59
Government	18,30	11,14
Private/Public sector		
Private	39,46	64,81
Public	60,54	35,19
Work experience		
Years of income > 1 B.a. (mean)	23,85 years	32,1 years

Note: Each cell sums up to 100 percent, with the exception of experience.

The first definition of "working" is drawn out of the categorical variable *Status*, which shows the activity the individual is situated in, among which is the option *working*. The category *Status* is made up by binary variables created from income and social security variables. To be defined as a *working* in the sample the individual must have a yearly income larger than 1 B.a.[8]. Both the *early retirement*- and the *retirement* variable are created from a variable representing the year an individual start with early retirement or retirement respectively. The *disability benefit* variable is created from the starting year of disability payment and the level of disability benefit. Since individuals in reality can hold more than one status simultaneously, the state with a higher percentage share will dominate. In the case of 50/50 work and disability benefit, the latter will take precedent. There are about 500 000 such observations,

[6] For my purposes only a few generalized sectors was required and I have created these six sectors from several more in the dataset. An overview of the grouping can be found in Appendix C.
[7] An example of governmental enterprise is Statoil.
[8] The annual amount is changed each year, and the size of the annual amount (B.a.) was obtained from NAV (2014)

approximately 40 000 per year. By this definition 68,29 per cent of men and 56,97 per cent of the women are *working*. Furthermore 7,02 per cent of the women and 6,30 per cent of the men in the sample receive *retirement pension*. The higher number for women can be explained by longer life expectancy combined with earlier retirement. The number of people in *early retirement* is quite even between men and women, respectively 3,00- and 2,62 per cent. Women are much more likely than men to be on *disability benefit*, 1 of 4 women and almost 1 of every 5 men is out of the workforce for this reason (26,26- and 18,10 per cent). The reminding 5,64 per cent of the sample does not qualify to any of the categories above, and has been defined as "other". This might be individuals that are voluntarily or involuntarily unemployed, or people earning less than 1 B.a. per year.

The second definition "employed" is based in the Aa-register and contains all individuals in our sample with a registered employer, though this excludes every working individual that is self-employed. While creating the sample I also sifted out all individuals that work less than 16 hours (2 days) per week. So to be categorised as *employed* the individual must have a registered employer and work more than 16 hours per week. The sifting by work hours removed about 10 per cent of the job changes from the sample. In total, 49,55 per cent of all women and 56,85 of the men are registered as *employed*. The lower number for this definition can be explained partly by those who are self-employed. There are approximately 150 000 individuals with entrepreneurial income that are not registered as employees and 116 000 of those have entrepreneurial income above NOK 200 000. A more thorough explanation with graphic illustration on the structuring of the employee data can be found in Appendix A.

Next to follow is the sector and industry the individuals are employed in (if employed and registered in the Aa register). This table display some gender differences, with a much larger portion of women in the public sector than men. This is especially evident for jobs in municipalities where women hold the largest share by far, and in private businesses which are dominated by men.

The last variable is measuring the total number of years an individual has an income larger than 1 B.a. As expected this number is much lower for women than men. This variable can be used as a measure on experience in the workforce.

5.1.3. Income

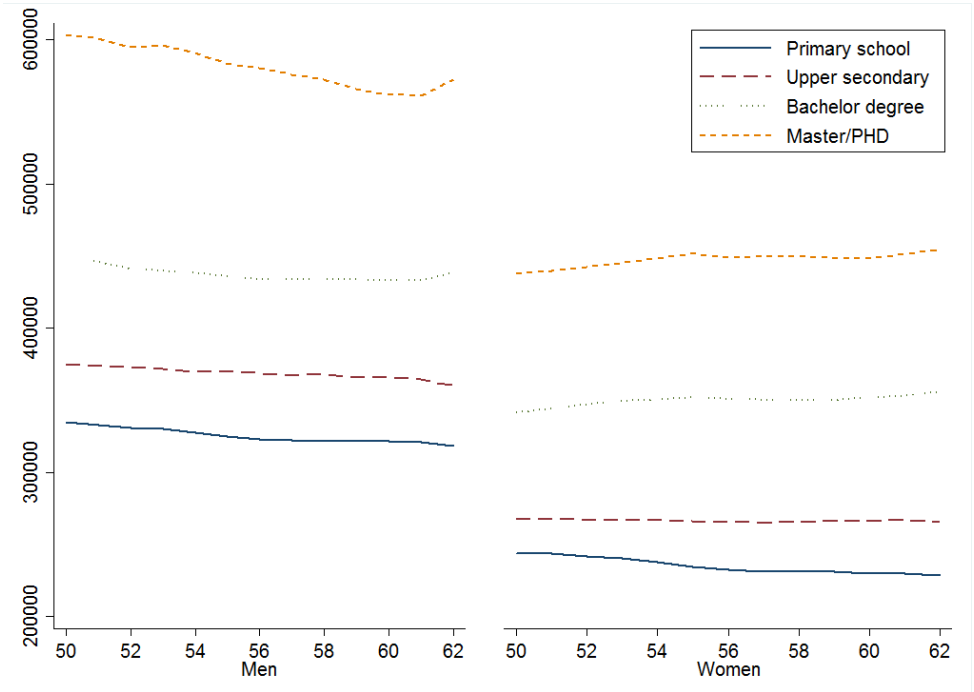
Income is another aspect of working life. The following table show the mean and standard division of income for the individuals and the spouses in this sample.

Table 4: Income details

VARIABLES	N	mean	sd	min	max
Pensionable income: Men	475,366	339,049	391,839	0	1.097e+08
Pensionable income: Women	467,449	194,308	167,136	0	9.669e+06
Pensionable income: Men's spouses	325,877	213,468	161,500	0	6.635e+06
Pensionable income: Women's spouses	292,420	335,845	435,407	0	1.101e+08

Figure 5 display sum of pensionable income over age by education and gender, but only for those still active in the workforce. The figure only includes ages 50-62 to get a general view of income for the different groups. As discussed in chapter 3.3, it is evident that by this time of the career the wage profiles have flattened.

Figure 5: Median total pensionable income with age (50-62), by education level and gender



5.2. The dependent variable: Nonemployment

The first dependent variable is nonemployment. I will start this section with explaining the term "nonemployment, then continuing with the how the variable is constructed. After that I will describe some of the results I expect when analysing the variable and finally conclude the section with some descriptive statistics about nonemployment.

The term nonemployment means not working, and must not be confused with *un*employment. When studying the dependent variable *nonemployment* I will not distinguish between the reasons of *why* the individual is leaving, whether it is to retirement, disability pension or just not wanting to work, I will only focus on whether the individual is working or not. The term "nonemployment' is borrowed from Anne Beeson (1998) "Job-to-Job and Job-to-Nonemployment Turnover by Gender and Education Level".

When analysing nonemployment I will use the first definition, "working", for individuals active in the workforce. This dependent variable will be used to estimate the likelihood of an individual leaving the workforce. All the individuals are sorted into two categories; working or not working. The working category contains those who fulfil the ILO definition, where an employee is described as one who have worked at least 4 hours and is expected to work minimum 7 days (including people with temporary abstinence because of sickness, vacation, military service or other paid leaves), as well as the additional restriction I included keeping only those earning more than one B.a. yearly. Consequently nonemployment contains all the reminder individuals in the sample, who are divided into the remaining four status categories: Retirement, early retirement (AFP), disability pension and other.

(Obviously) I expect the probability of leaving the workforce to increase with age since everyone will leave the workforce at some point. It is expected that individuals with heavy physical jobs leave earlier than those with less physical work as discussed in chapter 3.3. We can investigate this statement by looking at the effect of education and wage, since heavy physical work usually require less education and have lower wage than many sedentary jobs (Groot and Verberne, 1997). I also expect the individuals health condition to strongly influence the decision of leaving (Bråthen and Bakken, 2012). A heavy physical job might be taxing for the health with old age, but there are a number of other factors that influence health that I cannot control for using this dataset. From the results in Bråthen and Bakken (2012) I

also expect the spouses decision on leaving the workforce to have an impact on the probability. Whether the individual has an opportunity of early retirement is a second effect that probably has a large impact, though I only have observations on those who have utilized that opportunity, making it difficult to test.

Figure 6 show the percentage of nonemployment on age by education and gender. It is based on the individual remaining in the workforce at any time, and show the percentage that leave at each age. The shape is quite similar in both figures, with one peak each for both the start of early retirement and the official retirement age. Women are more likely to leave the workforce than men at all ages, but the biggest difference is for those who have mandatory primary school as highest education. Figures on type of mobility by education can be found in Appendix B.

Figure 6: Percentage of nonemployment by age, by education and gender. Per cent

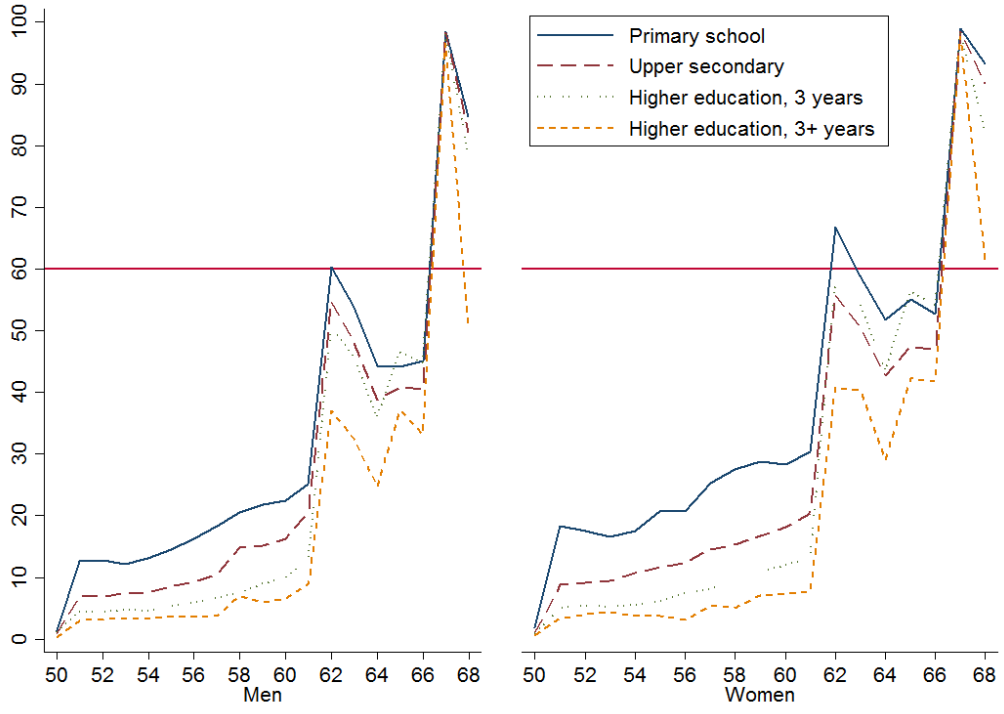
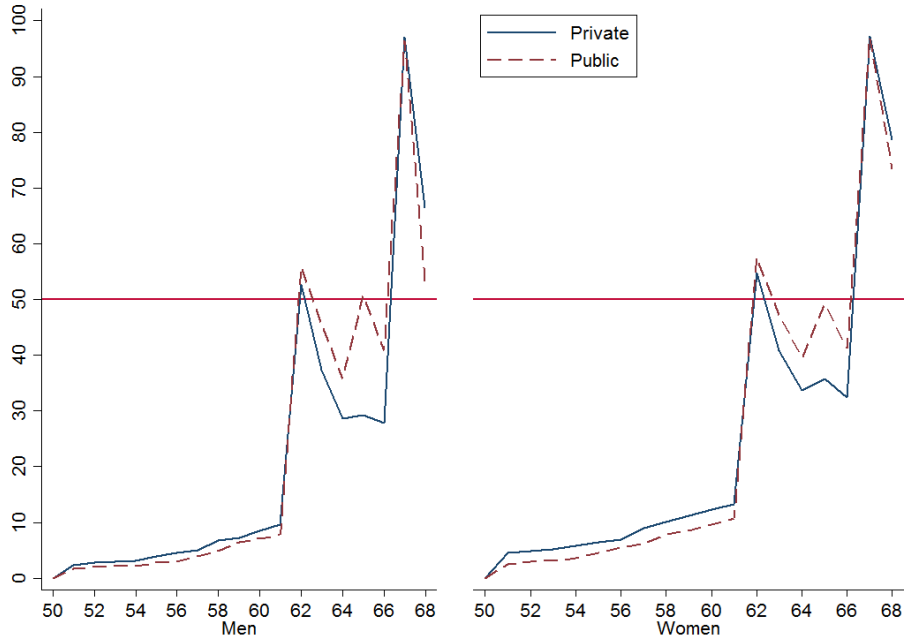


Figure 7 show the percentage of nonemployment on age by sector and gender. Here the graph has three peaks for the public sector, the additional peak occur at age 65. This is because of the nature of the early retirement agreement for those who work in public sector. If an individual wait until 65 to take out early retirement he will receive full pension instead of the reduced amount at 62.

Figure 7: Percentage of nonemployment on age, by sector and gender. Per cent



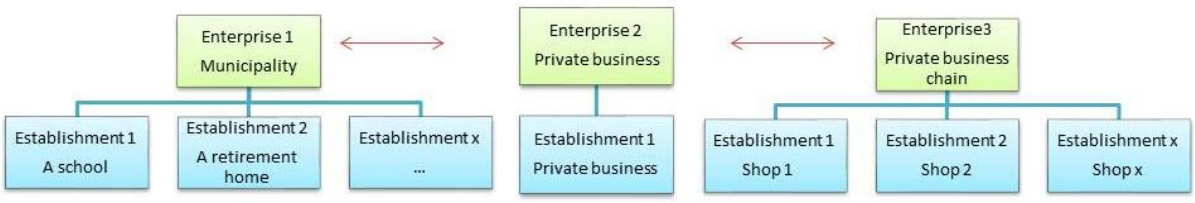
5.3. The dependent variable: Job change

The main analysis in this thesis is job change (or job-to-job mobility). I will start this section by discussing what qualifies as a job change and some possible causes for conducting such a transit. I will follow with a brief introduction on how the job change variable is constructed in the data, and then give some of the result I expect from the analysis together with some descriptive statistics about job change.

A job change can be explained in several different ways and can have a number of different underlying causes. What qualifies as a new job depends on who you ask. Is it a job change with new colleagues and work environment? Or is a new organisation number on the pay check needed or must is also be a shift to a new enterprise not only establishment? The reasons people change jobs could be due to higher wage, more responsibility, new tasks, career progression, moving to a new place, or maybe because the spouse has a new job that require relocating. The reasons can also be of a less voluntary sort; like downsizing in the company or bankruptcy.

When conducting both the analysis and descriptive statistics on job change I use the definition "Employed" of those in the workforce. Johansen (2013) defined job change two different ways; as a yearly change of establishment both within and across enterprises. In this analysis I will only look at job change across enterprise and not distinguish between every establishment. To explain further we can review the distinction between establishment and enterprise: All establishments are subject to an enterprise, but one enterprise can have more than one subordinate establishment. The figure below shows some examples.

Figure 8: Graphic illustration on difference between establishment and enterprise



It is only job change between enterprises that are interesting for this thesis. The reasoning is that an individual usually retain pension privileges when shifting within an enterprise.

All job spells are identified by a number accompanied with a number representing establishment and one representing enterprise. The job change variable is binary and created the same year as the change in enterprise number occurs. Some additional restrictions have been implemented to clean the variable of the changes we are not interested in studying. Only one job change per individual per year is kept, and if an individual change enterprise only for a period of less than 60 days before returning, the two job spells are melted together. These job changes are excluded to remove for example seasonal work and other short employments. Also a change in enterprise number must be accompanied with a change in establishment number. This is done to avoid registering firms that are only changing type of ownership.

I expect the frequency of job change to decline with age, career progression slows and for many there is the option of retiring instead of finding a new job. The reason for expected decline is a combination of demand and supply of senior workers. The demand of senior workers is low, so many senior workers often have difficulties finding new jobs. Companies are aware that productivity decline with age, and are thus often reluctant to hire (and even sometimes keep) senior workers (Daniel and Heywood, 2007, Hutchens, 1986). Groot (1997) found that the mobility cost usually is higher than the eventual wage increase a job change causes. They also found that tenure within a firm has a larger impact on mobility than age. This can be viewed by the theory on firm specific capital (Becker, 2009) discussed in chapter 3.3.

The low frequency of job change by senior workers can also be explained from the supply side: Most workers do not wish to change job. The high wages received as a result of the implicit contract cannot always be transferred to new firms, because of the productivity/wage gap and firm specific capital. So to reap the benefit of the contract, the workers wish to stay until mandatory retirement requires them to depart. And as described in the previous chapter many choose early retirement. To be able to utilize this option the individual needs to stay in a job that provides the arrangement, at least until the age 62. In cases of downsizing, senior workers are often protected by seniority or tenure, it is therefore risky to change jobs and lose this privilege

The statistics reported in Johansen (2013) is a good source of supporting results, and for better comparison I have divided this sample into the same age groups as presented there and

created a similar figure as Figure 4 one on page 23. The last group of columns representing age group 67-68 have to small sample size to give any definite results but is included to give an indication of the direction. Regarding the remaining age groups the percentage of job change is quite similar, though my results are slightly higher.

Figure 9: Reproduction of graph by Johanson (page 19). Job change by year over age groups (Obs! Different scales in the original).

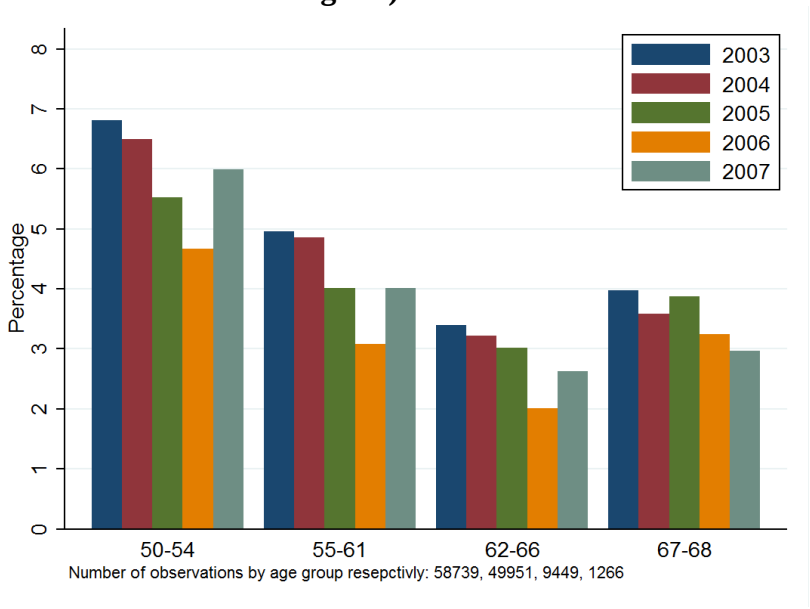


Figure 10 show the percentage development in job change by age and the number of job changes respectively. As expected there is a steep decline in level of job change with age. It is important to keep in mind that percentage is taken out of the total of people employed, not the whole population. This means that the percentage are calculated based on a very different numbers per age, the number of individuals still working is reduced by 30 per cent by age 62 and only 6 per cent are remaining at age 68. At age 50, 8118 men and 5313 women conducted a shift, while at 68 the number was 231 and 125 respectively. Both figures show a clear difference in level of job change by gender, with women having almost 2 per cent fewer job changes at every age.

Figure 10: Percentage and number of working population with job change, over age

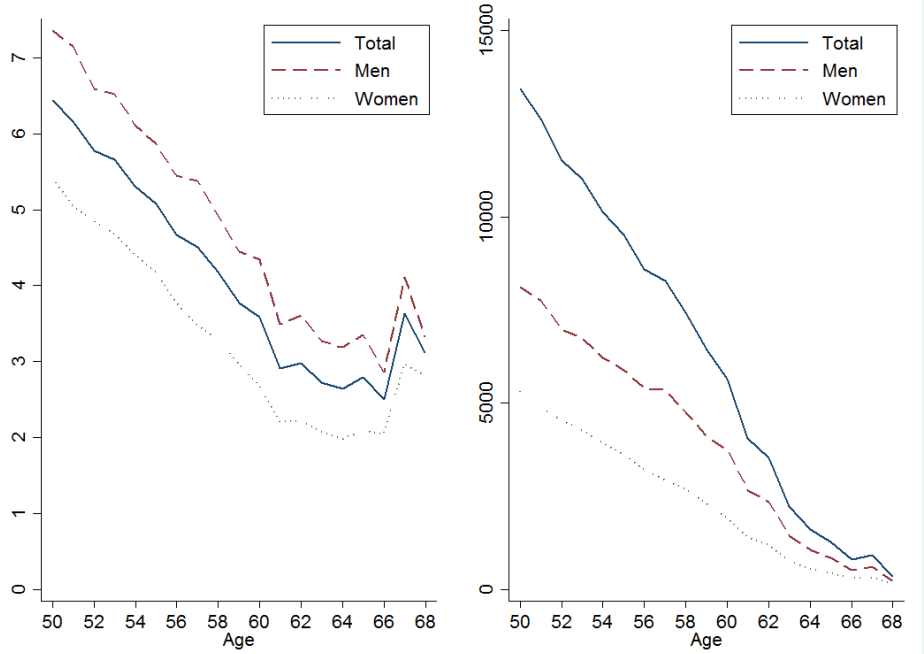
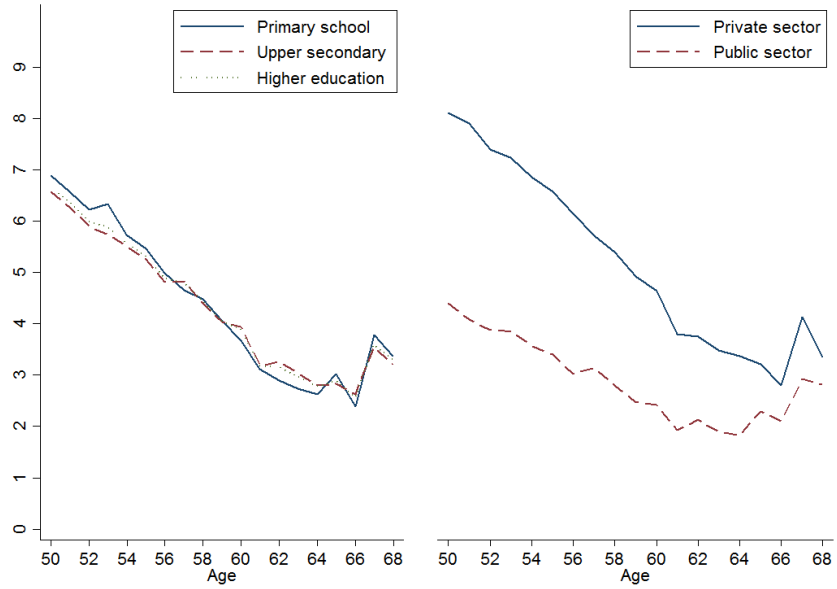


Figure 11 show a more surprising result. There is no appreciable difference in level of job change with level of education, while the difference between public and private sector is patent. One explanation could be that it is commonly known that governmental jobs have good pension programs, and for senior individuals approaching retirement there is much to gain by staying in a governmental position.

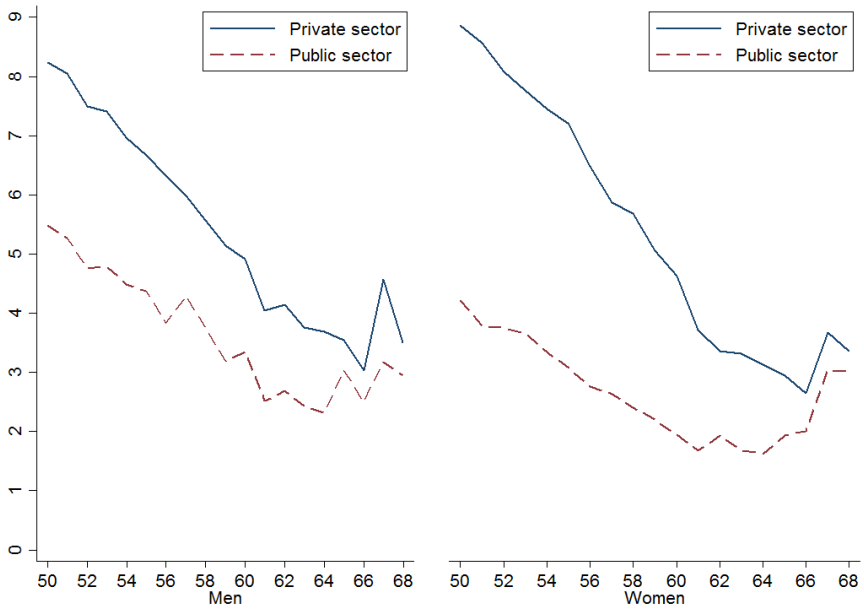
Figure 11: Percentage of working population with job change over age, by education and sector



The next figure will show that some of the gap between sectors can be partly explained by the same gap for gender. From the descriptive statistic on working sector (and elsewhere), we

know that there is a higher average of women in public sector than men, and further investigation reveals that much of the difference in gender is driven by the uneven deployment between sectors.

Figure 12: Percentage of working population with job change over age, by sector and gender



It is also interesting to observe where people change job to and whether they change working sector in the process. Table 5 show that most change within the same sector. This might be to keep an eventual pension agreement or because of a specific working skill that best applies to a specific sector.

Table 5: Number of job changes between and within sector

		Number of job changes	Total
Men	Private to Public	5922	65821
	Public to Private	5241	
	Public to Public	12038	
	Private to Private	42620	
Women	Private to Public	4358	36604
	Public to Private	3338	
	Public to Public	12187	
	Private to Private	16721	

6. Econometric method

In this chapter I will describe the econometric method used in the analysis. This paper focuses on labour mobility among senior workers in the Norwegian workforce in 2003-2008. I will analyse mobility from two different angles; the probability of exit from work and the probability of having a job change conditional on remaining in the workforce. I will look at how both probabilities develop over age.

The different dependent variables share one characteristic; they are binary. I will start this chapter describing models used when we have discrete choices. The dataset I have available is a panel, but for the regressions I will only use a cross section of the sample.

My presentation of the econometric framework is based on Verbeek (2008) and Wooldridge (2012).

6.1. Discrete choice model

The aim of the regression analysis is to learn how explanatory variables affect the outcome *y*. When the dependent variable only takes two mutually exclusive values, a binary (or discrete) choice model is needed. In a discrete choice model the dependent variable is usually defined as a dummy variable with the value 1 when the measured outcome occurs, and 0 otherwise. As is the case in this thesis:

$$y_i = \begin{cases} 1 & with\ a\ job\ change/is\ working \\ 0 & with\ no\ job\ change/not\ working \end{cases}$$

Where i represent the individual.

I want to find the probability of the occurrence y_i based on a variety of explanatory variables (x_i) and a coefficient β,

$$\Pr(y_i = 1|x_i) = F(x_i, \beta)$$

where F is a probability function. It then follows that:

$$\Pr(y_i = 0|x_i) = 1 - F(x_i, \beta) \qquad \text{(I)}$$

The estimate is considered valid and unbiased if the assumptions about the error term hold. The x_i variables should be exogenous (II), the error term (ε_i) should be independent of x_i

(III) and the expected value of the error term should be 0, which means the regression line should be correct (on average)(IV).

$$E(y_i|x_i) = x_i\beta \quad \text{(II)}$$

$$E(\varepsilon_i|x_i) = 0 \quad \text{(III)}$$

$$E(\varepsilon_i) = 0 \quad \text{(IV)}$$

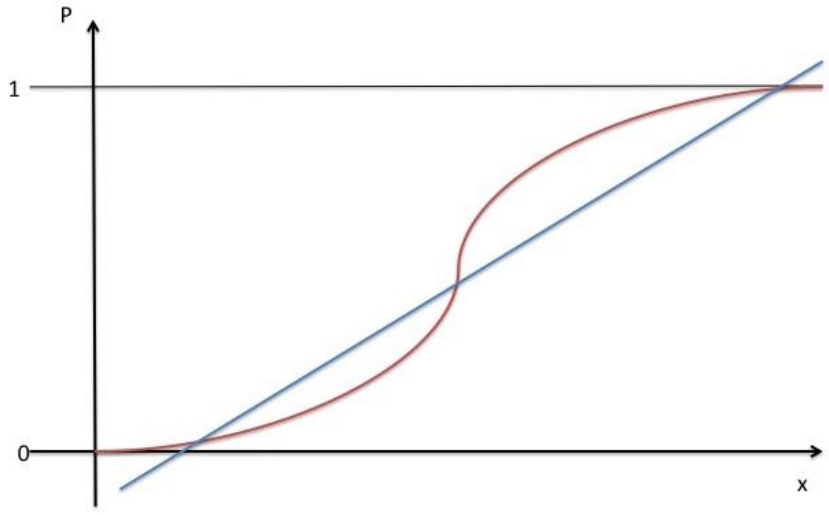
I have chosen to use logit in this analysis. The standard logistic distribution function as F in the probability model is given by:

$$\Pr(y_i = 1) = \frac{exp(x_i\beta)}{1 + exp(x_i\beta)} \quad \text{(V)}$$

As can be seen by the expression above, one of the advantages with the logit model is that the estimated probability always is limited between 0 and 1 when $\lim x_i \rightarrow \pm\infty$.

Discrete choice models are designed to determine the *probability* of one of the two outcomes directly. The probit and logit model are most common in applied work, and both have symmetric density functions that produce an S-shaped cumulative distribution as shown by the wavy line in Figure 13. The probit model assumes a standard normal distribution function, while logit assumes a logistic function. The cumulative distribution (CDF) gives very similar results for the probit and logit model, with logit having a bit longer tails.

Figure 13: Linear and non-linear probability function



The logit model is estimated by using Maximum Likelihood. The interpretation of coefficients in the logit model is a bit different than from those estimated than in a standard linear

Ordinary Least Square model. The estimated coefficients are the slope of the fitted values, and in the linear model the estimated coefficient will show the magnitude of an increase/decrease in the dependent variable with a one unit increase in an independent variable. The coefficient for the non-linear models tells that an increase in x will increase/decrease the likelihood that y=1, so the result coefficients in the logit model tell if the outcome of 1 is more or less likely. The different non-linear models have different forms, which in turn give the coefficients different scales; this also signifies that the results from different non-linear models cannot be compared directly. Evidently, only the sign of coefficients and not the magnitude can be interpreted directly. This is why it is better to consider the marginal effects of the changes in the explanatory variables.

6.2. Marginal effects

Calculating marginal effects is a useful tool when interpreting the coefficients from the logit model. Marginal effects are the change in the probability of y=1 given a 1 unit change in one of the explanatory variables and is expressed as a per cent. In a linear model the marginal effects are just the derivative of the model, but since logit has a non-linear functional form the derivative will depend on x, and the issue of direct interpretation remain unresolved. To avoid this problem we have to calculate the marginal effects for the logit model with a specific value of x, usually the mean. An alternative is to calculate margins for every individual in the sample and take the average of the result. I will use the latter as recommended by Cameron and Trivedi (2009). The expression for calculating marginal effect is given by:

$$\frac{\partial P}{\partial x_{ik}} = \frac{exp(x_i\beta)}{1 + exp(x_i\beta)}\,\beta_k$$

where k is the number of independent variables.

When the independent variable is a dummy variable the marginal effect is interpreted in comparison to the base category (x=0). With a group of dummy variables, for instance covering different types of education, the variable desired as base category is omitted from the regression. When the variable is continuous, the marginal effect show the increase/decrease in the probability that y=1 after a 1 unit change of x. For this reason the linear income variable is expressed in ten thousand NOK in the regression result. A change of 1 NOK in yearly income would have little effect on anything, and the marginal effect would be tiny.

6.3. Goodness-of-fit; pseudo R^2

A goodness-of-fit measure indicates the accuracy with which the model approximates the observed data. In a regular OLS regression, the R^2 represents the proportion of the total sample variation in the dependent variable explained by the independent variables. When using limited dependent variable models the measure is a calculated a bit differently. There are several options on calculating pseudo R^2. I will use McFadden R^2, which is the default method used by Stata.

$$McFadden\ R^2 = 1 - \frac{\log L_1}{\log L_0}$$

L_1 is the log likelihood of the model of interest and L_0 is the log likelihood value when all the parameter except the intercept are equal to zero. From the function above it is easy to see that the McFadden R^2 creates a ratio in the interval [0,1] and that if all coefficients in L_1=0 the R^2=0 .

6.4.Curvilinear effects

When using a logistic model we have the assumption that the binary dependent variable produces a linear relationship between the explanatory variables and the logit of the dependent variable. The resulting coefficients do not have to be linear, and sometimes a curvilinear shape to the slope may occur. This is a common occurrence in social sciences, and Osborne (2014) discuss underlying reasons and the importance of identifying the source of the curvilinear shape. Such curvilinearity can be a result misspecification of the model (omitted variable), poor coding or poor data cleaning, but it is just as likely one of the many things that are curvilinear by nature (Osborne, 2014). Age is an example that often has curvilinear qualities. This statement can be supported by common sense; there is for example naturally a curvilinear relationship at what age a woman can get pregnant. In some cases an author will change continuous variables into categories or groups, and depending on the nature of these groups the effect of the curvilinearity might be diminished or increased. Therefore dividing categorical variables into groups is most often not recommended (Osborne, 2014).

It is quite easy to confirm an eventual curvilinear variable using the simple algebra of adding the squared (x^2) and cubic (x^3) term of the variable. If the squared term is significant there is at least one bend in the slope, and two bends if the cubic term is significant. Testing the squared and cubic terms of Age using my data yields all significant values, though adding the cubic term does not change the value of log likelihood at all and can thusly be ignored.

7. Results

7.1. The model

I will study two types of mobility in this thesis; the probability of leaving the workforce and the probability of conducting a job change, both with age as the principal explanatory variable. The model presented below is the simplest of the tested models where Y represents either of the dependent variables. All regressions are run with men and women separately.

The simple model equation

$\Pr(y_i = 1|x_i) = F(x_i, \beta)$, where x is a vector that includes the basic demographic variables such as education, years of income > 1 B.a., income, marital status and age.

Most of the variables used in this regression are categorical and transformed into groups of dummy variables. To prevent falling in the "dummy trap", base categories are used. I have 19 Age dummies, representing individuals from 50-68 year old. I have chosen to use 51 as the base age group. I avoid using age 50 as base since every job change that occurs 1st January will not be registered (I have no employment information on individuals at age 49). For the education group *Primary School* is used as base category.

I will use several extensions to this model including spouse activity, sector, county and different varieties of the income variable. When including spouse occupation *Working spouse* is the base category, for the industry dummies *Private sector* is the comparison and for county *Oslo* is the base. I will also use interactions between age and income.

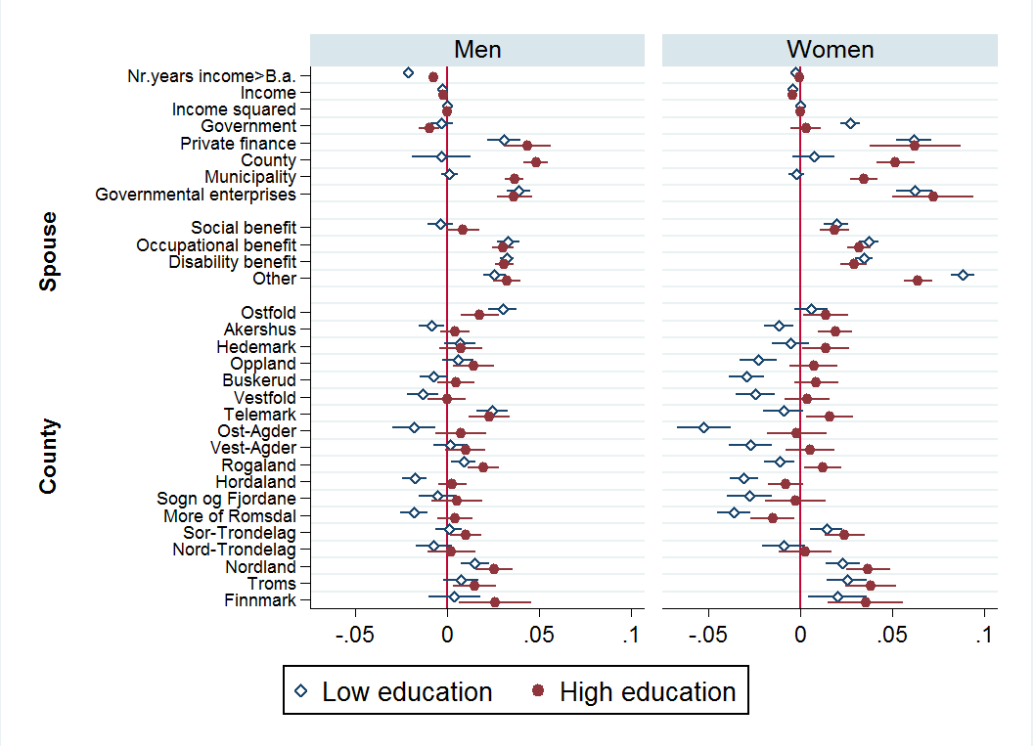
Only the marginal effects of the logit regression will be reported in this chapter and in the Appendix. Please note that not all coefficients in the figures are significant, despite small confidence intervals. Whether the estimate is significant on the 1, 5 or 10 per cent level can be viewed in the tables accompanying the figures.

7.2.Probability of nonemployment

The first type of mobility I will study is "leaving the workforce". I will use a cross section of the panel for the regression. The individuals are conditional on all being a part of the workforce when fist observed, thus all who are already out of employment (for any reason) are dropped. The cross section is made up by the last observation for each individual, which is either when exiting the workforce or the last observed year. The cross section have 804 301 observations. With only a few exceptions, estimated coefficients of the regression model are significant at the 1 per cent level. Even though the variables are significant, variables such as income, experience in the workforce and marital status has only a small impact on the probability of leaving the workforce. The Pseudo R^2 from the regressions on nonemployment is unusually high. A typical logit Pseudo R^2 can often be between 3,5-6 per cent (Verbeek 2008), but all reported in this section have a R^2 value over 35 per cent.

Because of the long list of explanatory variables I have divided the regression results into two figures. Figure 14 include coefficients from a collection of the control variables, while Figure 15 shows coefficients from the main explanatory variable; Age. A more detailed table with results follows after the figures.

Figure 14: Regression results (part I) of nonemployment with, by gender and education. Marginal effects with confidence intervals



In addition to dividing the results by gender, I have separated the regressions for those with low and high education. The low educated category includes individuals with *mandatory primary* and *upper secondary school* as highest education level. This category also includes the small groups with *no education* and *no information on education*. The highly educated group includes those with degrees from universities or university colleges. There are very clear differences in age coefficients for men in these two groups. This supports Lazear's theory discussed in chapter 3, that those with high education are less likely to leave or shirk from work. There is not much difference between high and low educated women. This could be because fewer women with high education have sedentary positions, and more hold to heavier jobs as for example teachers and nurses.

When including income in the regressions I tested different varieties of this variable: A logistic, a linear and an upper-quartile-dummy expression of the term. All three expressions gave similar results, and the other coefficients did not change much with either. The logistic term was the first discarded, though the coefficients did not change much, many were less significant and additionally it is more difficult to interpret logistic terms directly. The upper-quartile-dummy gave significant values, but such a distinction is not necessary here. So of the three forms I chose to use the linear term in this regression, I also added a squared term to control for eventual increase/decrease in the marginal effect of income. The squared term is significant but very close to zero which means the total effect of income is linear negative. To make the coefficients easier to read I change the income variable to show per 10 000 NOK. With a 10 000 NOK more in yearly income the probability of leaving the workforce decreases with 0,25 per cent for men and 0,4 per cent for women.

When analysing exit from work I have chosen to include industry as an explanatory variable. The base category is the private sector (except financial institution). None have very strong impact, but it seems the individuals in other industries have a higher probability of leaving.

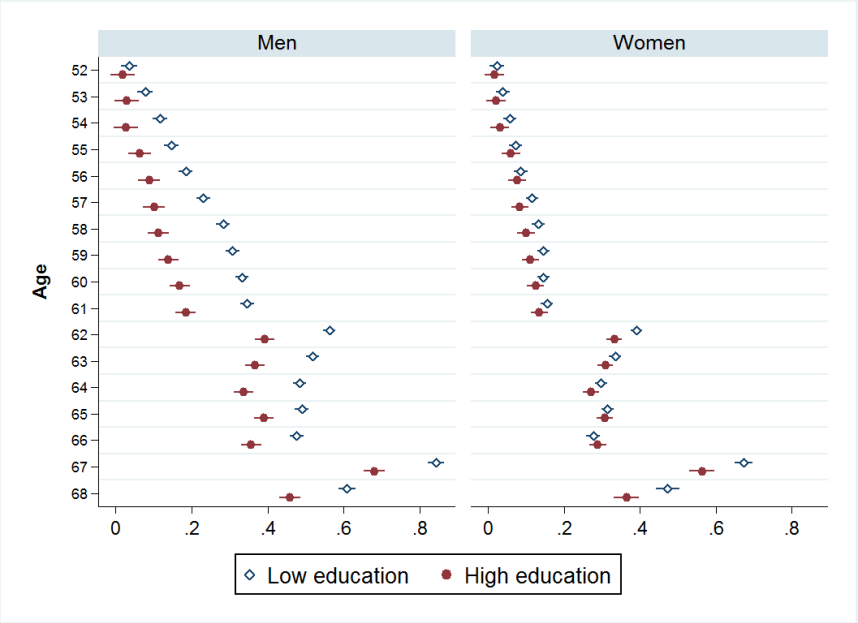
Next I control for geographical effects by including the county where the individual work. Here *Oslo* is used as a base category., and it seems that people living in the south and west are less likely to leave the workforce, those in the north have a higher probability of leaving, while the east is mixed. The county coefficients are stronger for women than for men. The

estimated coefficients for county has been removed from Table 6, but can be found in Appendix E.I Table 12

As mentioned in chapter 4.1.1 and 5.2 Bråthen and Bakken (2012) found that spouse activity should have a large impact on the individuals' decision of leaving the workforce. When I include variables representing spouse activity in the regression, the estimated coefficients are significant but not large. The sign of the coefficients are similar to those in Bråthen and Bakken (2012), indicating that it is more likely for an individual with a spouse out of the workforce to leave as well.

The next figure shows the Age coefficients, and the following table display the magnitude and significance level of most coefficients.

Figure 15: Regression results (part II) of nonemployment with, by gender and education. Marginal effects with confidence intervals



As expected the probability of leaving increase steadily with age until the lower early retirement age at 62, at that age the probability of leaving is almost doubled to 0,49 and 0,37 for men and women respectively.. The margins decrease a bit, until the official retirement age at 67. For this regression the age 51 is used as base, and since one of the conditions of being included in the sample is that the individual is still working at age 50, the coefficient representing that age predicts no variation and is omitted. There is also difference between men and women in the probability of leaving. Men have ha steeper increase and higher

probability of leaving with each year. Mind again that the base used in the regression is 51 so all probabilities are interpreted by that age. The higher marginal effects show that men are much more likely to leave at for example age 58 than age 51, not that they are more likely to leave the workforce earlier than women.

Table 6: Estimated probability of nonemployment, by education. Marginal effects

	Low education				High education			
VARIABLES	**Men**	***se***	**Women**	***se***	**Men**	***se***	**Women**	***se***
Nr.years income>B.a.	-0.0211***	*(0.0003)*	-0.0023***	*(0.0002)*	-0.0072***	*(0.0004)*	-0.0002	*(0.0002)*
Income	-0.0029***	*(0.0001)*	-0.0042***	*(0.0001)*	-0.0023***	*(0.0001)*	-0.0041***	*(0.0002)*
Income squared[9]	0.0000***	*(0.0000)*	0.0000***	*(0.0000)*	0.0000***	*(0.0000)*	0.0000***	*(0.0000)*
Government	-0.0031	*(0.0031)*	0.0271***	*(0.0028)*	-0.0097***	*(0.0029)*	0.0032	*(0.0042)*
Private finance	0.0310***	*(0.0046)*	0.0621***	*(0.0049)*	0.0436***	*(0.0065)*	0.0627***	*(0.0126)*
County	-0.0033	*(0.0081)*	0.0073	*(0.0057)*	0.0483***	*(0.0033)*	0.0520***	*(0.0052)*
Municipality	0.0013	*(0.0024)*	-0.0020	*(0.0021)*	0.0365***	*(0.0027)*	0.0349***	*(0.0038)*
Governmental enterprises	0.0388***	*(0.0032)*	0.0623***	*(0.0050)*	0.0365***	*(0.0049)*	0.0723***	*(0.0112)*
Spouse: Social insurance	-0.0037	*(0.0036)*	0.0196***	*(0.0033)*	0.0085*	*(0.0047)*	0.0189***	*(0.0040)*
Spouse: Occupational pension	0.0333***	*(0.0030)*	0.0376***	*(0.0027)*	0.0303***	*(0.0030)*	0.0321***	*(0.0032)*
Spouse: Disability pension	0.0325***	*(0.0018)*	0.0346***	*(0.0025)*	0.0311***	*(0.0026)*	0.0293***	*(0.0037)*
Spouse: Other	0.0258***	*(0.0030)*	0.0887***	*(0.0032)*	0.0324***	*(0.0039)*	0.0642***	*(0.0040)*
52	0.0361***	*(0.0108)*	0.0239**	*(0.0098)*	0.0181	*(0.0165)*	0.0181	*(0.0132)*
53	0.0770***	*(0.0103)*	0.0394***	*(0.0095)*	0.0284*	*(0.0161)*	0.0223*	*(0.0132)*
54	0.1160***	*(0.0100)*	0.0578***	*(0.0092)*	0.0265	*(0.0164)*	0.0315**	*(0.0129)*
55	0.1472***	*(0.0098)*	0.0728***	*(0.0091)*	0.0626***	*(0.0152)*	0.0611***	*(0.0120)*
56	0.1842***	*(0.0096)*	0.0867***	*(0.0089)*	0.0881***	*(0.0145)*	0.0770***	*(0.0118)*
57	0.2301***	*(0.0094)*	0.1165***	*(0.0086)*	0.1007***	*(0.0144)*	0.0845***	*(0.0118)*
58	0.2825***	*(0.0092)*	0.1328***	*(0.0084)*	0.1115***	*(0.0143)*	0.1005***	*(0.0115)*
59	0.3070***	*(0.0092)*	0.1462***	*(0.0083)*	0.1386***	*(0.0140)*	0.1119***	*(0.0114)*
60	0.3326***	*(0.0091)*	0.1465***	*(0.0083)*	0.1686***	*(0.0136)*	0.1252***	*(0.0113)*
61	0.3456***	*(0.0091)*	0.1556***	*(0.0083)*	0.1848***	*(0.0136)*	0.1355***	*(0.0112)*
62	0.5621***	*(0.0085)*	0.3918***	*(0.0076)*	0.3924***	*(0.0127)*	0.3332***	*(0.0102)*
63	0.5175***	*(0.0087)*	0.3347***	*(0.0078)*	0.3664***	*(0.0129)*	0.3094***	*(0.0105)*
64	0.4844***	*(0.0089)*	0.2978***	*(0.0082)*	0.3360***	*(0.0132)*	0.2710***	*(0.0109)*
65	0.4898***	*(0.0090)*	0.3152***	*(0.0083)*	0.3905***	*(0.0131)*	0.3085***	*(0.0110)*
66	0.4758***	*(0.0093)*	0.2771***	*(0.0089)*	0.3568***	*(0.0135)*	0.2893***	*(0.0117)*
67	0.8433***	*(0.0108)*	0.6738***	*(0.0121)*	0.6813***	*(0.0143)*	0.5636***	*(0.0172)*
68	0.6084***	*(0.0116)*	0.4731***	*(0.0160)*	0.4591***	*(0.0140)*	0.3654***	*(0.0170)*
R2	0,4321		0,36		0,4775		0,4324	
Observations	141,985		116,853		74,353		54,847	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[9] The coefficient of *income squared* is not zero; only very close (e^{-06}).

7.3.Probability of changing job

In this section I will discuss the results from analysing the probability of conducting a job change. Again I will use a cross section of the panel available. In the previous analysis the individuals were included in this cross section conditional on being registered as working at the first observation, now I drop *all* observation from the year they leave the workforce. The cross section only includes one observation per *job spell*, and for all who has conducted a job change during the observed time period, that observation will be used in the regression. For all others, the last year observed is included. Consequently an individual with multiple job changes during the observation period have more than one observation in the cross section. The cross section have 849 096 observations.

I run separate regressions for gender, public and private sector, and for higher- and lower education. Pseudo R^2 is much lower in the results on job change than nonemployment but still mostly sound. The first round of regression only have values from 1,72-2,10 per cent, but the results strengthen to 2,23-6,06 per cent after dividing the regression by education and adding geographic measures.

As with the previous analysis I tested the different varieties of the income variable: A logistic, a linear and an upper-quartile-dummy expression of the term. Again all three expressions gave the similar results, with small changes in the coefficients. I choose to continue with the dummy-variable because using a distinct group makes it easier to interpret the results. This variable is a dummy for the upper income quartile, and takes the value 1 for all who have more than 442 231 NOK pensionable income yearly. We can assume that the education variable for *Master/PHD* is correlated with the income[10] since most with more than 3 years of higher education will belong to this income group. Because of this correlation, the dummy representing *Master/PHD* education is rendered insignificant since its explanation value is captured by the *Upper income quartile* dummy. This effect only occurs in the regressions for men and not women; this could be because very few women of that time and age belong to the upper income quartile (only 15 per cent of the quartile)[11]. I have also tested with the variables representing spouse activity in the model, but none proved significant and were therefore dropped from the final result.

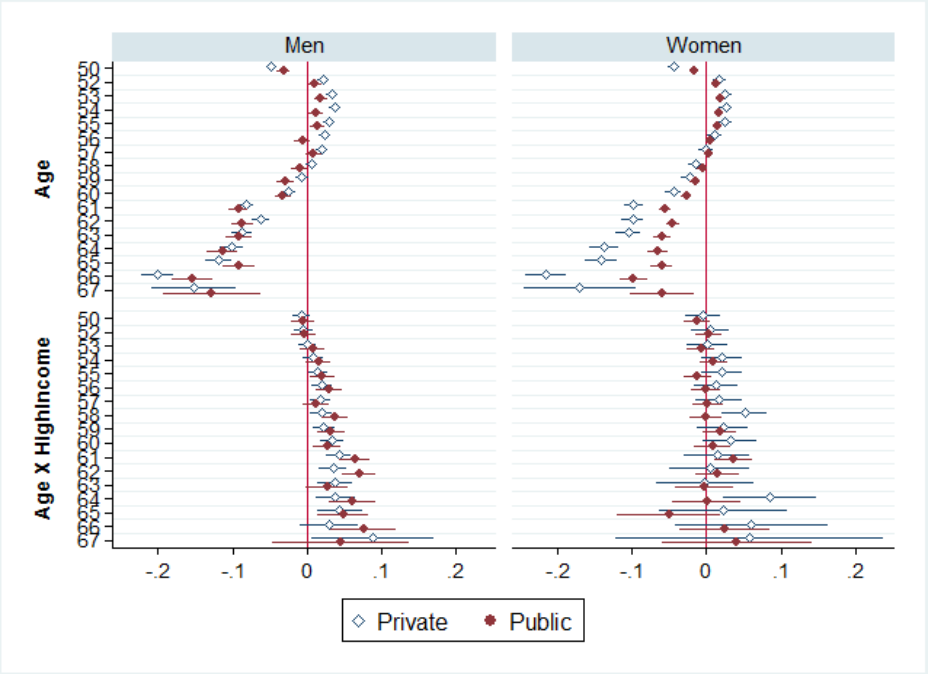
[10] The correlation table in Appendix D confirms this statement
[11] Men 75 per cent > Women 95 per cent (495 000 > 482 600)

7.3.1. The simple model with age-income interactions, by sector

This first series of regressions are of the simple model written out in chapter 7.1. including age-income interaction terms. Figure 16 shows the probability of changing job by gender and sector, and only the age- and age*income coefficients are included in the figure. The details of the remaining coefficients can be found in Table 8.When discussing the probability of job change in chapter 5.3 I assumed that (like nonemployment), the probability of job change would decline with age. But the coefficients have a curvilinear shape, and the probability of job change will increase before the decline. This result diverge a bit form previous results on job mobility. Early work found a negative relationship between job mobility and experience (Mincer and Jovanovic, 1982, Parsons, 1975), and later Topel and Ward (1992) found the opposite result when also controlling for wage, though they studied much younger individuals.

The marginal effects are all above zero until the age 58-59, so the probability of changing jobs is higher in the rest fifties than at the base at 51. The peak of the marginal effects is a bit different for each regression but lies between the ages 53-55.

Figure 16: Regression results job change with age*income interaction terms, by gender and sector. Marginal effects with confidence intervals[12,13]



[12] Base is 51. Age 68 was excluded from the figure because of very a large confidence interval.
[13] In the figure all other variables than *Age* and *Age*Income interactions* are removed for simplicity, but still a part of the underlying regression.

The age-income interaction terms draw out the part of the age coefficient that is explained by income for the individuals from the high income quartile. As a result the effects of the high income group and the low income group can be studied separately. The Age coefficients show the probability of job change for all who are *not* a part of the upper income quartile, while the sum of both the age- and interaction coefficients show the effect on those with the high income. For the coefficients for individuals not in the upper income quartile, the likelihood of changing jobs peaks at age 54 for both genders in private sector: Man are 3,74 per cent and women 2,54 per cent more likely to change jobs at age 54 than the base at age 51. As can be seen from the lower part of Figure 16, the high income effect draws in the opposite direction than the age affect, and income have increased impact with age. For the interactions the marginal effects for Age is calculated by adding

$$Age + Income + Age * Income$$

In the regressions on women almost none of the interaction coefficients are significant, so hence I will only focus on the results from the regressions on men in this section. The interaction coefficients are only significant for age 55-65.

Table 7: Example of probability of job change for the different income groups

Age	Income group	Calculating marginal effect	Final marginal effect
56	Upper income quartile Lower income	0,0279+(-0,0260)+0,0134 0,0279	0,0153 0,0279
64	Upper income quartile Lower income	(-0,1056)+(-0,0260)+0,0367 -0,1056	-0,0949 -0,1056

For the remaining explanatory variables the marginal effects are rather small. Most are significant, with the exception of *Master/PHD* for men, *No education* and a few more variables in the regression for men working in public sector. The first is not significant for the reasons mentioned earlier and the second probably because *No education* has a very small sample size. The regression for men in public sector have an additional curiosity, the coefficient for *Bachelor* is negative. If speculating, I would guess that this category include many teachers, which Johansen reported having a low percentage of job-to-job mobility. Otherwise it is clear that the higher educated, the more likely one are to change jobs as a senior worker, if only by a very small percentage. All are less likely to change jobs if married, though for men the effect is less than 1 per cent. Experience (or years of income > 1 B.a) have only a small negative effect for most groups, this is consistent with the findings done by Ghosh (2007) where the probability of job change is decrease with experience.

Table 8: Estimated prob. of job change with age/income interactions, marginal effects

	Men				Women			
VARIABLES	**Private**	***(se)***	**Public**	***(se)***	**Private**	***(se)***	**Public**	***(se)***
No education	0.0125	*(0.0229)*	-0.0078	*(0.0401)*	0.0344	*(0.0274)*	-0.0332	*(0.0346)*
Upper secondary	0.0043**	*(0.0018)*	0.0062**	*(0.0030)*	0.0098***	*(0.0024)*	0.0104***	*(0.0020)*
Bachelor	0.0098***	*(0.0025)*	-0.0296***	*(0.0034)*	0.0263***	*(0.0033)*	0.0166***	*(0.0021)*
Master/PHD	-0.0014	*(0.0035)*	-0.0072*	*(0.0038)*	0.0301***	*(0.0066)*	0.0393***	*(0.0029)*
No info on educ	0.0139	*(0.0091)*	0.0368***	*(0.0137)*	0.0321**	*(0.0142)*	0.0504***	*(0.0090)*
Married	-0.0092***	*(0.0015)*	-0.0022	*(0.0019)*	-0.0367***	*(0.0019)*	-0.0243***	*(0.0012)*
Nr.years inc>B.a.	-0.0044***	*(0.0002)*	0.0002	*(0.0003)*	-0.0014***	*(0.0002)*	-0.0003***	*(0.0001)*
50	-0.0451***	*(0.0035)*	-0.0295***	*(0.0045)*	-0.0427***	*(0.0040)*	-0.0155***	*(0.0025)*
52	0.0208***	*(0.0037)*	0.0126***	*(0.0047)*	0.0166***	*(0.0043)*	0.0133***	*(0.0026)*
53	0.0371***	*(0.0038)*	0.0226***	*(0.0048)*	0.0261***	*(0.0044)*	0.0193***	*(0.0026)*
54	0.0374***	*(0.0039)*	0.0151***	*(0.0049)*	0.0229***	*(0.0045)*	0.0160***	*(0.0027)*
55	0.0303***	*(0.0041)*	0.0147***	*(0.0050)*	0.0254***	*(0.0046)*	0.0143***	*(0.0028)*
56	0.0279***	*(0.0042)*	-0.0053	*(0.0052)*	0.0139***	*(0.0047)*	0.0056*	*(0.0029)*
57	0.0171***	*(0.0042)*	0.0106**	*(0.0051)*	0.0001	*(0.0048)*	0.0022	*(0.0030)*
58	0.0051	*(0.0044)*	-0.0065	*(0.0054)*	-0.0091*	*(0.0050)*	-0.0053*	*(0.0032)*
59	-0.0066	*(0.0045)*	-0.0285***	*(0.0057)*	-0.0220***	*(0.0052)*	-0.0149***	*(0.0033)*
60	-0.0240***	*(0.0047)*	-0.0286***	*(0.0057)*	-0.0493***	*(0.0055)*	-0.0275***	*(0.0036)*
61	-0.0810***	*(0.0052)*	-0.0921***	*(0.0066)*	-0.1006***	*(0.0061)*	-0.0545***	*(0.0040)*
62	-0.0621***	*(0.0058)*	-0.0858***	*(0.0075)*	-0.1003***	*(0.0072)*	-0.0451***	*(0.0045)*
63	-0.0855***	*(0.0070)*	-0.0915***	*(0.0091)*	-0.1046***	*(0.0084)*	-0.0596***	*(0.0058)*
64	-0.1056***	*(0.0080)*	-0.1104***	*(0.0106)*	-0.1337***	*(0.0100)*	-0.0660***	*(0.0065)*
65	-0.1151***	*(0.0090)*	-0.0939***	*(0.0109)*	-0.1437***	*(0.0112)*	-0.0636***	*(0.0073)*
66	-0.2075***	*(0.0111)*	-0.1578***	*(0.0139)*	-0.2210***	*(0.0139)*	-0.1007***	*(0.0095)*
67	-0.1436***	*(0.0288)*	-0.1168***	*(0.0332)*	-0.1759***	*(0.0382)*	-0.0592**	*(0.0233)*
68	-0.2366**	*(0.1054)*	-1.7347	*(91.0864)*	(*Omitted*)		-0.0823	*(0.0542)*
High Income	-0.0260***	*(0.0043)*	-0.0024	*(0.0058)*	-0.0241***	*(0.0089)*	0.0139**	*(0.0062)*
(50)*High Income	-0.0121**	*(0.0059)*	-0.0045	*(0.0080)*	0.0002	*(0.0120)*	-0.0126	*(0.0085)*
(52)*High Income	-0.0043	*(0.0063)*	-0.0003	*(0.0084)*	0.0057	*(0.0131)*	0.0022	*(0.0088)*
(53)*High Income	-0.0049	*(0.0064)*	0.0063	*(0.0084)*	0.0041	*(0.0138)*	-0.0090	*(0.0092)*
(54)*High Income	0.0055	*(0.0066)*	0.0135	*(0.0086)*	0.0295**	*(0.0138)*	0.0084	*(0.0091)*
(55)*High Income	0.0111*	*(0.0067)*	0.0198**	*(0.0086)*	0.0231	*(0.0142)*	-0.0102	*(0.0097)*
(56)*High Income	0.0134*	*(0.0068)*	0.0299***	*(0.0088)*	0.0129	*(0.0154)*	0.0067	*(0.0101)*
(57)*High Income	0.0216***	*(0.0070)*	0.0104	*(0.0087)*	0.0222	*(0.0160)*	0.0005	*(0.0105)*
(58)*High Income	0.0192***	*(0.0072)*	0.0326***	*(0.0089)*	0.0479***	*(0.0158)*	-0.0004	*(0.0111)*
(59)*High Income	0.0184**	*(0.0074)*	0.0331***	*(0.0094)*	0.0200	*(0.0177)*	0.0133	*(0.0114)*
(60)*High Income	0.0315***	*(0.0077)*	0.0277***	*(0.0096)*	0.0380**	*(0.0186)*	0.0073	*(0.0123)*
(61)*High Income	0.0402***	*(0.0086)*	0.0636***	*(0.0105)*	0.0300	*(0.0226)*	0.0287**	*(0.0129)*
(62)*High Income	0.0326***	*(0.0095)*	0.0700***	*(0.0117)*	0.0098	*(0.0275)*	0.0148	*(0.0150)*
(63)*High Income	0.0364***	*(0.0116)*	0.0310**	*(0.0148)*	-0.0023	*(0.0336)*	0.0055	*(0.0201)*
(64)*High Income	0.0367***	*(0.0135)*	0.0576***	*(0.0162)*	0.0850***	*(0.0317)*	-0.0049	*(0.0232)*
(65)*High Income	0.0324**	*(0.0156)*	0.0459***	*(0.0176)*	0.0293	*(0.0438)*	-0.0408	*(0.0355)*
(66)*High Income	0.0328	*(0.0202)*	0.0759***	*(0.0223)*	0.0354	*(0.0526)*	0.0317	*(0.0313)*
(67)*High Income	0.0781*	*(0.0422)*	0.0340	*(0.0472)*	0.0639	*(0.0920)*	0.0507	*(0.0521)*
(68)*High Income	-0.1906	*(0.1803)*	1.6291	*(91.0864)*	(*Omitted*)		(*Omitted*)	

R2	0,0176	0,0172	0,0210	0,0192
Observations	315,529	155,787	156,252	219,796

Standard errors in parentheses

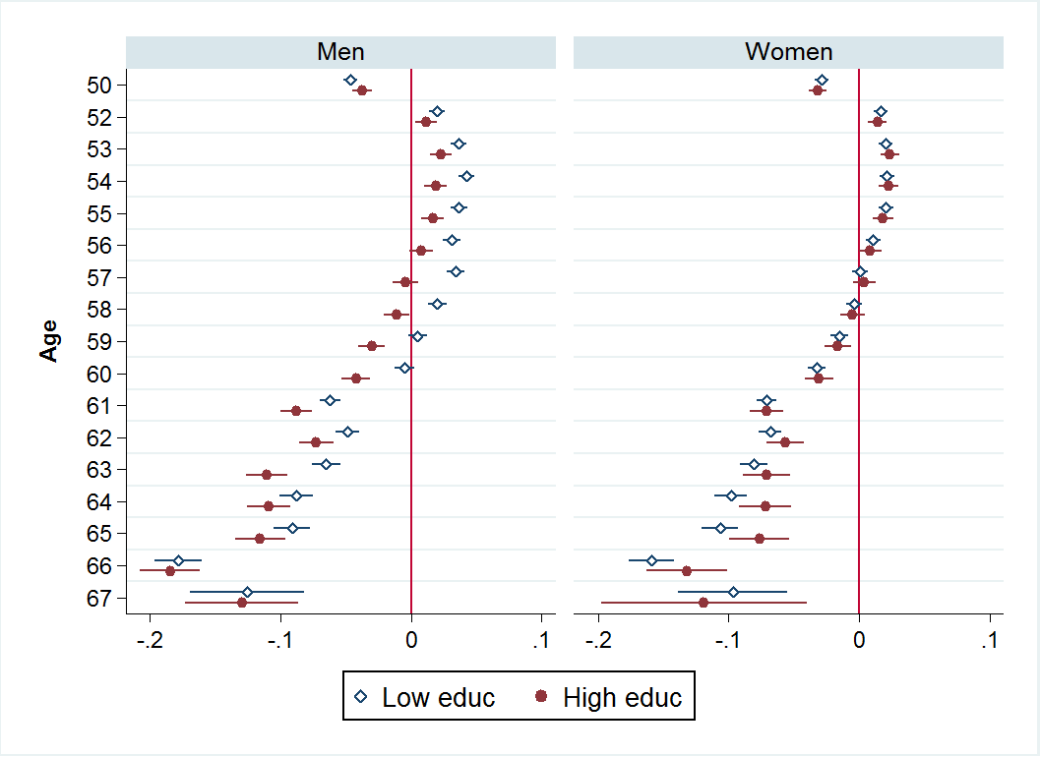
*** p<0.01, ** p<0.05, * p<0.1

7.3.2. Extended model: By education

The extended regression is separated by high and low education level. Again the low educated category includes the individuals with *mandatory primary* and *upper secondary school* as highest education level, as well as the groups with *no education* and *no information on education*. The highly educated group include *Bachelor* or *Master*/*PhD*. In this model I have extended the control variables to include *county of work* and *industry*. The regression results are divided into two figures, the Figure 17displaying the age coefficients and

Figure 18 display the remaining coefficients. The complete table of results can be found in Appendix E, section E.II Job change, Table 13.

Figure 17: Regression results job change (part I), by gender and education. Marginal effects with confidence intervals

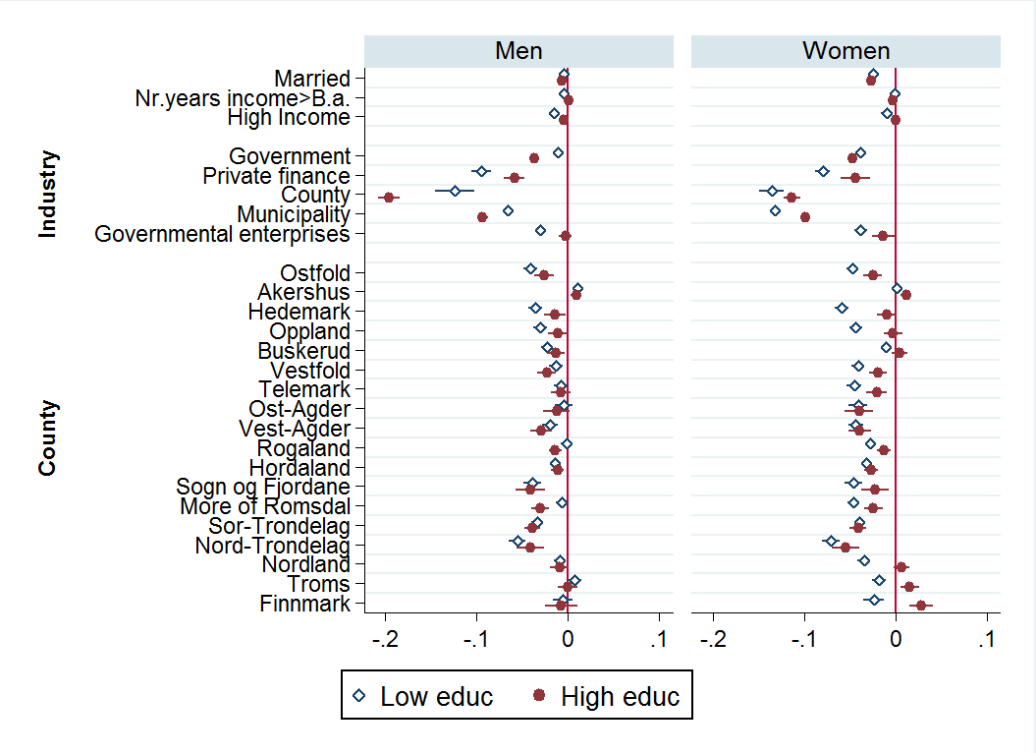


Note: Base is 51, and age 68 was again excluded from the figure because of very a large confidence interval

The most interesting feature of this second regression is the distinct difference in probability for men with high and low education, and simultaneously the lack of difference in the two categories of women. The regression results by sector form chapter 7.3.1 showed a higher probability of job change for individuals working in the private sector. The distinction is more prominent between education levels than between sector. We can assume that most jobs requiring lower education are in the private sector. This coincides with Lazear's theory

presented in chapter 3. Asymmetric information about the highly educated workers' productivity creates the demand for an implicit contract to keep up incentives. When the outcome is difficult to observe, the implicit contract must save the bulk of the payment until late in the career, which creates the gap between productivity and wage (Lazear, 1979). The individuals with less education can more easily change job without reduction in pay. Another reason for the higher probability of job change could be that this group is often more sensitive to economic fluctuations, and are therefore more often exposed to changes in labour demand.

Figure 18: Regression results job change (part II), by gender and education. Marginal effects with confidence intervals



Note: Base variable is *Private sector* (except *private finance*) and *Oslo*

Geographical location have more effect on women's' probability job change, with most counties showing a lower probability for job change by women than the base county Oslo. Working in a municipality or municipality-county reduces the probability of job change much. This might be because many working there change position or establishment within the enterprise (municipality/county).

8. Concluding remarks

In this chapter I will conclude the thesis by discussing the results from chapter 7 in light of theories, empirical papers and the new legislation proposal featured earlier. I will first look at results from the two dependent variables separately, and then I will discuss the robustness of the results and finally conclude with some suggestions to future research.

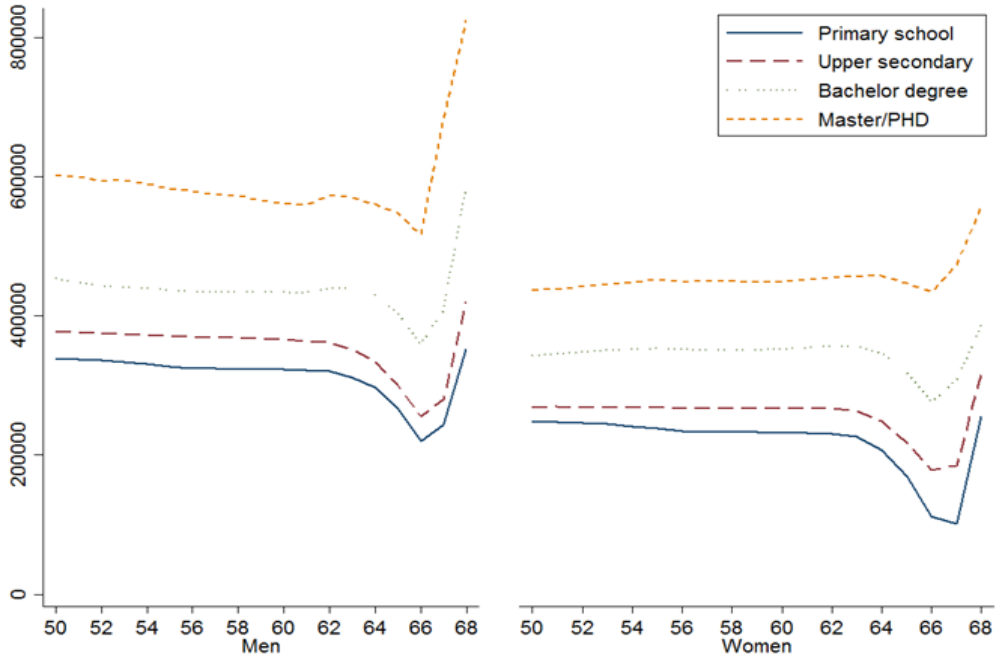
Exit from the workforce

Lazear's theory predicts that individuals with high wages and high education are those who stay in the workforce longest. This is confirmed by the results from both the descriptive statistics and regression results from the analysis of exit from work. The difference is most palpable for men separated into groups of educational level, where the probability of leaving is much higher for those with low education than those with high education. The two education levels amongst women have almost the same probability of leaving the workforce. In the future it will be interesting to see if this probability changes when the generations with a larger portion of highly educated women come of age.

There is an ongoing debate about extending the mandatory retirement age from 70 to 72, and the internal company age limit from 67 to 70 (the second age limit applies if agreed upon by employer and employee ex ante) (Prop. 48 L, 2014-2015). This is the age where a firm of legal grounds can terminate an employment contract based on age. It is only a very small fraction of the population that will be affected by this legislation since most leave the workforce before age 67, but those it does affect is usually very resourceful individuals and often costly to the employing firm. Figure 19 is a recurrence of the income figure from chapter 5.1.3, only expanded to incorporate the last years. The figure shows the median income of the individuals still active in the workforce. I use the first definition of "working", to also include all who are self-employed. It is obvious that those who continue working after the standard retirement age at 67 are very resourceful individuals regardless of gender or education. The small sample is a selection, but it is interesting to note that 24 per cent are in governmental positions, 28 per cent in private businesses and 35 per cent are not registered in the Aa-register. Since the last category has no registered employer, they are presumed to be self-employed. The big dip in income observed in the years before the retirement age can be a result of a reduction in working hours, and thus a reduction in pensionable income. These

individuals might still have early retirement- or disability pensions to compensate the lack of working income.

Figure 19: Median of total pensionable income with age (50-68) for individuals still working, by education level and gender



When analysing the probability nonemployment I also controlled for spouses' decision of leaving the workforce. Bråthen and Bakken (2012) found that the spouses decision had strong effect on the probability of working another year, they defined this as the "jump" effect. My results indicate the same, but not as strongly. Of the three effects "pull", "push" and "jump" discussed in chapter 4.1.1 it is difficult to say which increase the probability of leaving more without variables measuring the individuals' health and a variable on the workers satisfaction.

If Prop. 48 L is approved, it is plausible that the legislation will have little effects on the ratio of senior workers. And as expressed in the official hearing, the Organization for Norwegian Empoyers (NHO) is not entusiasthic about the cost the legislation entails. It is also interesting to note that the government seems to propose excluding the public sector from the new regulations (the section describing this Prop. 48 L (2014-2015) is a bit ambiguous).

The fact that the individuals' who stay long in the workforce are more often highly educated does not necessarily imply a causal relationship between education and exiting the workforce. I do not have information on the individuals' health status, and that might capture much of the effect.

Job change

When analysing the probability of a job change I found that the coefficients have curvilinear shape, I expected a steady decline in job change with age, but the probability of changing will increase for an individual in early fifties, before declining. The income*age interaction strengthens the conformation of Lazear's theory by refining the group with the expected higher productivity/wage-gap. If an individual belong to the upper income quartile, the probability of changing is smaller than for the group with lower income. When dividing the regressions into education the results are even more distinct, isolating the group with jobs where it is difficult to observe effort and outcome. These individuals do not wish to change jobs because firm specific capital and productivity gives higher wages at the current position than at any alternative firm, so they are comfortable staying in their current positions.

I can only speculate on the reasons of why the probability of job change increase for individuals in their fifties. There are many effects that could influence the probability in either direction. If we look at the combination of both the dependent variables, it is plain that those with the highest probability to leave, also have a higher probability of job change. Is this because their jobs are more sensitive to economic fluctuations, or because it is hard to keep a heavy physical job late in the career?

The decline in job change (in the sixties) is twofold. It can partly be explained by the diminishing demand for senior workers: Companies are well aware that the level of productivity decreases with age, and are not interested in hiring such costly workers (Hek and Vuuren, 2011, Hutchens, 1986, Daniel and Heywood, 2007). It is easier to hire younger workers and then invest in on-the-job training for this worker (Brooke, 2003, Prskawetz and der Wissenschaften, 2006). Secondly; the workers do not wish to leave. The high wages received as a result of the implicit contract cannot always be transferred to new firms, because of the productivity/wage gap and firm specific capital. So to reap the benefit of the contract, the workers wish to stay until mandatory retirement requires them to depart.

There is another ongoing debate regarding a new legislation in the Work Environment Act. The present government seek to ease the regulations on permanent employment, making it easier to employ workers on more short term contracts (Prop. 39 L, 2014-2015). The legislation is aimed at newly educated and young workers, but might also have consequences

for the generations of older workers. As mentioned above it is the same group who have the highest probability of both leaving and changing work. If the regulations on temporary employment are changed, many of those who change jobs later in their working career might only get temporary employment. It is well-established in the literature that firms are reluctant to hire older workers (Hek and Vuuren, 2011, Hutchens, 1986, Daniel and Heywood, 2007). The firms conundrum can be solved by only hiring experienced workers on short term contract, and thus get the gains from their high general human capital without binding the firm to the individual for the years where the gap between productivity and wage increase. The proposition itself tells that the change in legislation will increase mobility (Prop. 39 L, 2014-2015). Already it is plausible to assume that the group with highest probability of changing jobs do it out of necessity rather than willingness.

Robustness

In this section I will discuss some of the models weaknesses and possible improvements. The largest source of error is omitted variables. When an individual choose to change jobs voluntarily it is very difficult to explain the reason by only using background characteristics. The choice to change job is probably most often founded in interest of a new topic or challenge. And this is very difficult to capture in a variable. It would also be interesting to control for eventual *involuntary job change*, and who this affect. This is easier to register.

Another variable that probably have strong impact is *job availability* in near geographical distance to the individuals' home. This can be replaced with a measure of geographic centrality, since most cities usually have a larger job market and as a consequence more turnover. The *size of the firm*, where the individual work can probably also affect the results, since big firms often have more turnover than smaller firms. *Firm specific tenure* would also interesting to include, to give better understanding of how much tenure affect job change.

And last, but not least; the analysis lack a health variable. Knowing the individuals health condition would be most useful when analysing exit from the workforce. Without a measure on health, it is impossible to draw any conclusion about causality.

Further research

There is great need for, and many possibilities for further research on job-to-job mobility in Norway. First of all it would be interesting to compare job changes in establishments to the changes in enterprise. If the level of change between establishments stays high or decrease less than job changes between enterprises, it can indicate that contracts and pension agreements with the specific enterprise is the reason for not changing position.

There are also many ways to improve the analysis by including more information. Especially all the variables listed as omitted in the previous section. *Involuntary job change, job availability, geographic centrality, size of firm* and *tenure* are possible to attain without too much difficulty. There have also been derived several different methods for measuring *health*. *Reasons for job change* is probably the most difficult variable to measure, but it is possible to get an indication through use of surveys.

Another interesting extension to the analysis is to look at the data as a panel and test for time effect. It would be advantageous to control for economic fluctuations, which probably have strong connections to the level of job change.

For future policy changes to be effective more research is needed to give a better understanding of the senior workers' labour market mobility.

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Appendix A

A. Structuring the employee/employment register for this analysis

The FD-trygd database contains several datasets on employment. The datasets include different information related to employment, storing the available details in different formats. I need information form two separate datasets named F and TAB, and some structural changes are needed to manage merging information from the two.

The main dataset in the employer/employee data register is named F and contain information on each job spell, more accurately when the job spell starts, stops and any changes. Unfortunately F does not contain all the information we need to study job change, but this information can be found in one of the other registers named TAB. Merging these two together and then with the rest of the sample created some issues, because the two registers and the sample are all constructed very differently. This next section will explain the process and the choices we made when completing this sample. I will start by describing the F and TAB register respectively and then how they are merged together to best fit with the rest of the sample. I will also use graphical supplements for better explanation.

The F register contains complete historical information on every "job spell" sorted by individuals. A job spell is represented with a serial number connected to the individual number, and can be explained as each position an individual hold. The number will always change when a job change occurs either between establishment, enterprise or both, but it will also change when an individual get a new position within an establishment. Other registration issues may also trigger a change in job spell.

Table 9: Coding of the F register

Individual number	Job spell serial number	1	Start date of job spell
		2	Change in job spell
		0	End date of job spell
		3	Start date before 2003 (automatically set to 1st Jan 2003)

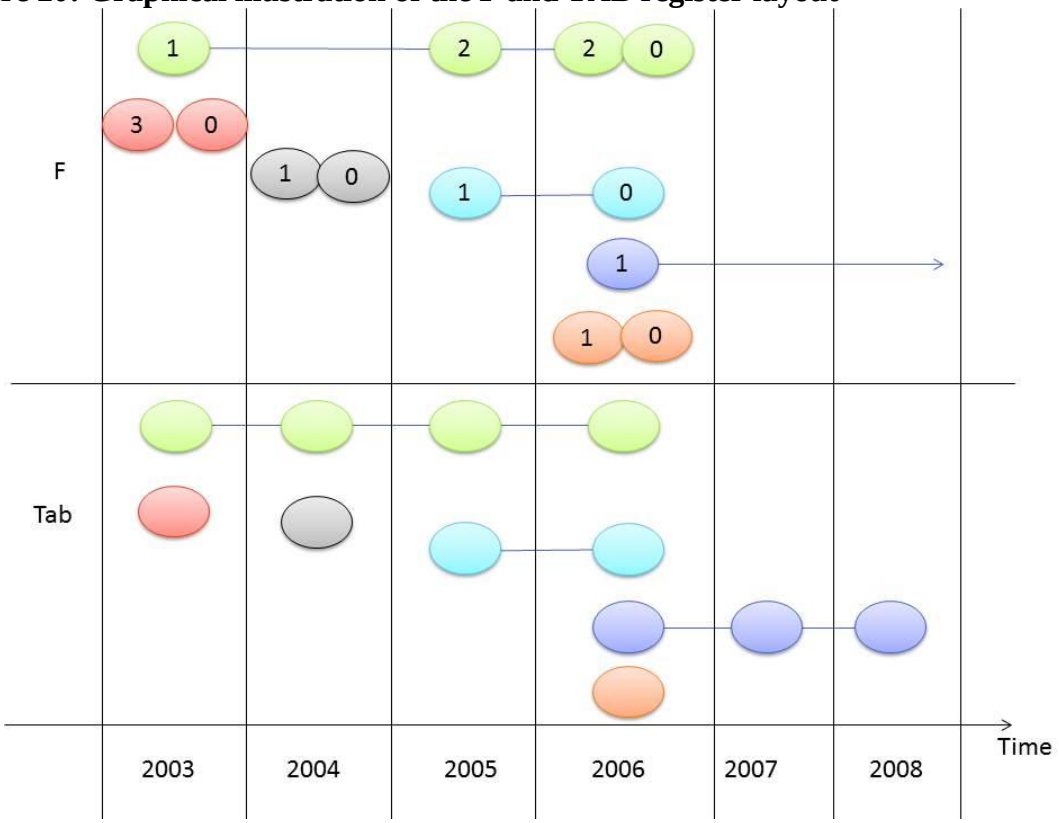
One individual can have several job spells the same year, representing the different jobs an individual might hold. An individual can also have several records on one job spell within one

year, for example starting and quitting a job within a year. This can also happen periodically since many have seasonal depending jobs. Since the register only make records when a job spell change, an individual can be represented with only one record for all the observed years, indicating holding one job spell without changing it the whole period we observe them.

The TAB register is also sorted on individual number and the serial number for job spell. The TAB register is based in *yearly* information and will have one record for each year observed as long as the individual is registered with a job. It is from this register we get most of the information we want to study like the enterprise number (changes in which will be the one of the dependent variables), sector, and municipality.

The first figure shows an example individual and how this person's work information is recorded in the F and TAB register. Each circle represents one record (observation), the colours differentiating the job spells within the time frame from 2003-2008. The numbers within the circles in F show what kind of record we have as given by Table 13.

Figure 20: Graphical illustration of the F and TAB register layout



The figure above is a good example of a "messy" record. The measures taken to simplify the sample are illustrated in the next figure. The encircled observations are all within the same enterprise, and are therefore merged into one. The crossed out observations is removed because of short duration.

The F and TAB register is merged using the job spell serial number, the result after the merging is a bit messy and further measures to simplify the sample were implemented:

- If an individual is registered starting a job spell less than 60 days after ending a job within the same enterprise, the records are merged to one job spell.
- Every job spell with duration less than 360 days is removed.
- Every job spell with less than an average of 16 work hours (2 days) per week is removed.
- Last but not least, the sample is restructured to get only one observation per job spell per year.

Figure 21: Graphical illustration of the sample simplification

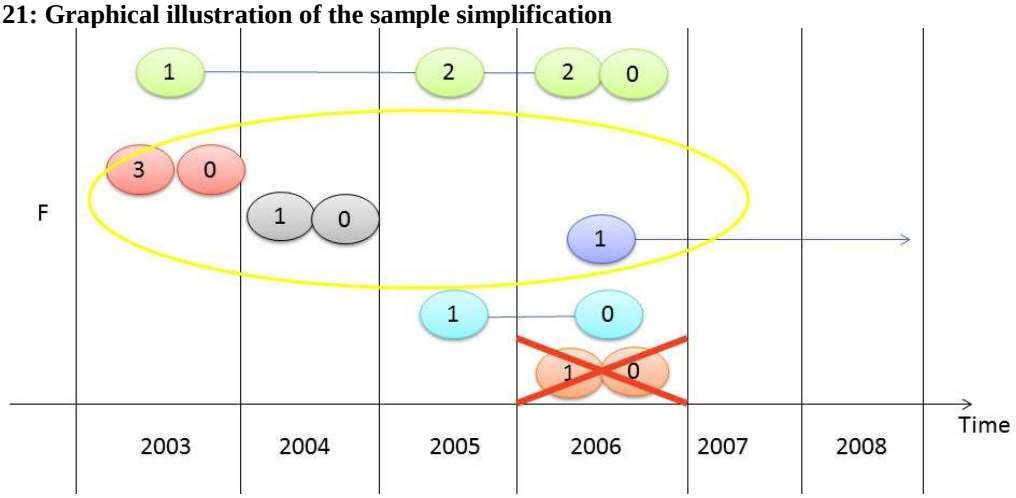
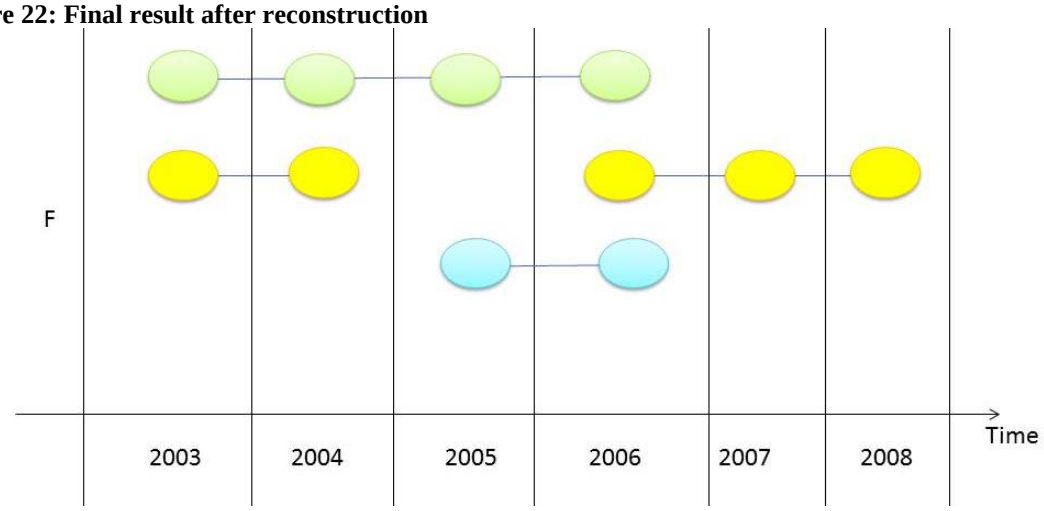


Figure 22: Final result after reconstruction



Appendix B

B. Activity status in the workforce by education and age

Overviews of activity status depending on highest completed education for the individuals in the sample are presented in the three figures below. A glance at the figures show that the share leaving early for disability benefit is decrease with more years of schooling, which support the theory that education level is correlated with the probability of leaving early. In 2013 there was 710 645 people between 55-66 years living in Norway (Statistisk Sentralbyrå, 2014b), of these 480 708 (67,7 per cent) people were registered employed (Statistisk Sentralbyrå, 2014c), which means that over 200 000 is already out of the workforce before the standard (voluntary) retirement age at 67.

Figure 23: Activity status for individuals with Mandatory primary school as highest achieved education, by gender. Per cent

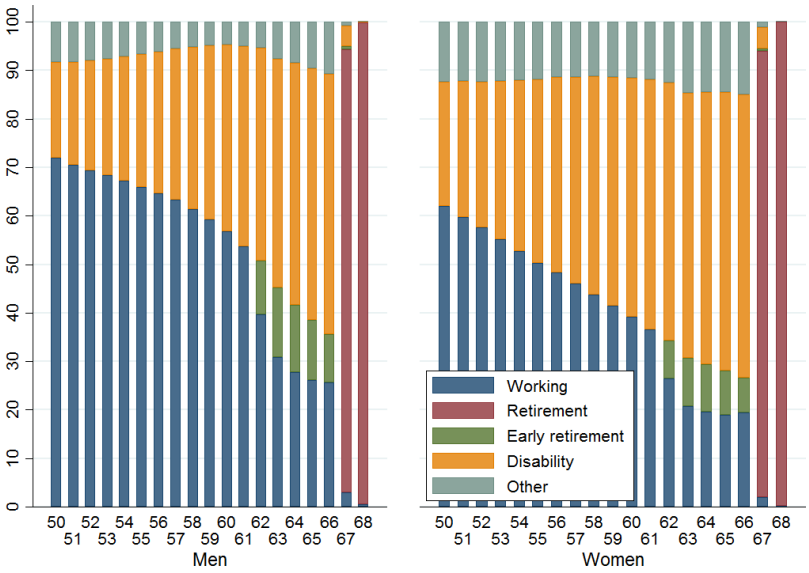


Figure 24: Activity status for individuals with Upper secondary school as highest achieved education, by gender. Per cent

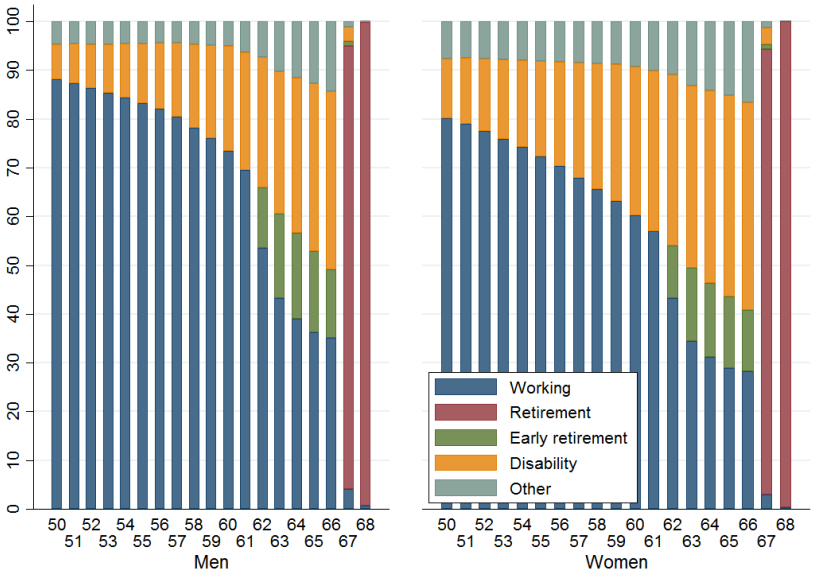
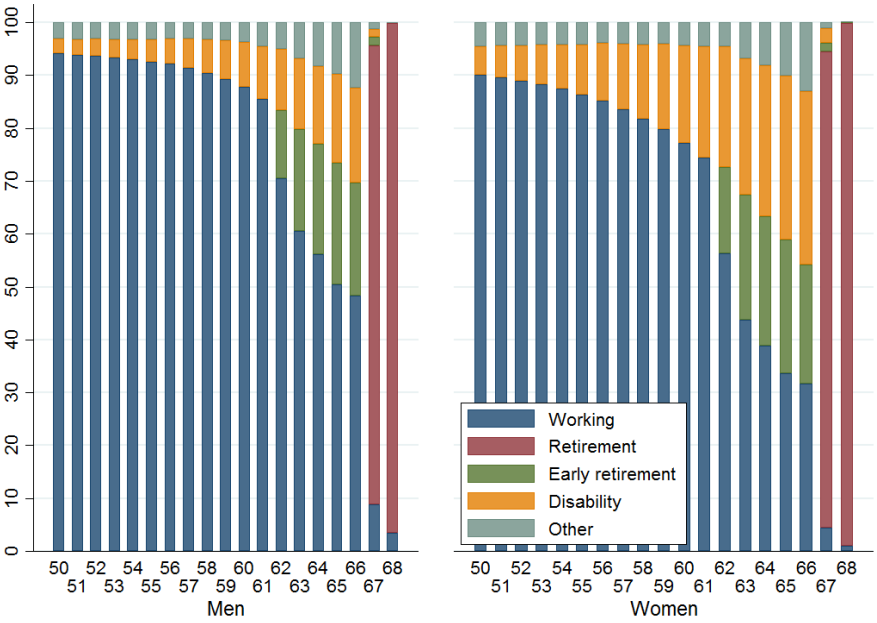


Figure 25: Activity status for individuals higher education, by gender. Per cent



Appendix C

C. Sector overview

Identification number	Original sector classification (Statistics Norway)	Classification used in this thesis
110	Government	Government
150	Central bank	
190	Governmental loan institutions	
210	Bank	Private financial institutions
250	Bank	
310	Credit company	
370	Investment firms	
380	Equity firms	
390	Other financial institutions	
391		
410	Life insurance	
470	General insurance	
490	Financial auxiliaries	
510	County	County
550	Municipality	Municipality
610	Public administration companies	
630	Governmental enterprises	Government
635		
660	Municipality enterprises	Municipality
680		
710	Private enterprises	Private
740	Private No profit production organizations	
760	Personal enterprises	
770	Private No profit consumption organizations	
790	Self-employed	
810	earners in retirement, on benefits or students	
890	Other	
900	Foreign sector	

Appendix D

D. Correlation tables

Table 10: Correlation table, nonemployment

Nonemployment	Education	Married	Nr.years income>B.a.	High income	Age	County
Education	1.0000					
Married	0.0386	1.0000				
Nr.years income>B.a.	-0.0556	0.0396	1.0000			
High income	**0.3145**	0.0620	0.1359	1.0000		
Age	-0.0067	0.0720	0.4475	-0.0443	1.0000	
County	-0.0436	0.0277	-0.0364	-0.0900	-0.0256	1.0000

Table 11: Correlation table, job change

Job change	Education	Married	Nr.years income>B.a.	High income	Age	County
Education	1.0000					
Married	0.0401	1.0000				
Nr.years income>B.a.	-0.0519	0.0323	1.0000			
High income	**0.3060**	0.0638	0.1351	1.0000		
Age	-0.0090	0.0664	0.3965	-0.0279	1.0000	
County	-0.0518	0.0259	-0.0305	-0.0942	-0.0250	1.0000

Appendix E

E. Regression tables and figures

I. Nonemployment

Table 12: County coefficients, extension to Table 6

	Low education				High education			
VARIABLES	**Men**	***se***	**Women**	***se***	**Men**	***se***	**Women**	***se***
Ostfold	0.0302***	*(0.0038)*	0.0061	*(0.0047)*	0.0179***	*(0.0052)*	0.0140**	*(0.0061)*
Akershus	-0.0084**	*(0.0035)*	-0.0117***	*(0.0042)*	0.0042	*(0.0040)*	0.0192***	*(0.0047)*
Hedemark	0.0069	*(0.0043)*	-0.0051	*(0.0051)*	0.0077	*(0.0059)*	0.0141**	*(0.0066)*
Oppland	0.0060	*(0.0044)*	-0.0227***	*(0.0052)*	0.0144**	*(0.0057)*	0.0074	*(0.0066)*
Buskerud	-0.0071*	*(0.0040)*	-0.0292***	*(0.0048)*	0.0049	*(0.0052)*	0.0088	*(0.0061)*
Vestfold	-0.0134***	*(0.0044)*	-0.0244***	*(0.0053)*	-0.0002	*(0.0054)*	0.0039	*(0.0063)*
Telemark	0.0246***	*(0.0044)*	-0.0092*	*(0.0055)*	0.0229***	*(0.0058)*	0.0161**	*(0.0066)*
Ost-Agder	-0.0181***	*(0.0061)*	-0.0525***	*(0.0075)*	0.0075	*(0.0070)*	-0.0018	*(0.0083)*
Vest-Agder	0.0019	*(0.0048)*	-0.0272***	*(0.0060)*	0.0099*	*(0.0057)*	0.0053	*(0.0068)*
Rogaland	0.0089***	*(0.0034)*	-0.0112***	*(0.0042)*	0.0197***	*(0.0043)*	0.0125**	*(0.0052)*
Hordaland	-0.0178***	*(0.0033)*	-0.0305***	*(0.0040)*	0.0028	*(0.0040)*	-0.0079	*(0.0050)*
Sogn og Fjordane	-0.0051	*(0.0053)*	-0.0276***	*(0.0062)*	0.0052	*(0.0070)*	-0.0024	*(0.0084)*
More of Romsdal	-0.0182***	*(0.0039)*	-0.0361***	*(0.0047)*	0.0042	*(0.0049)*	-0.0150**	*(0.0061)*
Sor-Trondelag	0.0009	*(0.0038)*	0.0145***	*(0.0045)*	0.0102**	*(0.0044)*	0.0243***	*(0.0055)*
Nord-Trondelag	-0.0072	*(0.0050)*	-0.0090	*(0.0059)*	0.0024	*(0.0066)*	0.0028	*(0.0072)*
Nordland	0.0152***	*(0.0040)*	0.0231***	*(0.0047)*	0.0257***	*(0.0052)*	0.0371***	*(0.0062)*
Troms	0.0073	*(0.0049)*	0.0256***	*(0.0056)*	0.0150**	*(0.0061)*	0.0386***	*(0.0071)*
Finnmark	0.0040	*(0.0071)*	0.0205**	*(0.0081)*	0.0262***	*(0.0100)*	0.0356***	*(0.0104)*

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

II. Job change

Table 13: Estimated probability of job change by gender and education, marginal effects

	Low education				High education			
VARIABLES	**Men**	***se***	**Women**	***se***	**Men**	***se***	**Women**	***se***
Married	-0.0052***	*(0.0014)*	-0.0238***	*(0.0013)*	-0.0071***	*(0.0021)*	-0.0264***	*(0.0019)*
Nr.years income>B.a.	-0.0045***	*(0.0002)*	-0.0010***	*(0.0001)*	0.0006*	*(0.0003)*	-0.0025***	*(0.0002)*
High income	-0.0160***	*(0.0016)*	-0.0095***	*(0.0031)*	-0.0047**	*(0.0020)*	0.0005	*(0.0025)*
Government	-0.0111***	*(0.0026)*	-0.0386***	*(0.0019)*	-0.0372***	*(0.0025)*	-0.0470***	*(0.0023)*
Private finance	-0.0952***	*(0.0056)*	-0.0795***	*(0.0039)*	-0.0590***	*(0.0058)*	-0.0434***	*(0.0081)*
County	-0.1244***	*(0.0110)*	-0.1352***	*(0.0068)*	-0.1958***	*(0.0060)*	-0.1131***	*(0.0049)*
Municipality	-0.0656***	*(0.0024)*	-0.1321***	*(0.0019)*	-0.0940***	*(0.0030)*	-0.0983***	*(0.0024)*
Governmental enterprises	-0.0306***	*(0.0029)*	-0.0380***	*(0.0034)*	-0.0030	*(0.0037)*	-0.0132**	*(0.0062)*
Ostfold	-0.0413***	*(0.0036)*	-0.0469***	*(0.0033)*	-0.0263***	*(0.0056)*	-0.0244***	*(0.0053)*
Akershus	0.0098***	*(0.0027)*	0.0021	*(0.0024)*	0.0089***	*(0.0032)*	0.0119***	*(0.0032)*
Hedemark	-0.0360***	*(0.0039)*	-0.0591***	*(0.0038)*	-0.0145**	*(0.0059)*	-0.0091*	*(0.0054)*
Oppland	-0.0305***	*(0.0040)*	-0.0431***	*(0.0037)*	-0.0107*	*(0.0059)*	-0.0023	*(0.0053)*
Buskerud	-0.0229***	*(0.0035)*	-0.0105***	*(0.0029)*	-0.0132***	*(0.0049)*	0.0048	*(0.0045)*
Vestfold	-0.0133***	*(0.0036)*	-0.0406***	*(0.0035)*	-0.0233***	*(0.0053)*	-0.0184***	*(0.0050)*
Telemark	-0.0080**	*(0.0039)*	-0.0451***	*(0.0039)*	-0.0078	*(0.0055)*	-0.0202***	*(0.0057)*
Ost-Agder	-0.0050	*(0.0049)*	-0.0407***	*(0.0051)*	-0.0127*	*(0.0073)*	-0.0397***	*(0.0079)*
Vest-Agder	-0.0199***	*(0.0042)*	-0.0432***	*(0.0043)*	-0.0292***	*(0.0060)*	-0.0390***	*(0.0064)*
Rogaland	-0.0020	*(0.0028)*	-0.0278***	*(0.0027)*	-0.0139***	*(0.0038)*	-0.0128***	*(0.0039)*
Hordaland	-0.0142***	*(0.0027)*	-0.0316***	*(0.0025)*	-0.0114***	*(0.0035)*	-0.0265***	*(0.0037)*
Sogn og Fjordane	-0.0393***	*(0.0050)*	-0.0458***	*(0.0048)*	-0.0415***	*(0.0082)*	-0.0224***	*(0.0077)*
More of Romsdal	-0.0071**	*(0.0031)*	-0.0458***	*(0.0032)*	-0.0307***	*(0.0051)*	-0.0239***	*(0.0051)*
Sor-Trondelag	-0.0340***	*(0.0034)*	-0.0389***	*(0.0031)*	-0.0396***	*(0.0044)*	-0.0406***	*(0.0046)*
Nord-Trondelag	-0.0556***	*(0.0048)*	-0.0707***	*(0.0050)*	-0.0417***	*(0.0076)*	-0.0543***	*(0.0077)*
Nordland	-0.0094***	*(0.0033)*	-0.0344***	*(0.0034)*	-0.0094*	*(0.0050)*	0.0069	*(0.0046)*
Troms	0.0068*	*(0.0038)*	-0.0182***	*(0.0038)*	-0.0006	*(0.0056)*	0.0161***	*(0.0049)*
Finnmark	-0.0060	*(0.0054)*	-0.0237***	*(0.0057)*	-0.0075	*(0.0090)*	0.0283***	*(0.0067)*
50	-0.0466***	*(0.0028)*	-0.0283***	*(0.0026)*	-0.0372***	*(0.0039)*	-0.0313***	*(0.0034)*
52	0.0198***	*(0.0030)*	0.0167***	*(0.0028)*	0.0116***	*(0.0041)*	0.0144***	*(0.0036)*
53	0.0361***	*(0.0030)*	0.0204***	*(0.0028)*	0.0226***	*(0.0042)*	0.0238***	*(0.0037)*
54	0.0422***	*(0.0031)*	0.0216***	*(0.0029)*	0.0188***	*(0.0044)*	0.0226***	*(0.0039)*
55	0.0365***	*(0.0032)*	0.0206***	*(0.0029)*	0.0166***	*(0.0044)*	0.0185***	*(0.0041)*
56	0.0311***	*(0.0033)*	0.0110***	*(0.0030)*	0.0074	*(0.0047)*	0.0087**	*(0.0043)*
57	0.0343***	*(0.0034)*	0.0009	*(0.0031)*	-0.0043	*(0.0048)*	0.0043	*(0.0046)*
58	0.0201***	*(0.0035)*	-0.0036	*(0.0032)*	-0.0112**	*(0.0050)*	-0.0048	*(0.0048)*
59	0.0050	*(0.0037)*	-0.0150***	*(0.0033)*	-0.0302***	*(0.0053)*	-0.0161***	*(0.0052)*
60	-0.0053	*(0.0038)*	-0.0321***	*(0.0035)*	-0.0423***	*(0.0056)*	-0.0305***	*(0.0056)*
61	-0.0621***	*(0.0041)*	-0.0709***	*(0.0038)*	-0.0881***	*(0.0061)*	-0.0706***	*(0.0065)*
62	-0.0489***	*(0.0047)*	-0.0680***	*(0.0045)*	-0.0725***	*(0.0066)*	-0.0564***	*(0.0073)*
63	-0.0653***	*(0.0056)*	-0.0802***	*(0.0054)*	-0.1105***	*(0.0081)*	-0.0709***	*(0.0092)*
64	-0.0881***	*(0.0065)*	-0.0981***	*(0.0063)*	-0.1089***	*(0.0086)*	-0.0718***	*(0.0102)*
65	-0.0912***	*(0.0072)*	-0.1063***	*(0.0072)*	-0.1155***	*(0.0097)*	-0.0763***	*(0.0117)*
66	-0.1783***	*(0.0092)*	-0.1589***	*(0.0087)*	-0.1847***	*(0.0117)*	-0.1318***	*(0.0157)*
67	-0.1255***	*(0.0224)*	-0.0966***	*(0.0213)*	-0.1298***	*(0.0220)*	-0.1188***	*(0.0402)*
68	-0.3367***	*(0.0991)*	-0.2150**	*(0.1034)*	-0.1899***	*(0.0422)*	-0.1559	*(0.0972)*
R2	0,0223		0,0408		0,0606		0,0533	
Observations	319,842		258,668		144,934		116,983	