Yearn for churn: Recent trends in Norwegian labour market dynamics

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Department of Economics
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Abstract

By using a linear probability model on data from the Norwegian Register for Employers and Employees on the period 2003-2012 I examine trends in job-to-job mobility and what changes in the Norwegian labour market are influencing the job-to-job rate. Due to difficulties in re-coding of organisational changes within the public sector, I construct flows from the second to the third quarter for each year in the sample. From 2003 to 2012 the job-to-job rate has increased by 1.9%. I find a positive, statistically significant trend of about 0.127% not explained by my other covariates over the selected time period, after using a variety of controls and explanatory variables. Job mobility is highly pro-cyclical, falls with age, is higher for women than men and has no correlation with the share of immigrants among the employed. For industries I find the highest rates within education and health, and in administrative and support services, while construction and retail have the lowest mobility rates. Three of my findings run counter to the results from the US: Job-to-job mobility in Norway has been steadily upward sloping, while in the US it has been falling over time. Job-to-job mobility increases with educational attainment in Norway, while it falls in the US. Norwegian workers at small establishments also have relatively low job-to-job rates compared to larger establishments, while US data indicate a falling trend in job-mobility with firm size. Mind that the definitions of firm and establishment differ.

Keywords: Job-to-Job flows, labour market, linear probability model.

Preface

This thesis completes my Master of Economic Theory and Econometrics degree at the University of Oslo. Criticising the research is one thing, doing and presenting your own is something else entirely. The main challenge for me has been to put stable, directed effort into the work of writing the thesis. I had my doubts to whether I would complete my thesis on time, and I am glad i have. I am indebted to my supervisor Erling Barth for his guidance, patience and help. This thesis could not have been completed without him. I would also like
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I would probably not have met Thomas McKay, who helped me with proof reading. I would
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1 Introduction

Job-to-job transitions are often numerous, yet rather overlooked in both academic and political discussions about the labour market. The allocation, and reallocation of labour, is important for growth and development, shifting workers to more productive jobs better fitting their skill sets. Evidence suggests that dynamism in the labour market affects economic performance (Davis and Haltiwanger, 2014), and may affect the ability of the Norwegian economy to sustainably and successfully become less dependent on oil exports after the fall of oil prices since 2014. This thesis will examine the recent changes in job-to-job flows in the Norwegian labour market, especially in light of the changing demographic composition of the labour force and increasing educational levels. Rather than using a natural experiment or a complex econometric model, the goal of this thesis is simply to shed light on what is actually going on.

Job hopping, being defined as voluntary job switches at least every other year, is in public discourse written about as a new phenomenon introduced to the labour market by young people born between 1980 and 2000 (millennials). See Berger (2016) or Zimmerman (2016) for examples of current newspaper/blog articles on the subject. There are those who believe we are inevitably headed towards a more flexible labour market. For example, Robin Chase, co-founder of the company ZIPCAR has the following quote in her book Peers Inc. The quote was highlighted in the Guardian Adams (2015), and was introduced to the Norwegian political debate by Enterprise Federation of Norway (Virke).

“My father had one job in his lifetime, I will have six jobs in my lifetime and my children will have six jobs at the same time” (Chase, 2015).

There is not much trace of a more flexible, on-demand economy in US labour flow data. Firstly, labour markets were not less fluid in the past comparable to the present. Topel and Ward (1992) find in US panel data for the period 1957 to 1972 that the average (male) worker has seven jobs during the first ten years of their career. Secondly, the share of the workforce with two or more jobs in the past year has fallen to its lowest level since 1973, and from 15% in 2000 to 10% in 2013 (Hyatt, 2015).

Thirdly, job-to-job flows have also decreased, not increased. Job-to-job flows in the United States have been fallen with about a third from 1998 to 2012 (Hyatt and Spletzer, 2013), displayed in figure 2. Job-to-job flows are usually pro-cyclical, but have not recovered since the Great recession Hyatt and Spletzer (2013). The decrease can be partially explained by an ageing population, higher educational attainment and a change in firm composition, with fewer start-ups and larger firms. Davis and Haltiwanger (2014) conclude that it is unlikely the US will return to high employment rates if labour market flows do not increase.

How does the Norwegian labour market fare in comparison? A direct comparison of levels is hard, as differing samples, definitions and measurements heavily influence the results
Figure 1: Share of workforce with two or more jobs in the US, from Hyatt (2015, figure 2)
Figure 3: Job-to-Job Flows
1995:Q4 – 2012:Q3, LEHD and CPS Quarterly Data

Notes: LEHD data are from Hyatt and McEntarfer (2012). CPS national monthly data were downloaded from the Federal Reserve website and converted to a quarterly frequency. All data are seasonally adjusted.

Figure 2: Quarterly Job-to-job rates for the United states, from Hyatt and Spletzer (2013, figure 3)
(Dale-Olsen, 2016b). However, we can compare trends across time with stable methods of estimation. Norway’s population is also aging as well as attaining more education. However, the economic environments have differed considerably. The resource boom and increasing prices for petroleum from 2003 to 2014 (with the exception during the great recession in 2009) has kept growth high and unemployment low in Norway, with a mild negative shock during the Great Recession. The Great Recession of 2007-2009 originated in the United States, and was much more severe there than in Norway, distorting credit markets (Foster et al., 2014) followed by a weak recovery. Moreover, the job-to-job rates in the United States had not recovered to the levels seen before the recession in 2001, see figure 2.

Churn in labour markets is the amount of hiring and separations a firm or establishment has in excess of those needed to adjust their levels of employment. Churn is a similar measure to job-to-job flows, but the former is measured with employers as the measured unit while the latter measures at the individual level. Dale-Olsen (2016a) finds that churn follows the business cycle in Norway. When corrected for the business cycle, his findings indicate an increase in mobility in the 1990s, but a statistical insignificant decline in the 2000s.

In this thesis I use a linear probability model on data from the Norwegian Register for Employers and Employees on the period 2003-2012 I also examine trends in job-to-job mobility and which changes in the labour market are influencing the job-to-job rate. Due to data limitations, I construct flows from the second to the third quarter for each year rather than annual or continuously running quarterly rates. Comparing job-to-job flows in the United States and Norway can be fruitful as the two countries have substantially different labour market institutions and labour laws. With my data set, I can compare the factors affecting job-to-job flows in both countries, which may shed some light on the effect of different labour market institutions. This can be particularly interesting if Norway has had similar downward trends as the US.

In part 2 i give an overview of the literature, trends on Norway and the US and possible explanations for the decline in US job-to-job mobility. In Part 3 I describe the data I will be using. Part 4 describes my empirical strategy. In part 5 i show my results and I conclude in part 6.

2 Literature

The labour market is a market where sellers are much more numerous than buyers. Throughout our lives, most of us enter, re-enter and eventually exit the labour force. Its size and importance for macroeconomic performance and income inequality make the labour market special. Differing labour market institutions across countries play a key role of the literature on the variants of capitalism in explaining different outcomes in employment, productivity and inequality Esping-Andersen (2013). The concept of unemployment, people without work actively seeking paid work, and changes in the unemployment rate has been studied
rigorously and is perhaps the economic variable with the highest interest among the public (Fisher, 1973).

Jobs, like labour, are not homogeneous. The continuous reallocation of workers to jobs and establishments with higher productivity is an important driver of economic growth as new, more productive jobs are created and filled while less productive jobs are left and destroyed. Foster et al. (2001) explain for more on the link between reallocation of labour input and productivity. Davis and Haltiwanger (2014) find a positive effect of worker reallocation on employment rates, especially for the young and those with little education. Others, however, find no such relationship (Dale-Olsen, 2016b; OECD, 2010). Moreover, job switching is important for wage growth at the individual level, and has been for a considerable amount of time. Topel and Ward (1992) find that job changes account for a third of wage early-career growth.

Worker flows between establishments are often related to, but still a different concept than job flows. Workers moving to relatively more productive jobs is a virtuous process for economic development. However, one could in theory have workers moving between the exactly same jobs where only matching throughout workers careers matters and job creation and destruction is zero. The latter case is purely theoretical endpoint. Every economy has some degree of job reallocation, and OECD (2010) finds a high correlation between job and worker flows at the national level.

The amount of job-to-job transitions are directly related to hiring and separations. Per definition a job-to-job move is a separation followed by a hiring before the employment status is measured again. With longer intervals, the person being measured can be unemployed or out of the labour force for longer between the two jobs while still being considered as if the transition from one employer to another went instantly. On the other hand, jobs lasting shorter than the measurement intervals, e.g single quarter jobs in annually measured data will be invisible. As hiring and separations vary over the business cycle, so does job-to-job mobility as well. In a recession, hiring fall first, by employers expanding less and not replacing staff that voluntarily leave. As there are less job openings, the already employed stay on in their old jobs, thereby not vacating these jobs, meaning there is no need to replace them, exacerbating the reduction in job openings and job-to-job flows (Lazear and Spletzer, 2012). During a boom, this self-reinforcing process works the opposite way, with more hiring leading to more separations needing replacement.

Labour market institutions and governments interventions in the labour market directly affect labour market outcomes. This applies to job-to-job transitions, yet the results are often ambiguous (OECD, 2010). A common problem is that similar kinds of institutions are not necessarily designed in the same way, and may interact with other institutions or market fundamentals leading to different outcomes. Davis and Haltiwanger (2014) write the following on the effects of changes in US policy, e.g. firing restrictions:

* As yet, however, we know little about how much these policy factors con-
tributed to secular declines in fluidity.”

Dale-Olsen (2016b) provides a recent overview of the literature on institutions and labour market mobility, both for jobs and workers. An earlier, partially overlapping overview can be found in OECD (2010).

Employment protection legislation has a direct effect on worker flows and an indirect effect on job flows, as job destruction can be slowed down by making it more difficult to downsize. There is more evidence of employment protection legislation affecting on job mobility negatively (Davis and Haltiwanger, 2014). The direct effect on worker flows, is ambiguous, yet Bassanini and Garnero (2013) find a negative effect on intra-industry job-to-job transitions of stricter employment protection legislation. The most important aspect they find is the frequency of reinstatement by the courts. Differing legislation between different kinds of workers, as between workers on open ended contracts or fixed term contracts can have distortionary effects, as where tighter rules for open ended contract workers can lead to employers substituting permanent hires with fixed term hires (Centeno and Novo, 2012).

Prices affect quantities, and although this thesis does not examine wages and job-to-job mobility due to data limitations, there is some literature on the effects of institutional restrictions on wage setting on labour market mobility. Evidence on that the effect of minimum wages on job-to-job rates vary between negative (Dube et al., 2013; Portugal and Cardoso, 2006), yet not necessarily negative effects on employment, and no significant effects (OECD, 2010). The effects of collective wage bargaining agreements depends on the instrument, whether it is the presence of unions, the decentralisation of wage negotiations within collective bargaining structures or comparisons between countries with different unionisation rates. García Serrano and Malo (2002) find that union presence lowers the quit rate, and therefore job mobility through the “voice” effect unions have on conditions, while Dahl et al. (2013) and Falch (2011) find for respectively Danish and Norwegian contexts that decentralising collective wage bargaining increases wage disparities and thus reducing voluntary separations. On the other hand, Barth et al. (2014) note that Sweden has a higher share of workers in one-year old firms than the US and (the rest of) the EU for the period 1990-2004. Sweden has a high unionisation rate, and a high degree of workers in young firms, suggests a high rate of creative destruction and thereby worker mobility as well.

There are upsides with less job-to-job mobility (Hyatt, 2015) as well. Hiring processes are costly both for employers and employees, and may reduce the incentive for investment in firm specific human capital, which may reduce productivity (García Serrano and Malo, 2002). A higher initial matching quality of workers, wages thus reducing the need for job changes could also drive down job-to-job mobility, but there is little evidence of this showing up in recent US wage data (Hyatt and Spletzer, 2016).
2.1 Recent trends and overview

There is a large amount of variation in how data collection and “construction” of labour market flows are performed. This matters considerably for comparison across studies and countries. In the following section, one has to compare levels of labour market mobility between countries with a large degree of caution. Some have for this reason refrained from doing cross-country comparisons since 1999 (Dale-Olsen and Roenningen, 2001). There are several differences in method that can affect the mobility result, as reviewed by Dale-Olsen (2016b). Mobility is not equally distributed across the population, meaning which parts of the population you include and exclude will affect the results. Not only will survey and register data yield different results, but different kinds of register data might not pick up the same people in the same way. For example, in this thesis I use data from the Norwegian Register for Employers and Employees, but with a cut-off of for firm with less than five employees. This means I miss out not only on several small firms, but also young firms, as most entrant firms start out small.

Decker et al. (2014) demonstrate how job creation, which affects worker mobility, varies with firm size and age. Moreover, where one sets the boundaries between employer units also matter. Intra-firm job changes within the same firm will often not be picked up in administrative data. For example, measuring “employer” at the establishment level, rather than the firm level changes job reallocation rates in Davis and Haltiwanger (2014) by up to ten percent. It also matters what measurement one is constructing. Although OECD (2010) find a high correlation between job and worker mobility (in cross country data), does not mean there is unity between the two measures. Asymmetric macroeconomic conditions and shocks will also need to be corrected for when comparing job-to-job rates across countries. Furthermore, whether worker mobility is measured at establishments, like in Dale-Olsen (2016a), or at the individual level as done in this thesis. With these words of caution, we advance to a selection of labour market mobility measures for Norway and the United States in table 2.

2.2 Why is the dynamism of the US labour market fading?

Is the American economy back to full employment after the Great Recession? Although unemployment rates are below 5%, the employment rate is still below what is was before the financial crisis in 2007. Monetary policy is still very expansive, with very low interest rates and a large quantitative easing program to boost investment further. Within macroeconomics there is an ongoing discussion of whether the weak recovery of the US is “the new normal” (Summers, 2014). More importantly for this thesis, labour market dynamics seem to be recovering.

The newest LEHD seasonally adjusted data on job-to-job rates for the first quarter of 2015 is 5.2%, the second highest (highest being the quarter before) since the forth quarter
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<td>Labour force surveys</td>
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<td>Register for Employers &amp; Employees</td>
<td>all</td>
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<td>Hyatt and Spletzer (2013)</td>
<td>Job-to-job flow</td>
<td>LEHD, administrative, state wide employer unit</td>
<td>30 states, all</td>
<td>65 % of national employment</td>
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<td>Hyatt and Spletzer (2013)</td>
<td>Job-to-job flow</td>
<td>CPS, survey</td>
<td>Sample, all</td>
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<td>Bassanini and Garnero (2013)</td>
<td>2000-2004</td>
<td>Norway</td>
<td>12.34 %</td>
<td>Annual average</td>
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<td>Dale-Olsen (2016a)</td>
<td>1990-2012</td>
<td>Norway</td>
<td>1993: 10%, 2007: 16 %</td>
<td>Max-min points, annual</td>
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Table 2: A selection of labour market mobility measures
of 2007 (USCB, 2016). The job-to-job rates measured before the financial crisis were, still, however, considerably below what they were measured to be at the turn of the millennium, 6.8% in the 3rd quarter of 2000, and 7.9% in the 2nd quarter of 1998 (Hyatt and Spletzer, 2013). Although Lazear and Spletzer (2012) find a $-0.96$ correlation between churn and the unemployment rate during the recession, there seems to be a more driving down the job-to-job rate than simply the business cycle. Evidence suggests that the financial crisis can have distorted the US financial markets, leading to the cleansing effect of destroying the least productive jobs first may have been hampered, thus harming efficiency (Foster et al., 2014).

As people age, so does their labour market behaviour. Demographic change changes the composition of the labour force and thus how it reacts and behaves. When we compare labour market flow over time, we are effectively comparing different labour markets. The American population, like most Western populations, is aging. As shown in Topel and Ward (1992), most job switches happen early in people’s careers. An older population will on average have come further in in their respective careers, and therefore drive job-to-job flows downward. Hyatt and Spletzer (2013) find that worker age explains 21% of the decline in job-to-job flows in the LEHD data, and 9% in the CPS data. When analysing the increases in tenure, Hyatt and Spletzer (2016) explain 50% of the increase in modified CPS data and 30.8% in the modified LEHD data.

Our economies are becoming more complex and sophisticated. Workers acquire more skills and education on average than before. Labour at different education- and skill levels face different demand from employers. Evidence suggests more education makes signaling in the labour market easier (Arcidiacono et al., 2010). Hyatt and Spletzer (2013) find increased educational attainment explaining 2.9% of the decrease in job-to-job flows in the CPS data, but a small, negative effect ($-0.2\%$), i.e. positive effect on mobility in the LEHD data. If the new human capital is relatively more firm-specific, meaning the return from it is lower in other firms than the one the person is currently employed at, the outside wage option should fall, decreasing job-to-job mobility. Cairo (2013) uses a search model with on-the-job training costs and training requirements and is able to explain 28.4% of the decline in job reallocation from 1993 to 2011 in BED data. In a similar modeling approach on micro data from the CPS, Cajner and Cairo (2013) find that changes in age and educational attainment explain 75% – 90% of the decline in unemployment inflows from 1976 to 2011.

An economy with a high share of young firms, must over time also be an economy where firms relatively frequently are shut down, as young firms often fail (Decker et al., 2014). A high frequency of entry and exit among the share of employers will normally mean a high rate of job creation and destruction, leading to higher worker mobility and worker flows. This in turn should lead to more job-to-job transitions. In the US, the opposite has happened over time. Davis and Haltiwanger (2014) find a declining trend in the share of employed at young firms, and Hyatt and Spletzer (2013) explain 7.6% of the decline in job-to-job rates in LEHD due for changes in firm age. However, age is not everything. Decker et al. (2014)
show while start-up create a lot of jobs initially, many of them exit or stabilise. There is a small number of entrants, or trans-formative entrepreneurs whose firms grow rapidly after entry. These firms are important for net job creation at the macroeconomic scale. There has, like other start-ups, become less of them over time, across all sectors in the economy after 2000 Decker et al. (2016). Davis and Haltiwanger (2016) are currently exploring on whether financial conditions have worsened particularly for start-ups, an if tighter financial constraints play a role in this decline.

3 Data

To examine labour market transitions, I use data drawn from the Norwegian Register for Employers and Employees (AA-registeret). In this data employers have responsibility for reporting in their employees. However, the register does not cover everyone working. The self-employed, employees outside usual form of employment, e.g. board members, and people working less than four hours a week or hiring that last less than a week are excluded. Moreover, I have excluded employees in businesses with less than 5 employees.

I have a repeated cross section data set where a sample is drawn May 15th each year from 2003 to 2012. These micro data are drawn at the individual level. I also draw indicators on whether they are employed August 15th and May 15th the next year, and if they are still employed at the same employer at both these times. I do not have data on hiring. Individuals only show up in my data if they are employed May 15th. From the same micro data I choose the following covariates to use as right hand side variables for decomposing the trends and drivers of Norwegian job-to-job flows.

The indicator variables are the following:

- **Age** - Topel and Ward (1992) find job-to-job mobility to decrease with age. It may take time to find a good match in the labour market. With incomplete information for both employers and employees, a process of trial and error is often necessary. Demographic change may therefore drive trends in job-to-job flows.

- **Sex** - the Norwegian labour market is relatively segregated, and there is a large literature on the different labour supply elasticity of the two sexes (Barth and Dale-Olsen, 2009). There are also possible differences in search behaviour due to household division of labour.

- **Education** - Workers with different skill sets face different demand, and will have a different variety of vacant jobs to realistically apply for. Educational attainment is measured by the highest completed education of the individual. The human capital

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1The data analysis is undertaken at the Institute for social research (ISF) as part of NFR sponsored project #236786. The programs are developed by me and tried out on a placebo data set, and then subsequently executed by my supervisor at ISF on the original data.
attained from education may be more or less firm specific, leading to different mobility rates for different kinds of education.

- **Industry** - Dale-Olsen (2016a) shows that churn rates differ by industry. Job-to-job rates are therefore likely to do so as well. Both employers and employees can initiate job-to-job moves. The need for downsizing and closure due to industry specific shock may lead to employees finding employment elsewhere or losing employment altogether.

- **Size of establishment** - Larger establishments may have internal labour markets, masking job changes in our data. Small businesses may have other characteristics as well.

- **Municipality of establishment** - The Norwegian welfare state promotes decentralisation and seldom forces people to move closer to employment. This means the Norwegian labour market may act as several closely connected markets rather than one smooth homogeneous one, and the coefficients for the variables above may differ across these. Less populated municipalities will have thinner labour markets with a smaller number of potential employers nearby. Municipality data is used as controls, and will not be studied in the same way as the others.

I add two running variables to pick up two macroeconomic trends which may affect the labour market, and thus job-to-job rates: The unemployment rate and the immigrant share of the employed. The job-to-job rate is usually measured to be pro-cyclical. Dale-Olsen (2016a) uses a metric for cyclicality also including vacant positions data from the Norwegian labour and Welfare Administration. I have chosen not to use these, as they are redefined in 2004, and gradually lose their share of publically posted vacant positions, to such an extent that Statistics Norway began their own survey for vacant positions in 2010 (Horgen and Wold, 2012). I will therefore use the unemployment rate as a proxy for the business cycle. In 2004 ten Central/Eastern European countries gained access to the European single market, which has led to increased labour migration to the rest of the European Economic area, including Norway. Norway’s migrant share has steadily increased the last decade, and there has been much discussion on how this affects the Norwegian labour market.

My data for the unemployment rate comes from the Norwegian labour force survey (Arbeidskraftundersøkelsen - AKU) and has been downloaded from Statistics Norway’s Statbank. From the same agency I have the immigration share, but these data come from administrative data. Mind that these data are aggregates and not linked to the individuals in the register for employers and employees, although the source of the data is the same. There is also a breach in the series on immigrants in 2008, although aggregate numbers are almost the same (a difference of 6 at the population level), the amounts for each nationality is far from smooth. The immigrant measure only includes registered residents, at least for the latter period, and as it is not connected to the micro data, may be inaccurate.
Data downloaded from Statistic Norway’s statbank. Unemployment rates from LFS, collected from Table 05111. Immigration share derived from register based data by subtracting Norwegian part of employed from total. Using data from Table 06480 for 2001Q4-2007Q4, and Table 08435Q4 for 2008Q4-2012Q4, the latter only among registered as resident. See http://www.ssb.no/en/arbeid-og-lonn

Figure 3: Macroeconomic environment
There are other variables that would be of interest to the analysis which I do not have access to. One of them is individual wage data, without it I am examining quanities of labour supply without being able to observe prices. Hyatt and Spletzer (2016) and Molloy et al. (2014) use wage data to analyse the declining mobility trends in the US. Moreover, wage growth and job changes in an economy with a lot of centralised wage bargaining like the Norwegian one is worth at least a thesis on its own. On the same note, coverage of union tariff agreements is also of interest, as studied by García Serrano and Malo (2002). Finally I am not able to identify whether employees are on open ended or fixed term contracts. Centeno and Novo (2012) study labour mobility from such a perspective and OECD (2015) find that increased frequency of non-standard work is a major driver of inequality in developed economies.

4 Empirical Approach

For each yearly sample of cross section data, I heavily rely on dummy variables to identify what happens to the sampled employees in the future. Each sampled individual has a value in the variable “year” to indicate from which year they are drawn. I use dummy variables to indicate whether the individual is employed at a later date and whether the individual is employed at the same place. See example below.

\[
jobq^3_{it} = \begin{cases} 
0 & \text{if employee } i \text{ is not employed at August 15th in year } t \\
1 & \text{if employee } i \text{ is employed at August 15th in year } t 
\end{cases}
\]

The dummy variables used for tracking labour market status are the following:

- \( jobq^3 \) - whether the individual is employed at August 15th in year \( t \).
- \( stayq^3 \) - whether the individual is employed August 15th in year \( t \) with the same employer as May 15th in year \( t \).
- \( jobA^2 \) - whether the individual is employed at May 15th in year \( t + 1 \).
- \( stayA^2 \) - whether the individual is employed at May 15th in year \( t + 1 \) with the same employer as May 15th in year \( t \).

In the third quarter (August 15th), an employee can be in three different states:

1. The employee is still employed with the same employer: \( jobq^3 = 1 \) and \( stayq^3 = 1 \).
2. The employee is still employed, but with another employer: \( jobq^3 = 1 \) and \( stayq^3 = 0 \).
3. The employee is no longer employed: \( jobq^3 = 0 \) and \( stayq^3 = 0 \).

The same holds for the indicator variables for May 15th next year. Our main outcome of interest is the second case, when someone has changed jobs. With this indicator variable, I
can construct average rates of job-to-job mobility and run ordinary least squares regressions on finding the partial effects of changes in other covariates on the probability of changing jobs. The quarterly term only compares moves made over the summer, and does not provide information of quarterly mobility rates between other quarters than the second and third. This means if seasonal hiring patterns change over time, they can affect the quarterly measure without affecting the annual one. Moreover, the quarterly measure can pick up shorter term jobs than the annual one and also identify more spells of unemployment between jobs. A major benefit of the quarterly measure is that when measuring is done in the same year, it is more resistant to changes in indexation and redefinition of the covariates used as right hand side variables.

The latter is a problem with the annual rates which I have not been able to solve. There have been several organisational reform within the public sector in the last decade, leading to changes in employment code between consecutive years, inflating job-to-job rates within the public sector. This leads to artificially high job-to-job mobility rates for workers in public administration and at large establishments (200+). I will therefore focus on the quarterly results, but also present some of the graphical annual results for comparison.

Exit rates will mainly be provided in the appendix. I am unable to differentiate between those leaving the labour force and those becoming unemployed, and a deeper study of them fall beyond the scope of this thesis.

*Age is grouped into three: Below 25, 25-54 and 55+. Educational attainment is divided into less than lower secondary education (dropped due to low frequency), lower secondary education (benchmark), higher secondary education, short tertiary education/bachelor’s degree, long tertiary education/master’s degree or more. Establishment size < 10, 10-49, 50-200, 200+. *

For industry composition I recode industry codes for the time period to NACE, rev. 2 (SN 2007) standard and merge the different industries into ten groups, see table 4. Broadly speaking I merge most secondary industries into one, excluding construction, due to its known cyclicality and rising immigrant share, ICT and finance, education with human health ans social work activities as these sectors are often publically financed, by a high education share and have an over representation of women. Lastly I merge several different services industries into one. Due to a small share of the employed in Norway work in agriculture, forestry and fishing, the category is dropped from graphical and regessional analysis.

The initial idea was to use professions/occupations in the same way as industries, using the ten main occupation groups as in ISCO-08/Styrk-08. I was, however, unable to convert the occupations data to the same standard as with industries, leading to a break in the series. Graphical results for occupations can be found in the appendix.

In a linear regression model, the dependent left hand side variable is binary, either 0 or 1. The population regression function then corresponds to the probability of the dependent variable being 1, given X. This kind of regression has most of the comfortable properties
<table>
<thead>
<tr>
<th>Industry grouping</th>
<th>Merged industry grouping</th>
<th>Assigned dummy</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - Agriculture, Forestry and Fishing</td>
<td>Agriculture, Forestry and Fishing</td>
<td>Dropped due to low frequency</td>
</tr>
<tr>
<td>B - Mining and Quarrying</td>
<td>Manufactures</td>
<td>Baseline</td>
</tr>
<tr>
<td>C - Manufacturing</td>
<td>Manufactures</td>
<td>Baseline</td>
</tr>
<tr>
<td>D - Electricity, gas steam and air conditioning</td>
<td>Manufactures</td>
<td>Baseline</td>
</tr>
<tr>
<td>E - Water supply, sewerage, waste management</td>
<td>Manufactures</td>
<td>Baseline</td>
</tr>
<tr>
<td>F - Construction</td>
<td>Construction</td>
<td>Nac2</td>
</tr>
<tr>
<td>G - Wholesale and retail trade, repair of motor vehicles</td>
<td>Retail</td>
<td>Nac3</td>
</tr>
<tr>
<td>H - Transportation and storage</td>
<td>Other services</td>
<td>Nac9</td>
</tr>
<tr>
<td>I - Accommodation and food service activities</td>
<td>HoReCa</td>
<td>Nac4</td>
</tr>
<tr>
<td>J - Information and communication</td>
<td>ICT and finance</td>
<td>Nac5</td>
</tr>
<tr>
<td>K - Financial and insurance activities</td>
<td>ICT and finance</td>
<td>Nac5</td>
</tr>
<tr>
<td>L - Real estate activities</td>
<td>Other services</td>
<td>Nac9</td>
</tr>
<tr>
<td>M - Professional, scientific and technical activities</td>
<td>Other services</td>
<td>Nac9</td>
</tr>
<tr>
<td>N - Administrative and support service activities</td>
<td>Administrative and support services</td>
<td>Nac6</td>
</tr>
<tr>
<td>O - Public administration and defence, compulsory social security</td>
<td>Public administration</td>
<td>Nac7</td>
</tr>
<tr>
<td>P - Education</td>
<td>Education and health</td>
<td>Nac8</td>
</tr>
<tr>
<td>Q - Human health and social work activities</td>
<td>Education and health</td>
<td>Nac8</td>
</tr>
<tr>
<td>R - Arts, entertainment and recreation</td>
<td>Other services</td>
<td>Nac9</td>
</tr>
<tr>
<td>S - Other service activities</td>
<td>Other services</td>
<td>Nac9</td>
</tr>
<tr>
<td>T - Activities of households and employers</td>
<td>Other services</td>
<td>Nac9</td>
</tr>
<tr>
<td>U - Activities of extraterritorial organisations and bodies</td>
<td>Other services</td>
<td>Nac9</td>
</tr>
</tbody>
</table>

Source: SSB (2008)

Table 4: Industry groupings
of normal OLS regressions, but the error terms are heteroskedastic, meaning one must use robust standard errors.

$Y$ is a dummy variable taking the value of 1 if there is a job-to-job move, it is defined in the following way:

$$Y = \begin{cases} 
0 & \text{jobq}3 = 0 \cup \text{stayq}3 = 1 \\
1 & \text{jobq}3 = 1 \cap \text{stayq}3 = 0 
\end{cases}$$

Below are the six different regression equations I will use. $year$ stands for year and runs from 2003 to 2012. $U$ is the unemployment rate for each year, $immigrantshare$ is the share of immigrants in the labour force measured in the 4th quarter of each year, $female$ is a dummy variable equal to 1 if the individual is a woman, $prime$ and $senior$ are age group dummies being equal to 1 if the individual is in their respective age group, $edu$ is the highest level of completed education for the individual, running from lower secondary to master’s degree or more, $nar$ is the indicator variable for industry, $establishment$ is the indicator variable for the size of the establishment and $municipality$ is the indicator variable for which municipality the establishment is located in.

1. $Y = \sum_{t=1}^{year} \alpha_t + \text{constant}$
2. $Y = \alpha_{year_t} + \text{constant}$
3. $Y = \alpha_{year_t} + \beta U_t + \gamma \text{immigrantshare}_t + \text{constant}$
4. $Y = \alpha_{year_t} + \beta U_t + \gamma \text{immigrantshare}_t + \delta \text{female}$
   $+ \epsilon_{prime} + \zeta_{senior} + \sum_{i=2}^{4} \eta_i \text{edu} + \text{constant}$
5. $Y = \alpha_{year_t} + \beta U_t + \gamma \text{immigrantshare}_t + \delta \text{female}$
   $+ \epsilon_{prime} + \zeta_{senior} + \sum_{i=2}^{4} \eta_i \text{edu} + \sum_{j=2}^{9} \theta_j \text{nar} + \sum_{k=0}^{4} \iota_k \text{establishment}_k + \text{constant}$
6. $Y = \alpha_{year_t} + \beta U_t + \gamma \text{immigrantshare}_t + \delta \text{female}$
   $+ \epsilon_{prime} + \zeta_{senior} + \sum_{i=2}^{4} \eta_i \text{education}_i + \sum_{j=2}^{9} \theta_j \text{industry}_j + \sum_{k=0}^{4} \iota_k \text{establishment}_k$
   $+ \sum_{l=1}^{N} \kappa_l \text{municipality}_l + \text{constant}$

5 Results

In this section I present and discuss the results from several linear probability models to decompose which forces are driving the annual and quarterly job-to-job rates in the Norwegian labour market 2003-2012. This is done by using several different regression models with an increasing amount of controls described in 4. In addition I present graphically the trends in job-to-job rates over time for different sub-groups. Exit rates are added to check that nothing drastic is going on between stayer- and exit rates without us noticing. My focus is on
the quarterly results, but some attention will be given to annual developments in subsection 5.1. I must again point out that none of these results are causal. I am simply providing an overview of current trends and correlations.

Simply by looking at figure 4, one can suspect there is a close negative correlation between the unemployment rate and the job-to-job rates. Both of the latter are slightly increasing through the studied time period, with a short decline during the global financial crisis 2007-2009. Compared to its initial level, the increase in the quarterly job-to-job rate is relatively much larger than the change in the annual rate. Bare in mind that the “quarterly rate” is the rate of change between the 2nd and 3rd quarter, not the rate for every quarter throughout the year. If employers shift their hiring to begin in May-August from other parts of the year, making hiring vary more with the seasons, the quarterly rate will increase without the average rate for every quarter rising on average. If could, however, be that there has been in increase in short term jobs being picked up by the quarterly measure, but not in the annual one. More detailed results will be provided in the sections 5.1 and 5.2 below.

5.1 Annual results

I will first present the graphical results for job-to-job rates by age group, educational attainment, size of establishment, industry and profession before moving over to the regression results.
The results for age groups in figure 5 are in line with previous findings (Topel and Ward, 1992), and yield few surprises. The young have higher mobility rates and their rate seems to be more sensitive to the business cycle. The upward trend seems to be relatively similar within each age group.

The levels in figure 6 are of more interest than the trends, the latter following the familiar pattern. The graph shows a stable difference between the education groups with more education correlating with more job-to-job mobility. This is reverse of the relationship found in US data, by e.g. Hyatt and Spletzer (2013); Cajner and Cairo (2013) where more educational attainment correlates with less job-to-job mobility. I have not been able to explain this seemingly reverse effect with other covariates available to me, such as firm size, professions, industry composition or spatial effects. Moreover, unionisation rates increase with educational attainment in Norway (Nergaard and Svalund, 2009), making it implausible that labour market institutions are more similar between US and Norway for employees with tertiary education. I will return to discussing the results on education during the OLS analysis.

When observing figure 7, it is important to keep in mind that my data set does not include establishments with less than five employees. Despite this, it is not the trend of the smallest establishments that stand out, it is that of the largest ones, with 200+ employees. The largest group varies strongly compared to the other groups, seems to have a different link with the business cycle than the others, and does not seem to have the same upward trend as the others. Due to several reforms in the public sector (transfer of Hospitals, merger of social services
Figure 6: Annual job-to-job rates by educational attainment

Figure 7: Annual job-to-job rates by establishment size
etc.), the quarterly data may be better for analysing the trends for large firms. Rather, job-to-job mobility for employees at the largest establishments seems to be slightly falling and after 2009 is overtaken by establishments with 10-200 employees. The relationship for the three groups with fewer employees than 200 seem to have the same upward trend over time, however, the levels between them are the reverse of what we find in the US, where larger firms lead to less mobility (Hyatt and Spletzer, 2013). This can be driven by different cut-offs between firms/establishments and the exclusion of firms with less than five employees in my data set.

Most industrial groupings share around the amount of variation and slightly upward trend through the decade, with manufactures having the lowest rates of mobility, serving as our standard comparison in the regressive analysis, and education and health having the highest mobility rates of the similarly moving industries. See section 3 for how the different industrial groupings are constructed. The two industries with the most mobility stand out with their own unique patterns. Administrative and support services is much more procyclical than the other industries, while still having the same upward trend. Public administration, however, is strongly anti-cyclical, perhaps due to governmental stabilisation policies. We do clearly see the problem with reorganization reform in our data in the spikes in 2004 and 2009. This is the main reason why the quarterly data is preferred.
5.2 Quarterly results

First I present the graphical results for different subgroups in the data, before presenting and analysing the regression results in sub subsection 5.2.1. The quarterly results are not continuously quarterly, but compare flows between May 15th and August 15th in a given year. This means they can be affected by changing seasonality in the data and not necessarily represent the job-to-job rate over the entire year or all quarters. How do these data compare with US quarterly data? 2012Q3 LEHD seasonally unadjusted 4.9%, which is very close to my “quarterly” data for 2012. However, LEHD only identifies inter-state moves within the same firm,. On the other hand, the Norwegian data have the cut-off for small firms. It may be that the Norwegian and American job-to-job trends have converged over the studied time period, although they have been subject to very different macroeconomic conditions.

Over the studied time period, quarterly job-to-job rates increase by two percentage points, which is twice the increase of the annual rate. In comparison, the exit rate fluctuates within a percentage point, yet counter-cyclically. The job-to-job rate seems to have a pro-cyclical pattern, but with a clear upward trend.

The trend seems to be similar across age groups, with perhaps a bit more pro-cyclicality for the young. Compared with the OLS coefficients, it is a surprise that prime workers have higher job-to-job rates than the young. Note that many young adults in the first decade of their professional careers, as focused on by Topel and Ward (1992), will be in the prime age
group. As the dummy variables shows that the partial probability of from the prime age group relatively to the young is negative and significant, there must be other covariates, e.g. education, that is keeping the average job-to-job rate of prime workers above the young.

The levels in figure 11 are of more interest than the trends, the latter following the familiar pattern. The graph shows a stable different between the education groups with more education correlating with more job-to-job mobility. This is reverse of the relationship found in US data, by e.g. Hyatt and Spletzer (2013); Cajner and Cairo (2013) where more educational attainment correlates with less job-to-job mobility. Moreover, unionisation rates increase with educational attainment in Norway (Nergaard and Svalund, 2009), making it implausible that labour market institutions are more similar between US and Norway for employees with tertiary education. Bachelor’s degrees 0.5% point higher mobility than master’s degrees and above. Tertiary education is not evenly split between the public and private sector or across industries. However, industries are also in the regression and the positive education relation to job-to-job mobility holds.

Women have on average higher job-to-job rates than men. At first thought, this may seem to run contrary to the results in Barth and Dale-Olsen (2009) where women are more elastic with respect to labour supply on the external margin, while men are more elastic to change jobs with respect to wages. However, I do not look at the partial effect of wages, and there may be other factors, like industry, education or type of contract that make women on average change jobs more frequently than men.
Figure 11: Quarterly job-to-job rates by educational attainment

Figure 12: Quarterly job-to-job rates by sex
Education and health much higher than the others. Can be driven by contracts or times of hiring over the summer. Administrative and support services also high, and is clearly pro-cyclical. Industries with the least job-to-job mobility is construction and retail.

Size of establishment has an inverse U-shape in relation to the job-to-job mobility rate. Compared with US data, we should be expecting a downward linear relationship. We do have a cut-off at 5 employees or less which should have given us lower job-to-job mobility rates, but it is unclear why establishments with 5-10 should have lower mobility rates than establishments with 10-50 employees.

5.2.1 Regression results

In is part I present and analyse the OLS results on the quarterly job-to-job flow data. Regression model 1, with year dummies only is presented in table 5, models 2-4 with linear time trend and macroeconomic covariates, sex and age in table 6 and models 5 and 6 with size of establishment, industry code and municipality controls added in table 7.

The results from model 1 show in table5 show steadily rising coefficients, all of them statistically significant. The increase from 2003 to 2012 is estimated to be 1.9% points, which is considerable.

The results from model 2, 3 and 4 are presented in table 6, where the first one confirms the trend we can observe from model 1, upward sloping and highly significant. Adding the
Figure 14: Quarterly job-to-job rates by size of establishment

<table>
<thead>
<tr>
<th>Year</th>
<th>Coefficient</th>
<th>t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>.00245932</td>
<td>(10.45)</td>
</tr>
<tr>
<td>2005</td>
<td>.00245183</td>
<td>(10.43)</td>
</tr>
<tr>
<td>2006</td>
<td>.01126177</td>
<td>(48.24)</td>
</tr>
<tr>
<td>2007</td>
<td>.01517077</td>
<td>(65.55)</td>
</tr>
<tr>
<td>2008</td>
<td>.01227979</td>
<td>(53.60)</td>
</tr>
<tr>
<td>2009</td>
<td>.01106759</td>
<td>(48.34)</td>
</tr>
<tr>
<td>2010</td>
<td>.01429082</td>
<td>(62.54)</td>
</tr>
<tr>
<td>2011</td>
<td>.01859659</td>
<td>(81.7)</td>
</tr>
<tr>
<td>2012</td>
<td>.01928114</td>
<td>(85.26)</td>
</tr>
<tr>
<td>Constant</td>
<td>.0299434</td>
<td>(170.46)</td>
</tr>
</tbody>
</table>

Table 5: OLS results for 2nd to 3rd quarter job-to-job rates, model 1 year dummies
<table>
<thead>
<tr>
<th>Variable</th>
<th>(2)</th>
<th>t-statistic</th>
<th>(3)</th>
<th>t-statistic</th>
<th>(4)</th>
<th>t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time trend</td>
<td>.00205487</td>
<td>(116.78)</td>
<td>.00161287</td>
<td>(11.25)</td>
<td>.00137963</td>
<td>(9.58)</td>
</tr>
<tr>
<td>Unemployment</td>
<td>-.33940961</td>
<td>(-36.88)</td>
<td>-.365149</td>
<td>(39.47)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immigrant share Female</td>
<td>.01956837</td>
<td>(187.70)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prime age</td>
<td>-.00355743</td>
<td>(-15.96)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior age</td>
<td>-.01365706</td>
<td>(-54.53)</td>
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<td></td>
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</tr>
<tr>
<td>Higher secondary</td>
<td>.00545847</td>
<td>(41.59)</td>
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</tr>
<tr>
<td>Bachelor’s</td>
<td>.0241528</td>
<td>(254.76)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master’s and more</td>
<td>.0241</td>
<td>(128.26)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>.02994341</td>
<td>(310.28)</td>
<td>.04466279</td>
<td>(29.20)</td>
<td>.02998253</td>
<td>(29.20)</td>
</tr>
</tbody>
</table>

Table 6: OLS results for 2nd to 3rd quarter job-to-job rates, models 2-4

covariates reduces the magnitude of the upward trends, but it is still significant, both in economic and statistical terms. The unemployment rate has a powerful, negative correlation with the job-to-job rate, as expected. Immigrant share on the other hand is statistically insignificant. This may of course be because of the data not being matched at the micro level, or that different immigrants have different effects on labour market flows. Women have a higher probability of changing jobs than men. Age drives down job-to-job rates, in line with what I expected. Job-to-job mobility rises with education attainment, which runs against the results from the United States. Employees with a bachelor’s degree have a 80 higher job-to-job rate than employees with lower secondary education as their highest completed education.

Adding the other covariates and controls in model 5 and 6 in table 7 does not change the significance of the earlier variables, but the linear time trend from model 2 in 6 is now almost halved to 0.00126786, an 0.127% increase annually. This is still positive, statistically significant and seems to indicate and upward trend beyond that explained by changes in the other added covariates. Size of establishment is falling among the dummies from 0.007 for establishments with 10-49 employees to −0.02 for establishments with 200+ employees compared to establishments with 5-9 employees. Education and health is associated with an increased mobility of 0.5%. After controlling for municipalities, the industry with the least job-to-job mobility is construction.
<table>
<thead>
<tr>
<th>Variable</th>
<th>(5)</th>
<th>t-statistic</th>
<th>(6)</th>
<th>t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time trend</td>
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<td>8.75</td>
<td>.00126786</td>
<td>8.83</td>
</tr>
<tr>
<td>Unemployment share</td>
<td>-.39723247</td>
<td>(-43.16)</td>
<td>-.3995</td>
<td>(-43.25)</td>
</tr>
<tr>
<td>Immigrant share</td>
<td>-.00228014</td>
<td>(-0.13)</td>
<td>-.0068</td>
<td>(-0.38)</td>
</tr>
<tr>
<td>Female</td>
<td>.00383647</td>
<td>(33.57)</td>
<td>.0039</td>
<td>(34.73)</td>
</tr>
<tr>
<td>Prime age</td>
<td>-.00474021</td>
<td>(-21.23)</td>
<td>-.0044</td>
<td>(-19.82)</td>
</tr>
<tr>
<td>Senior age</td>
<td>-.01812783</td>
<td>(-72.08)</td>
<td>-.0180</td>
<td>(-71.25)</td>
</tr>
<tr>
<td>Higher secondary Bachelor’s</td>
<td>.00571419</td>
<td>(41.59)</td>
<td>.00556157</td>
<td>(42.27)</td>
</tr>
<tr>
<td>Master’s and more 10-49 employees</td>
<td>.02283522</td>
<td>(156.67)</td>
<td>.02366574</td>
<td>(160.48)</td>
</tr>
<tr>
<td>50-200 employees</td>
<td>.0169319</td>
<td>(86.80)</td>
<td>.01893508</td>
<td>(94.66)</td>
</tr>
<tr>
<td>200+ employees</td>
<td>.00719384</td>
<td>(51.88)</td>
<td>.00760939</td>
<td>(54.49)</td>
</tr>
<tr>
<td>Construction</td>
<td>.0043736</td>
<td>(27.74)</td>
<td>.00547064</td>
<td>(34.14)</td>
</tr>
<tr>
<td>Retail</td>
<td>-.00319722</td>
<td>(-19.09)</td>
<td>-.00217502</td>
<td>(-12.64)</td>
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<td>HoReCA</td>
<td>-.00362603</td>
<td>(-16.63)</td>
<td>-.0024164</td>
<td>(-10.93)</td>
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<tr>
<td>ICT &amp; Finance</td>
<td>-.00396903</td>
<td>(-20.41)</td>
<td>-.00164762</td>
<td>(-8.23)</td>
</tr>
<tr>
<td>Administrative</td>
<td>.00230315</td>
<td>(6.18)</td>
<td>.00469648</td>
<td>(12.40)</td>
</tr>
<tr>
<td>Public admin</td>
<td>.00358297</td>
<td>(-15.63)</td>
<td>-.00069641</td>
<td>(-2.95)</td>
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<tr>
<td>Other services</td>
<td>.02086823</td>
<td>(74.49)</td>
<td>.02300455</td>
<td>(80.54)</td>
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<tr>
<td>Education &amp; health</td>
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<td>(12.76)</td>
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<td>(19.73)</td>
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<td>Municipality controls constant</td>
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<td>(274.80)</td>
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<td>Municipaljuvenility controls</td>
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<td>.00018402</td>
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<tr>
<td>Constant</td>
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<td>(27.21)</td>
<td>.02574012</td>
<td>(24.81)</td>
</tr>
</tbody>
</table>

Table 7: OLS results for 2nd to 3rd quarter job-to-job rates, models 5 & 6
6 Conclusion

Contrary to what is found in the US, job-to-job mobility in Norway follows an increasing trend. The raw numbers suggest an average increase of 2 percentage points from 2003 to 2012, and I am unable to explain 1.27 percentage points of this development in my model. The remaining difference can explained by low unemployment rates and controlling for educational attainment, sex, industrial composition, geographical location and changes in the size of establishments. Increased immigrant share of the employed has no explanatory power on job-to-job rates in my estimates. The increased trend may be driven by changes in job-to-job rates within groups. As my measure covers transitions between May and August, a change in seasonal hiring patterns or short term jobs during the studied time period would also affect my results. Moreover, the driving factors can be both on the supply side, through changed job-to-job search and on the demand side through changing rates of job creation and destruction. During the ten years studied in this thesis, Norwegian labour market mobility has shifted toward the one in the US.

With job-to-job rates in 2015 reaching the same levels as in 2007 in the US and the increased unemployment rates in Norway due to the shock to petroleum prices from 2014, the macroeconomic conditions of both countries are changing. With the Norwegian downturn and American recovery, studying newer data may provide a better picture of the underlying job-to-job flows in both countries. There is, however, a change in how Norwegian labour market panel data are measured from 2015, bridging this change will be crucial for the ability to make accurate comparisons over time. The most interesting findings are as I see it the opposite time trend compared both to US trends and the findings of Dale-Olsen (2016a), in addition to an opposite correlation with respect to education attainment in the US and Norway and that Norwegian small businesses have relatively low mobility. These findings warrant further research, in addition to examining how centralised wage bargaining affects job-to-job mobility.

References

Adams, T. (2015). My father had one job in his life, i’ve had six in mine, my kids will have six at the same time. Published in the Guardian November 29th 2015, accessed November 3rd, 2016.


OECD (2015). In it together: Why less inequality benefits all.


A Extra results
Figure 15: Annual job-to-job rates by profession
Figure 16: Quarterly exit rates by educational attainment

Figure 17: Quarterly exit rates by industry
Figure 18: Quarterly exit rates by profession
Figure 19: Quarterly exit rates by size of establishment

Figure 20: Quarterly exit rates by sex
B Analysis code

B.1 Graphical code

clear all
cd "folder"
use "data"
gen jjq3=stayq3==0 & jobq3==1
gen jjA2=stayA2==0 & jobA2==1
gen exitq3=jobq3==0
gen exitA2=jobA2==0
lab var jjq3 "job switch q3"
lab var jjA2 "job switch A2"
lab var exitq3 "exit rate q3"
lab var exitA2 "exit rate A2"
preserve
collapse (mean) stayA2 stayq3 jobq3 jobA2 jjA2 jjq3 exitA2 exitq3, by(year)
lab var jjq3 "job-to-job rate q3"
lab var jjA2 "job-to-job rate A2"
lab var exitq3 "exit rate q3"
lab var exitA2 "exit rate A2"
lab var stayA2 "stayer rate A2"
lab var stayq3 "stayer rate q3"
lab var jobq3 "employed rate q3"
lab var jobA2 "employed rate A2"
graph twoway (line exitA2 exitA2 year, lp(solid dash))
(line jjq3 jjA2 year, lp(solid dash)) graph save "exjj", replace
graph twoway (line exitq3 year, lp(solid )) (line jjq3 year, lp(dash)) graph save "exjj2", replace
restore
//gender preserve collapse (mean) jjA2 exitA2 jjA2j jjq3 jjq3j exitq3, by(year kvinne)
graph twoway
(line jjq3 year if kvinne==1, lp(solid) legend(label(1 "Women")))
(line jjq3 year if kvinne==0, lp(dash) legend(label(2 "Men")))
(graph save "Tgendjjq3", replace
graph twoway
(line exitq3 year if kvinne==1, lp(solid) legend(label(1 "Women")))
(line exitq3 year if kvinne==0, lp(dash) legend(label(2 "Men")))
(graph save "Tgendexq3", replace
restore
//age
gen ageG=1 if alder< 25
replace ageG=2 if alder>24 & alder<56
replace ageG=3 if alder>55
lab def age 1 "young" 2 "prime" 3 "senior"
lab val ageG age
lab var ageG "Age group" preserve collapse (mean) jjA2 exitA2 jjA2j jjq3 jjq3j exitq3, by(year ageG)
graph twoway
(line exitA2 year if ageG==1, lp(solid) legend(label(1 "under 25")))
(line exitA2 year if ageG==2, lp(dash) legend(label(2 "25-55")))
(line exitA2 year if ageG==3, lp(longdash) legend(label(3 "over 55")))
(graph save "TagexA2", replace
graph twoway
(line exitq3 year if ageG==1, lp(solid) legend(label(1 "under 25")))
(line exitq3 year if ageG==2, lp(dash) legend(label(2 "25-55")))
(line exitq3 year if ageG==3, lp(longdash) legend(label(3 "over 55")))
(graph save "Tagexq3", replace
graph twoway
(line jjq3 year if ageG==1, lp(solid) legend(label(1 "under 25")))
(line jjq3 year if ageG==2, lp(dash) legend(label(2 "25-55")))
(line jjq3 year if ageG==3, lp(longdash) legend(label(3 "over 55")))
(graph save "TagejjA2", replace
graph twoway
(line jjq3 year if ageG==1, lp(solid) legend(label(1 "under 25")))
(line jjq3 year if ageG==2, lp(dash) legend(label(2 "25-55")))
(line jjq3 year if ageG==3, lp(longdash) legend(label(3 "over 55")))
(graph save "Tagejjq3", replace
restore
//education
label define utdanning 0 "mindre enn grunnskole" 1 "grunnskole" 2 "videregåande skole" 3 "bachelor" 4 "mastergrad eller mer"
gen utd1=int(utd/10)
replace edu=0 if utd1==0 | utd1==1
replace edu=1 if utd1==2 | utd1==3
replace edu=2 if utd1==4 | utd1==5
replace edu=3 if utd1==6 replace edu=4 if utd1==7 | utd1==8 lab var edu utdanning
//few obs
preserve
collapse(mean) jjA2 exitA2 jjA2j jjq3 jjq3j exitq3, by(year edu)
graph twoway (line exitA2 year if edu==1, lp(solid) legend(label(1 "lower secondary")))
(line exitA2 year if edu==2, lp(dash) legend(label(2 "higher secondary")))
(line exitA2 year if edu==3, lp(longdashed) legend(label(3 "bachelor")))
(line exitA2 year if edu==4, lp("-._") legend(label(4 "master’s and more")))
replace exitA2=1 if exitA2==0
graph twoway (line exitq3 year if edu==1, lp(solid) legend(label(1 "lower secondary")))
(line exitq3 year if edu==2, lp(dash) legend(label(2 "higher secondary")))
(line exitq3 year if edu==3, lp(longdashed) legend(label(3 "bachelor")))
(line exitq3 year if edu==4, lp("-._") legend(label(4 "master’s and more")))
replace exitq3=1 if exitq3==0
graph twoway (line jjA2 year if edu==1, lp(solid) legend(label(1 "lower secondary")))
(line jjA2 year if edu==2, lp(dash) legend(label(2 "higher secondary")))
(line jjA2 year if edu==3, lp(longdashed) legend(label(3 "bachelor")))
(line jjA2 year if edu==4, lp("-._") legend(label(4 "master’s and more")))
replace jjA2=1 if jjA2==0
graph twoway (line jjq3 year if edu==1, lp(solid) legend(label(1 "lower secondary")))
(line jjq3 year if edu==2, lp(dash) legend(label(2 "higher secondary")))
(line jjq3 year if edu==3, lp(longdashed) legend(label(3 "bachelor")))
(line jjq3 year if edu==4, lp("-._") legend(label(4 "master’s and more")))
replace jjq3=1 if jjq3==0
//restore

//industry lab def naering 1 "Jordbruk, skogbruk og fiske" 2 "Sekundærmøbler utenom bygg og anlegg" 3 "Bygge- og anleggsvirksomhet" 4 "Varehandel, reparasjon av motorvogner" 5 "Overnattings- og serveringsvirksomhet" 6 "Informasjon og kommunikasjon, finansierings- og forskningsvirksomhet" 7 "Forretningsmessig tjenesteyting" 8 "Offentlig administrasjon og forsvar" 9 "Undervisning, helse og sosial" 10 "Annen tjenesteyting"
gen nacl=int(nac09/1000)
gen nael=1 if nacl==0 | nacl==1 | nacl==2 | nacl==3
replace nael=2 if nacl==5 | nacl==6 | nacl==7 | nacl==8 | nacl==9
replace nael=3 if nacl==10 | nacl==11 | nacl==12 | nacl==13 | nacl==14 | nacl==15 | nacl==16 | nacl==17 | nacl==18 | nacl==19 | nacl==20 | nacl==21 | replace nael=2 if nacl==22 | nacl==23 | nacl==24 | nacl==25 | nacl==26 | nacl==27 | nacl==28 | nacl==29 | nacl==30 | nacl==31 | nacl==32 | nacl==33 | replace nael=2 if nacl==34 | nacl==35 | nacl==36 | nacl==37 | nacl==38 | nacl==39 | replace nael=3 if nacl==40 | nacl==41 | nacl==42 | nacl==43
replace nael=4 if nacl==44 | nacl==45 | nacl==46 | nacl==47
replace nael=5 if nacl==48 | nacl==49 | nacl==50 | nacl==51 | nacl==52 | nacl==53
replace nael=6 if nacl==54 | nacl==55 | nacl==56 | nacl==57 | nacl==58
replace nael=7 if nacl==60 | nacl==61 | nacl==62 | nacl==63 | nacl==64 | nacl==65 | nacl==66 | nacl==67
replace nael=8 if nacl==70 | nacl==71 | nacl==72 | nacl==73 | nacl==74 | nacl==75 | nacl==76 | nacl==77 | nacl==78 | nacl==79 | nacl==80 | nacl==81 | nacl==82
replace nael=9 if nacl==84 | nacl==85 | nacl==86 | nacl==87 | nacl==88 | nacl==89
replace nael=10 if nacl==94 | nacl==95 | nacl==96 | nacl==97 | nacl==98
lab val nael naering
//few obs
preserve
drop if nael==1
collapse(mean) jjA2 exitA2 jjq3 exitq3 (count) nj=jjA2 nx=exitA2, by(year nae1)

graph twoway (line exitA2 year if nae1==2, lp(solid) legend(label(1 "Manufactures")))
(line exitA2 year if nae1==3, lp(dash) legend(label(2 "Construction")))
(line exitA2 year if nae1==4, lp(longdash) legend(label(3 "Retail")))
(line exitA2 year if nae1==5, lp("_{-}") legend(label(4 "HoReCa")))
(line exitA2 year if nae1==6, lp(solid) legend(label(5 "ICT and finance")))
(line exitA2 year if nae1==7, lp(dash) legend(label(6 "Administrative & support service")))
(line exitA2 year if nae1==8, lp(longdash) legend(label(7 "Public administration")))
(line exitA2 year if nae1==9, lp("_{-}") legend(label(8 "Education & Health")))
(line exitA2 year if nae1==10, lp("_{-}") legend(label(9 "Other services")))

graph save "TnaeexA2", replace

graph twoway (line jjA2 year if nae1==2, lp(solid) legend(label(1 "Manufactures")))
(line jjA2 year if nae1==3, lp(dash) legend(label(2 "Construction")))
(line jjA2 year if nae1==4, lp(longdash) legend(label(3 "Retail")))
(line jjA2 year if nae1==5, lp("_{-}") legend(label(4 "HoReCa")))
(line jjA2 year if nae1==6, lp(solid) legend(label(5 "ICT and finance")))
(line jjA2 year if nae1==7, lp(dash) legend(label(6 "Administrative & support service")))
(line jjA2 year if nae1==8, lp(longdash) legend(label(7 "Public administration")))
(line jjA2 year if nae1==9, lp("_{-}") legend(label(8 "Education & Health")))
(line jjA2 year if nae1==10, lp("_{-}") legend(label(9 "Other services")))

graph save "TnaejjA2", replace

restore

//profession

generate yrk1=int(yrk2/10)
label define yrke 0 "militære yrker" 1 "administrative ledere og politikere"
2 "akademiske yrker" 3 "høyskoleyrker"
4 "kontor- og kundeservileyrker" 5 "Salgs- service- og omsorgsyker"
6 "yrker innen jordbruk, skogbruk og fiske"
7 "Håndverkere o.l." 8 "prosess- og maskinoperatører, transportarbeidere mv."
9 "yrker uten krav til utdanning", replace

//few obs preserve

collapse(mean) jjq3 exitq3 jjA2 exitA2, by(year yrk1) keep if year<2007

graph twoway (line exitA2 year if yrk1==1, lp(dash) legend(label(1 "Managers")))
(line exitA2 year if yrk==2, lp(longdash) legend(label(2 "Professionals")))
(line exitA2 year if yrk==3, lp("_{-}") legend(label(3 "technicians and assoc prof")))
(line exitA2 year if yrk1==4, lp("_{-}") legend(label(4 "Clerical support")))
(line exitA2 year if yrk1==5, lp("_{-}") legend(label(5 "Service and sales")))
(line exitA2 year if yrk1==7, lp("._-") legend(label(6 "Craft and related")))
(line exitA2 year if yrk1==8, lp("--") legend(label(7 "Operators and assemblers")))
(line exitA2 year if yrk1==9, lp("--") legend(label(8 "Elementary occupations")))
graph save "TyrkexA2_1", replace
graph twoway (line jjA2 year if yrk1==1, lp(dash) legend(label(1 "Managers")))
(line jja2 year if yrk==2, lp(longdash) legend(label(2 "Professionals")))
(line jjA2 year if yrk1==3, ip(".--") legend(label(3 "technicians and assoc prof")))
(line jjA2 year if yrk1==4, ip(".--") legend(label(4 "Clerical support")))
(line jjA2 year if yrk1==5, ip(".--") legend(label(5 "Service and sales")))
(line jjA2 year if yrk1==7, ip(".--") legend(label(6 "Craft and related")))
(line jjA2 year if yrk1==8, ip(".--") legend(label(7 "Operators and assemblers")))
(line jjA2 year if yrk1==9, ip(".--") legend(label(8 "Elementary occupations")))
graph save "TyrkejjA2_1", replace

graph twoway (line exitq3 year if yrk1==1, lp(dash) legend(label(1 "Managers")))
(line exitq3 year if yrk==2, lp(longdash) legend(label(2 "Professionals")))
(line exitq3 year if yrk1==3, lp(".--") legend(label(3 "technicians and assoc prof")))
(line exitq3 year if yrk1==4, lp(".--") legend(label(4 "Clerical support")))
(line exitq3 year if yrk1==5, lp(".--") legend(label(5 "Service and sales")))
(line exitq3 year if yrk1==7, lp(".--") legend(label(6 "Craft and related")))
(line exitq3 year if yrk1==8, lp(".--") legend(label(7 "Operators and assemblers")))
(line exitq3 year if yrk1==9, lp(".--") legend(label(8 "Elementary occupations")))
graph save "Tyrkejjq3_1", replace

graph twoway (line jjq3 year if yrk1==1, lp(dash) legend(label(1 "Managers")))
(line jjq3 year if yrk==2, lp(longdash) legend(label(2 "Professionals")))
(line jjq3 year if yrk1==3, lp(".--") legend(label(3 "technicians and assoc prof")))
(line jjq3 year if yrk1==4, lp(".--") legend(label(4 "Clerical support")))
(line jjq3 year if yrk1==5, lp(".--") legend(label(5 "Service and sales")))
(line jjq3 year if yrk1==7, lp(".--") legend(label(6 "Craft and related")))
(line jjq3 year if yrk1==8, lp(".--") legend(label(7 "Operators and assemblers")))
(line jjq3 year if yrk1==9, lp(".--") legend(label(8 "Elementary occupations")))
graph save "Tyrkejjq3_2", replace

restore preserve collapse(mean) jjq3 exitq3 jjA2 exitA2, by(year yrk1)
keep if year>2007

graph twoway (line exitq3 year if yrk1==1, lp(dash) legend(label(1 "Managers")))
(line exitq3 year if yrk==2, lp(longdash) legend(label(2 "Professionals")))
(line exitq3 year if yrk1==3, lp(".--") legend(label(3 "technicians and assoc prof")))
(line exitq3 year if yrk1==4, lp(".--") legend(label(4 "Clerical support")))
(line exitq3 year if yrk1==5, lp(".--") legend(label(5 "Service and sales")))
(line exitq3 year if yrk1==7, lp(".--") legend(label(6 "Craft and related")))
(line exitq3 year if yrk1==8, lp(".--") legend(label(7 "Operators and assemblers")))
(line exitq3 year if yrk1==9, lp(".--") legend(label(8 "Elementary occupations")))
graph save "Tyrkejjq3_2", replace

graph twoway (line jjq3 year if yrk1==1, lp(dash) legend(label(1 "Managers")))
(line jjq3 year if yrk==2, lp(longdash) legend(label(2 "Professionals")))
(line jjq3 year if yrk1==3, lp(".--") legend(label(3 "technicians and assoc prof")))
(line jjq3 year if yrk1==4, lp(".--") legend(label(4 "Clerical support")))
(line jjq3 year if yrk1==5, lp(".--") legend(label(5 "Service and sales")))
(line jjq3 year if yrk1==7, lp(".--") legend(label(6 "Craft and related")))
(line jjq3 year if yrk1==8, lp(".--") legend(label(7 "Operators and assemblers")))
(line jjq3 year if yrk1==9, lp(".--") legend(label(8 "Elementary occupations")))
graph save "Tyrkejjq3_2", replace
restore

//bedsz
gen Bsize=1 if beds<10
replace Bsize=2 if beds>9 & beds<51
replace Bsize=3 if beds>50 & beds<201
replace Bsize=4 if beds>200
lab var Bsize "size of business"
preserve collapse(mean) jjq3 exitq3 jjA2 exitA2, by(year Bsize)
graph twoway (line exitq3 year if Bsize==1, lp(solid) legend(label(1 "<10 employees")))
(lime exitq3 year if Bsize==2, lp(dash) legend(label(2 "10-50 employees")))
(lime exitq3 year if Bsize==3, lp(longdash) legend(label(3 "50-200 employees")))
(lime exitq3 year if Bsize==4, lp("--") legend(label(4 "200+ employees")))
save "TBsizexq3", replace

graph twoway (line jjq3 year if Bsize==1, lp(solid) legend(label(1 "<10 employees")))
(lime jjq3 year if Bsize==2, lp(dash) legend(label(2 "10-50 employees")))
(lime jjq3 year if Bsize==3, lp(longdash) legend(label(3 "50-200 employees")))
(lime jjq3 year if Bsize==4, lp("--") legend(label(4 "200+ employees")))
save "TBsizeJJq3", replace

restore

B.2 Regression code

clear all
cd "folder" use "data"
//general variables
gen jjq3=stayq3==0 & jobq3==1
gen jjA2=stayA2==0 & jobA2==1
gen exitq3=jobq3==0
gen exitA2=jobA2==0
lab var jjq3 "job switch q3"
lab var jjA2 "job switch A2"
lab var exitq3 "exit rate q3"
lab var exitA2 "exit rate A2"
//age
gen ageG=1 if alder< 25
replace ageG=2 if alder>24 & alder<56
replace ageG=3 if alder>55
lab def age 1 "young" 2 "prime" 3 "senior"
lab val ageG age
lab var ageG "Age group"
//education
label define utdanning 0 "mindre enn grunnskole" 1 "grunnskole" 2 "videregående skole"
3 "bachelor" 4 "mastergrad eller mer"
gen utdl=int(utd/10)
gen edu=0 if utd1==0 | utd1==1
replace edu=1 if utd1==2 | utd1==3
replace edu=2 if utd1==4 | utd1==5
replace edu=3 if utd1==6
replace edu=4 if utd1==7 | utd1==8 lab val edu utdanning
//few obs
//industry lab def næring 1 "Jordbruk, skogbruk og fiske"
2 "Sekundærnæringer utenom bygg og anlegg" 3 "Bygge- og anleggsvirksomhet"
4 "Varehandel, reparasjon av motorvogner" 5 "Overnatting- og serveringsvirksomhet"
6 "Informasjon og kommunikasjon, finansierings- og forsikringsvirksomhet"
7 "Forretningsmessig tjenesteyting" 8 "Offentlig administrasjon og forsvar"
9 "Undervisning, helse og sosial" 10 "Annen tjenesteyting"
gen nae1=int(nac09/1000)
gen nael=1 if nael==0 | nael==1 | nael==2 | nael==3
drop if nael==1
replace nael=2 if nael==5 | nael==6 | nael==7 | nael==8 | nael==9
replace nael=2 if nael==10 | nael==11 | nael==12 | nael==13 | nael==14 | nael==15
| nael==16 | nael==17 | nael==18 | nael==19 | nael==20 | nael==21
replace nael=2 if nael==22 | nael==23 | nael==24 | nael==25 | nael==26 | nael==27
replace nae1=2 if nac1==35 | nac1==36 | nac1==37 | nac1==38 | nac1==39
replace nae1=3 if nac1==41 | nac1==42 | nac1==43
replace nae1=4 if nac1==45 | nac1==46 | nac1==47
replace nae1=5 if nac1==55 | nac1==56
replace nae1=6 if nac1==58 | nac1==59 | nac1==60 | nac1==61 | nac1==62 | nac1==63
replace nae1=6 if nac1==64 | nac1==65 | nac1==66 | nac1==67
replace nae1=7 if nac1==77 | nac1==78 | nac1==79 | nac1==80 | nac1==81 | nac1==82
replace nae1=8 if nac1==84
replace nae1=9 if nac1==85
replace nae1=9 if nac1==86 | nac1==87 | nac1==88
replace nae1=10 if nac1==49 | nac1==50 | nac1==51 | nac1==52 | nac1==53
replace nae1=10 if nac1==68
replace nae1=10 if nac1==69 | nac1==70 | nac1==71 | nac1==72 | nac1==73 | nac1==74 | nac1==75
replace nae1=10 if nac1==90 | nac1==91 | nac1==92 | nac1==93 | nac1==94 | nac1==95 | nac1==96 | nac1==97 | nac1==99 lab val nae1 naering
//few obs
//professions
gen yrk1=int(yrk2/10)
gen post07=year>2007
gen yrk1_2=yrk1*post07
lab def yrk 0 "militære yrker" 1 "administrative ledere og politikere" 2 "akademiske yrker" 3 "høyskoleyrker" 4 "kontor- og kundeservieyrker" 5 "salgs- service- og omsorgsyrker" 6 "yrker innen jordbruk, skogbruk og fiske" 7 "håndverkere o.l." 8 "prosess- og maskinoperatører, transportarbeidere mv." 9 "yrker uten krav til utdanning",
replace lab values yrk1 yrk
//few obs
//Size of business
gen Bsize=1 if bedsz<10
replace Bsize=2 if bedsz>9 & bedsz<51
replace Bsize=3 if bedsz>50 & bedsz<201
replace Bsize=4 if bedsz>200
lab var Bsize "size of business"
lab def bedsz 1 "<10 employees" 2 "10-50 employees" 3 "50-200 employees" 4 "200+ employees"
lab val Bsize bedsz
//dummify
tab ageG,gen(ald)
tab year,gen(aar) tab edu, gen(sko)
tab nael, gen(nar)
tab yrk1, gen(yrk)
tab yrk1_2,gen(y08)
tab Bsize, gen(biz)
//arbeidsledighet, AKU fra tabell 05111 i Statistikkbanken //import excel "C:\Users\axelhn.UIO\Dropbox\Masteroppgave - Copy\Data\test.xlsx", sheet("Sheet2") firstrow
//innvandringsandel, registerbasert. For 2003-2007:
Tabell 06480, Sysselsatte i alt, alle næringer, 2003K4-2007K4, 
Førstegenerasjonsinnvandrer/hele befolkningen, alle land.
//innvandringsandel, registerbasert. For 2008-2012:
Tabell 08435, Sysselsatte registrert bosatt, alle næringer, 20084K-20124K, (Norge-alle land)/alle land
*merge m:m year using UnemployedM.dta, nogen
tab ageG,gen(ald)
tab year,gen(aar) tab edu, gen(sko)
tab nael, gen(nar)
tab yrk1, gen(yrk)
tab yrk1_2,gen(y08)
tab Bsize, gen(biz)
//arbeidsledighet, AKU fra tabell 05111 i Statistikkbanken //import excel "C:\Users\axelhn.UIO\Dropbox\Masteroppgave - Copy\Data\test.xlsx", sheet("Sheet2") firstrow
//regressions
//regressions
reg jjq3 aar2-aar10
estimates store modt1
reg jjq3 t estimates store modt2
reg jjq3 t U immishare estimates store modt3
//simple model: demographics
reg jjq3 t U immishare kvinne ald2 ald3 sko3-sko5 estimates store modd
// simple model: jobb characteristics
reg jjq3 t U immishare kvinne ald2 ald3 sko3-sko5 nar2-nar9 biz2-biz4 estimates store moddj
areg jjq3 t U immishare kvinne ald2 ald3 sko3-sko5 nar2-nar9 biz2-biz4, absorb(geo)
estimates store moddjg estimates tab modt* modd*, t title(jjq3)