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Working Paper

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Discussion Papers, No. 278

Provided in Cooperation with:
Research Department, Statistics Norway, Oslo

Suggested Citation: Dale-Olsen, Harald; Rønningen, Dag (2000) : The Importance of Definitions of Data and Observation Frequen-cies for Job and Worker Flows - Norwegian Experiences 1996-1997, Discussion Papers, No. 278, Statistics Norway, Research Department, Oslo

This Version is available at:
https://hdl.handle.net/10419/192260

No. 278 **July 2000** **Discussion Papers**

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Abstract:
This paper examines the importance of definitions for establishments and for observation frequency for the resulting job and worker flow rates. In particular, this is of importance when comparing results across countries, i.e., in comparative analyses of job and worker flows. Measuring job and worker flow at the firm level, after invoking size limitations or after invoking a correction procedure for taking care of entry and exit due to administrative causes, lowers the job and worker flows compared to job and worker flows measured at establishment level, with no size limitations and no correction procedure. In a comparative analysis of job and worker flows, this shows that job and worker flows in Norway are lower than job and worker flows in many comparable countries.

JEL code: J63, C81

Acknowledgement: Paper presented at the Nordic Workshop on labour market research with register data, April 10-11, 2000 in Tampere, Finland. WORK IN PROGRESS. Thanks to our colleagues Helge Næsheim, Statistics Norway and Erling Barth and Pål Schøne at the Institute for Social Research, for valuable comments and helpful discussions. However, any mistakes are only us to blame. The work by Harald Dale-Olsen is financed by a grant by the Norwegian Research Council, grant # 128957/510, while the work by Dag Rønningen is financed by Ministry of Finance and the Ministry of Labour and Administration. Correspondent author: Harald Dale-Olsen, Institute for Social Research, P.O.Box 3233 Elisenberg, N-0208 Oslo, NORWAY. Tel.: +47 23 08 61 00, Fax.: +47 23 08 61 01, E-mail: hdo@isaf.no.

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1. Introduction

During the 1980s and 1990s changes in the labour markets in OECD-countries have shown big cross-country variation, in particular regarding unemployment and employment. A wish for a better understanding of labour market changes, together with the establishment of nationwide data systems, have contributed to a plethora of works, focusing on job and labour mobility.

At all times, and in all sectors and industries, jobs are created and destroyed. Some establishments exit, while other establishments enter the labour market. Some employees quit voluntarily, while others are fired. Some workers move from job to job without experiencing spells of unemployment, some become unemployed while others pull out of the labour market. This picture of the labour market shows a dynamic and turbulent system, where resources are continuously reallocated.

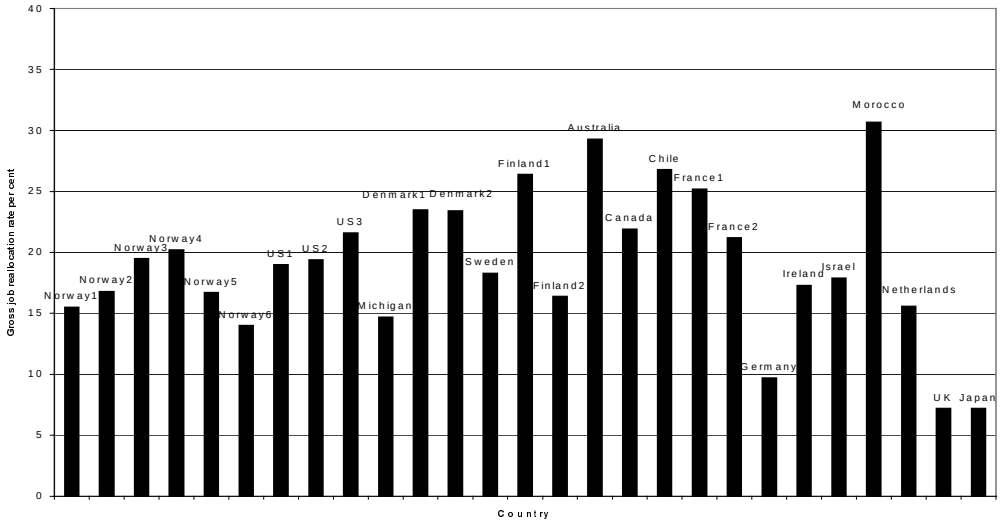
Studies of job and worker flows emphasise the dynamic aspect of an economy, and focus on the reallocation of resources that occurs at all times. In particular, these studies are inspired by the seminal works of Davis and Haltiwanger (1990, 1992) and Davis et al. (1996) on job flows and of Anderson and Meyer (1994), Burgess, Lane and Stevens (1996) and Albæk and Sørensen (1995, 1998) on worker flows.[1] Many of these studies have focused on national differences in job and worker flows, or what is often interpreted as differences in flexibility and adaptability in national labour markets (e.g., Burda and Wyplosz, 1994, Boeri, 1996a, 1996b, OECD, 1996, Salvanes, 1997).[2]

However, cross-country comparisons of job and worker flows are hampered by the fact that each country's data on job and worker flows have been created at different times, by using different kinds of sampling unit, with different sampling frequencies and by different coverage. Figure 1.1 shows mean gross job reallocation rates reported for the manufacturing sector in several countries. Even gross job reallocation rates from a single country only, vary a lot between the studies, e.g., the reported mean gross job reallocation rates from Norway vary between less than 15 per cent to over 20 per cent.

These differences and the following problems of identifying the real causes of cross-country differences in job and worker flows, make Davis and Haltiwanger write "We do not believe that strong inferences about the effect of economic policies and institutions can be drawn from cross -country comparisons of aggregate job flow rates" (Davis and Haltiwanger, 1999, p. 2754).

[1] See Davis and Haltiwanger (1999) for an excellent survey on gross job flows. This survey even includes worker flows considerations.
[2] In particular, see OECD (1996) for a comparative analysis of job and worker flows in several OECD-countries.

Figure 1.1 Gross job reallocation in the manufacturing sector. Yearly mean rate per cent.



Note: Number behind country denotes different studies. Source: Norway1 denotes Klette and Mathiassen (1996a,1996b), Norway2 denotes Salvanes (1995, 1997), Norway3 denotes 1990-figures from Salvanes (1997), Norway4 denotes Barth og Dale-Olsen (1997), Norway5 denotes figures from this paper, without the use of a correction procedure but all establishments(see further details later), while Norgway6 denotes figures from this paper, without the use of a correction procedure, and establishments with at least five employees only. US1, US2 and US3 denote Baldwin et al.(1998), Davis et al.(1996) and Anderson og Meyer (1994), respectively. Michigan denotes Foote(1997). Denmark1 and Danmark2 denote Albæk and Sørensen (1998) and Bingley et al. (1999), respectively. Finland1 and Finland2 denote Ilmakunnas and Maliranta (1999), France1 and France2 denote Gourinchas (1999) and Nocke (1994), respectively. Figures for Sweden, Australia, Canada, Chile, Germany, Ireland, Israel, Morocco, Netherlands, UK and Japan are gathered from Persson (1998), Borland and Home (1994), Baldwin et al.(1998), Roberts (1996), Wagner (1995), Strobl et al. (1998), Gronau og Regev (1996), Roberts (1996), Gautier (1997), Konings (1995) and Genda (1998), respectively. The figures from Gautier (1997) are reported in Davis and Haltiwanger (1999).

This paper makes cross-country comparisons of job and worker flow rates. Thus, we are at danger of "going against the wind". However, we are doing our comparison while utilising new knowledge of the impact of certain aspects of the data construction on job and worker flows, thus explicitly taking into account these effects in the cross-country comparisons. Thus, our topic in this paper is twofold. Firstly, we want to study the impact of differences in data definitions on job and worker flows. Secondly, we want to utilise this knowledge in cross-country comparisons of job and worker flows.

The paper is structured as follows: section 2 gives a short summary of economic theories particularly relevant for studies on job and worker flows. Section 3 describes our data and measures. Basic descriptive statistics are presented in section 4. Section 5 turns to our first topic, i.e., the impact of data construction job flow rates in Norway 1996-1997. Then, in section 6, we extend the analysis to worker flows. Finally, in section 7, we turn to our last topic, i.e., cross-country comparisons of job and worker flows.

2. Theoretical reasons for studying job and worker flows

The main reason for studying job and worker flows is grounded in the need for theoretical work to be confronted by empirical observations. Empirical studies of job and labour flows may shed light on several different theories concerning job and worker mobility. Even if this paper is a purely empirical work, some insight into the relevant theories is of interest. Thus, in this section, we present a short summary of some of the main theories that are particularly relevant for job and worker flows. We begin by looking at theories for job flows.

One strand of thought, what may be called theories of selection, is based on the idea that newly established firms are equipped differently when they enter a competitive market (Jovanovic, 1982, Hopenhayn, 1992, Jovanovic and MacDonald, 1994, Ericson and Pakes, 1995). This means that some firms have apriori better knowledge of and gain easier access to those facts that are necessary for survival and success in the market than other firms. Through a mechanism of selection, only the best equipped firms or the luckiest firms survive. These theories present a rather Darwinist way of looking at the life of a firm, in that the selection mechanism only secures survival of the fittest. After the firms grow older, the apriori knowledge of the way of the world looses its relative importance, since all the surviving firms gain information as time goes by. One of the empirical prediction of the model is that job destruction and establishment exit should be higher among young establishments than among old establishments.

A second strand of thought, the vintage theories, are based on the seminal works of Solow (1956) and Johansen (1959). The efficiency of an establishment is governed by the vintage of its stock of capital. The production technology of an establishment is supposed to be of a so-called putty-clay-kind, i.e., when an establishment is established it chooses a production technology that is "state of the art" (putty) and thus achieves maximum efficiency at the start of production. However, as time goes by and since the production technology is assumed fixed and not renewable (clay), the efficiency of production slowly declines. Old stock of capital implies in these theories a production technology with lower efficiency than the production technology of new stock of capital. Thus, the vintage theories predict higher job destruction and higher exit rates among older establishments than among younger establishments. Also, the vintage mechanism has, as well as search and matching behaviour, been incorporated in business cycle models of job flows (Mortensen and Pissarides, 1993, 1994, 1995, Mortensen, 1994). It should be noted that the vintage theories are of particular importance seen from a perspective of growth, in that the theories give a motivation for the Schumpetarian "Creative Destruction". Economic growth in a market economy implies a reallocation from less to more profitable establishments.

In this process, the need for being at the technological frontier leads to exit of units with obsolete ways of production. "Creative Destruction" has been incorporated in several seminal works from the 1990s in the literature on economic growth (Caballero and Hammour, 1994, 1996, Aghion and Howitt, 1992, 1998).

Next we focus on theories for worker mobility. One of the most central theories for labour mobility and wage growth is the theory of human capital (Becker, 1975, Mincer, 1974). Wages and wage growth are determined by accumulation of human capital. Typically, human capital is measured by education, experience, seniority and on-the-job-training. The theory implies that a worker considers his or her wage in a life cycle perspective whenever a worker changes jobs. Both the probability of job changes and the return to job changes, are determined by what kind of human capital the worker accumulates. Thus, firm-specific human capital lowers mobility by increasing the workers' productivity only in a specific firm, while general human capital has no mobility reducing effect.

In the human capital theory, both employees and employers have complete information and all adjustments happen instantaneously. The theories of search and matching (Burdett, 1978, Jovanovic, 1979, 1984) allow for the possibility that all participants in the labour market do not have complete information. Thus, one of the characteristics of the labour market in search and matching theories is that of frictions. Supply side oriented search theory tells a story of a worker who searches for alternative jobs, and by changing his or her search intensity may influence the number of received job offers. If the worker receives a job offer offering higher wages than his current wage, he changes job. Thus, increased expected return to searching, implies higher mobility. If one considers the wage in an economy as if it is characterised by a wage distribution, both shifting of the wage distribution upwards (a shifting of the mean, but no changes in the dispersion) or increasing the dispersion of the wage distribution (an increase in dispersion, but no changes in the mean), increases the mobility.

Why are these theories important for explaining cross-country differences in job and worker flows? We know that countries differ by institutional factors. However, institutional factors as, e.g., degree of centralisation of wage bargaining and employment protection legislation influence the expected return to job creation, thus influencing both job creation and job destruction. Moene and Wallerstein (1999) show, e.g., that increasing degree of centralisation of the wage bargaining system may increase the shake-out of less efficient firms as well as increase job creation of new efficient firms. The same institutional factors influence worker mobility as well. Increased degree of wage bargaining may have a negative impact on the dispersion of the wage distribution in a country, thus lowering the expected return to searching which again lowers

mobility. Increased employment protection legislation makes it more difficult for employers to fire employees, thus lowering involuntarily worker mobility. Also, it may make employers hesitant to hire new workers, since slumps in product demand cannot easily be followed by reduced employment.

3. Data and Measures

Our analysis is based on information from several Norwegian public administrative registers, which Statistics Norway has linked into an integrated register based data set including many subsets of register data. Mainly, we use information from the register of employers and employees. The register of employers and employees is administrated by the social insurance authorities. The register also serves other administrative purposes and is used by tax authorities and labour market authorities. The register comprises all jobs with a working week of more than 4 hours lasting at least 6 days. Jobs are identified by the combination of the personal ID-number, the ID-number of the employer (establishment number) and the period of duration. Basically, the register is continually updated. It should be noted that some of the employees have multiple employment spells in the same establishment. If these spells are closer than two months, in our data we define them as one spell. However, this afflicts only a few employment spells.

Before 1995 the occurrence of institutional or legal changes (e.g., new owner) at an employer, may result in the employer changing his establishment number. After 1995, separate number series for establishments and firms were established. Thus, after 1995 institutional or legal changes should not have impact on the establishment number series any more.

What are the factors that rule the changes in an establishment number? There are three aspects that define demographic events in an establishment. The three aspects are:

i) the firm that the establishment belongs to (owner),

ii) the economic activity that the establishment makes (industry code),

iii) geographic localisation (address).

Based on these three aspect, a rule is established in the register that governs the exit and entry of establishments. Whenever all three aspects change, this implies that the old establishment exits

and a new establishment enters. If two aspects change simultaneously, this usually implies that the old establishment exits and a new establishment enters. If only one aspect changes, this usually implies that the old establishment continues.

However, sometimes errors happen in the register, i.e., new establishment numbers are created and old establishment numbers are removed, even if only legal changes at the firm level have occurred. Also, additional and complicating issues are the problems regarding how to correctly identify establishment changes whenever merger and demerger of firms occur. These problems may be interpreted as measurement errors. Neglecting these problems cause figures for job and worker flows to be inflated.

In several international studies effort has been invested in ruling out entry and exit of establishment numbers due to administrative causes, and thus correctly identifying "true" birth and death of establishments (see Albæk and Sørensen (1995, 1998) and Bingley et al. (1999), Mustaniemi (1997) and Persson (1998) for analyses on Danish data, Finnish data, and Swedish data, respectively). Thus, if we wish to compare our job and worker flow figures with theirs, for comparability we should invoke the same corrections as they do. We do this by invoking a fourth aspect that defines demographic events in an establishment:

iv) the labour force of an establishment.

Utilising this fourth aspect, the following rules link two different establishment numbers together, i.e., the two numbers represent the same establishment:

1) they are connected to the same firm (same owner) and are doing the same economic activity (same industry),

2) they are connected to the same firm (same owner) and have the same labour force.

3) they have the same labour force and are doing the same economic activity (same industry) and are located in the same municipality.

Neither the same industry or the same labour force are uniquely defined. We define the same industry as same 4-digit NACE industry code. In Albæk and Sørensen (1995, 1998) and Bingley et al. (1999) same industry is defined at the 5-digit ISIC-level.

The same labour force is defined differently in the Danish, Finnish and Swedish studies, but basically, all studies build their definition of the same labour force on the share of the employees in the first establishment that is identified as an employee in the second establishment and vice versa. Recognise that this results in two percentage figures for the threshold values.[3] The studies differ when deciding how high this share has to be in order to link two different establishment numbers. In the Danish data, this threshold is 30 per cent, in Swedish data it is 50 per cent, while in Finnish data it is 60 per cent. This description is slightly inaccurate, because additional rules are invoked in all the studies.

We define the same labour force by using threshold values of 30, 50 and 60 per cent. However, as in the Danish studies we use the rules 1)-3) in an ordered succession, i.e., first we use rule 1), then we use rule 2) on the remaining establishments, and finally we use rule 3) on those establishments that remain after using rule 1) and rule 2). Also, in rule 2) we demand that the threshold value shall be satisfied at least one of the years, while in rule 3) we demand that the threshold value shall be satisfied both years. Also, recognise that this procedure differs from the Swedish procedure, since it uses the labour force criterion as the primary criterion for identifying establishments.

We use several measures to capture different aspect of the dynamics of the labour market. Most of these measures are known from several international studies (e.g., Burgess, Lane, Stevens, 1996; Davis et al., 1996, Davis and Haltiwanger, 1999). To utilise these measures, we need to know the stock of employees at two different dates and the employees that start and separate between these two dates. We use the terms "separate" and "separations", since we do not know whether the employee quits voluntarily or if the employee was fired. Since our topic is the impact of differences in data construction on job and labour flows, and one of these differences is differences in sampling frequency, we need two different sets of dates, i.e., we need one set of dates for the yearly rates and one set of dates for the quarterly rates. Thus, even if we observe the employers on a day to day basis, we limit the data to yearly observations and quarterly observations. We do this limitation primarily because it makes our figures comparable to figures in existing literature.

In the yearly sampling framework, the two stocks of employees are defined as the number of employees November 14, 1996 (n_{t-1}) and the number of employees November 26, 1997 (n_t). Starts and separations are defined by starts (h) and separations (q) during the period November 14, 1996 to November 26, 1997. In the quarterly sampling framework, the fourth quarter stock figures (in 1996 and 1997) are equal to the stock figures in the yearly sampling framework. How-

3 Depending on which establishment number's employment figures that are used in the denominator (base year).

ever, the stock figures for the 1.-3. quarter 1997 as well as all the flow figures differ. The stock of employees for the 1.-3. quarter 1997 is defined as the number of employees February 20, May 27, August 26, respectively. The first quarter starts and separations are defined by starts (h) and separations (q) during the period November 14, 1996 to February 20, 1997. The second quarter starts and separations are defined by starts (h) and separations (q) during the period February 20 to May 27, 1997. The third quarter starts and separations are defined by starts (h) and separations (q) during the period May 27 to August 26, 1997. The fourth quarter starts and separations are defined by starts (h) and separations (q) during the period August 26 to November 26, 1997.

We use standard definitions of job and worker flows (see, e.g., Burgess, Lane, Stevens, 1996, and Davis et al., 1996). For each employer, *net job flow* ($JF=n_t - n_{t-1}$) is defined as employment growth during one year. If it is positive, we have *gross job creation* ($JC= |n_t - n_{t-1}|$ when $JF \geq 0$, otherwise $JC=0$), if it is negative there is gross job destruction ($JD=|n_t-n_{t-1}|$ when $JF<0$, otherwise $JD=0$). *Gross job flow* ($AJF=|n_t - n_{t-1}|$) is the absolute value of net job flow. When aggregating over more than one establishment, AJF represents gross job reallocation as both job creation and job destruction enter positively. Excess job reallocation is defined as the total gross job reallocation in an economy minus the absolute value of the net growth (EJF=AJF-|JF| on the economy-level), i.e., the job reallocation over and above what is needed to accommodate the net growth. *Worker flow* ($WF=h + q_j$) is defined as the sum of hires and separations during the year. *Churning flow* (CF=WF – AJF) is defined as the part of the worker flow that is not necessary to accommodate the job flow. Churning flow is thus the part of worker flow that would remain even in a stationary environment where each firm kept its stock of workers constant. Each of these terms is made into rates by dividing by the average stock of workers during the year. These rates are denoted (in the same order as above) JFR, JCR, JDR, AJFR and so on.

Finally, we use these measures in construction of job and labour flows from several different populations. We study the impact of invoking size limitation on the population, i.e., what happens when establishments with at least 5 employees only, are considered, we study the impact on job and labour flows of doing the analysis on a population of firms instead of establishments, and we study the impact of different threshold values in the procedure for correcting exit and entry due to administrative purposes. As a summary table 3.1 presents the different populations that we later report job and worker flows for.

Table 3.1 The different populations used in measuring job and worker flows.

	Total				Manufacturing				Industries			
	Yearly		Quarterly		Yearly		Quarterly		Yearly		Quarterly	
	All	≥5	All	≥5	All	≥5	All	≥5	All	≥5	All	≥5
No correction	E, F	E, F	E, F	E, F	E, F	E, F	E, F	E, F	E	E	E	
CP: threshold value 60%	E, F	E, F	E, F	E, F	E, F	E, F	E, F	E, F				
CP: threshold value 50%	E, F	E, F	E, F	E, F	E, F	E, F	E, F	E, F				
CP: threshold value 30%	E, F	E, F	E, F	E, F	E, F	E, F	E, F	E, F	E	E		

Note: E denotes establishment, and F denotes firm. Thus, "E,F" denotes that we calculate job and worker flows on both establishment- and firm-level.

Apriori we have certain expectations regarding the difference in job and worker flow based on different populations. These expectations are summarised by table 3.2. First of all, recognise that the impact on job and worker flow rates by changing the population works by two effects. The first is by changing the mean number of employees in a unit, i.e., by changing the denominator of the job and worker flows. Obviously, the second effect is by changing the numerator. Thus, even if one finds a unique effect on job and worker flows, the total effect on job and worker flow rates may be less clear.

Mean quarterly rates are always lower than mean yearly rates. The sum of quarterly rates over all four quarters is higher than the yearly rates for high turnover units, while the effect is less clear for low turnover units. Since flows in small units are higher than flows in large units, size limitations reduce the job and worker flows. Given that firm entry and exit occur at the same rate as establishment entry and exit, job and worker flows from a population of firms are always lower than job and worker flows from a population of establishments. The reason is quite simply that firm-level job and worker flows do not measure flows within firms. Finally, invoking a procedure of correction reduces job and worker flows by elimination of entry and exit due to administrative causes. However, the effect on churning is less clear.

Table 3.2 Anticipated differences in job and worker flows based on different populations. Reference: establishment as unit, no limitation on size, yearly sampling frequency and no correction procedure.

	Change of sampling frequency				Size limitations	Changing unit	Invoking a procedure of correction
	High turnover		Low turnover				
	Mean	Sum	Mean	Sum			
Net growth	÷	+	÷	≈	÷	≈	÷/+
Gross job reallocation	÷	+	÷	≈/+	÷	÷/+	÷
Gross job creation	÷	+	÷	≈/+	÷	÷/+	÷
Gross job destruction	÷	+	÷	≈/+	÷	÷/+	÷
Excess job reallocation	÷	+	÷	≈/+	÷	÷/+	÷
Worker flow	÷	+	÷	≈	÷	÷/+	÷
Churning flow	÷	+	÷	-/≈	÷	÷/+	÷/+

Note: Sampling frequency: yearly/quarterly. Sampling unit: establishment/firm. Procedure of correction: no procedure/procedure.

4. Basic empirical description of the data

We start our empirical analysis by presenting some descriptive statistics from our data set. Our data set comprises all firms, all establishments and all employees during the 4. quarter 1996 to the 4. quarter 1997 in Norway. Table 4.1 shows the number of firms, establishments and jobs in 1996 and 1997, for the total economy as well as by industry. Also, the table presents mean number of jobs per establishment and per firm.

In the 4. quarter 1996 there existed roughly 135 000 firms, 170 000 establishments and slightly less than 2 000 000 jobs. The largest industries measured by the number of firms and establishments are the trade-industries and real estate and business services, while the smallest are financing and insurance and oil extraction, mining quarrying, electricity, gas and water supply. Recognise that there are nearly twice as many units in the trade-industries compared with real estate and business services. These small industries measured by the number of units employ few employees as well, and the corresponding large industries are among the industries where you find the largest number of jobs. However, most jobs are found in health and social services, and manufacturing is ranked as number three as far as number of jobs is concerned.

Mean numbers of jobs per firm and per establishment in 1996 were 14.6 and 11.7, correspondingly. However, table 4.1 shows big differences across the industries. The largest mean number of jobs per establishments is found in oil extraction, mining, quarrying, electricity, gas and water supply and in education with a mean number of jobs per employees of 34.0 and 31.7, correspondingly. The smallest establishments are found in primary sector and in personal services. The largest mean number of jobs per firm is found in education and in financing and insurance, with 108.5 and 67.4, respectively. In both these industries, the firm level means are nearly thrice as big as the establishment level means.

Table 4.1 shows that only small changes occured between the 4.quarter 1996 and the 4. quarter 1997. Norway experienced a boom in this period, with positive net growth of firms, establishments and jobs.

Table 4.1 Descriptive statistics. Correction procedure not invoked.

Industry	Number of firms	Number of establishments	Number of jobs	Mean number of jobs per establishment	Mean number of jobs per firm
1996					
Total	135 587	170 038	1 984 342	11.7	14.6
Primary	11 849	12 601	46 248	3.7	3.9
Oil extraction, mining, quarrying, electricity, gas and water supply	804	1 451	49 383	34.0	61.4
Manufacturing	11 624	13 190	295 702	22.4	25.4
Construction	12 589	13 564	109 006	8.0	8.7
Wholesale and retail trade, repair and household	35 367	42 266	305 070	7.2	8.6
Restaurants and hotels	5 824	6 495	73 387	11.4	12.7
Transport and communication	10 099	13 504	149 573	11.1	14.8
Financing and insurance	689	2 019	46 457	23.0	67.4
Real estate and business services	19 488	21 060	158 277	7.5	8.1
Public administration and defence	3 605	6 153	166 939	27.1	46.3
Education	1 409	4 816	152 814	31.7	108.5
Health and social services	9 312	16 791	355 101	21.1	38.1
Personal services	10 002	12 806	66 990	5.2	6.7
Industry unknown	2 926	3 322	9 395	2.8	3.2
1997					
Total	139 280	173 000	2 067 784	12.0	14.9
Primary	11 433	12 170	43 732	3.6	3.8
Oil extraction, mining, quarrying, electricity, gas and water supply	845	1 459	50 112	34.3	59.3
Manufacturing	11 814	13 330	304 313	22.8	25.8
Construction	13 188	14 188	121 069	8.5	9.2
Wholesale and retail trade, repair and household	36 010	42 732	321 266	7.5	8.9
Restaurants and hotels	6 123	6 772	77 225	11.4	12.6
Transport and communication	10 421	13 309	151 172	11.4	14.5
Financing and insurance	696	2 005	44 368	22.1	63.7
Real estate and business services	20 783	22 288	174 699	7.8	8.4
Public administration and defence	3 600	6 007	166 787	27.8	46.3
Education	1 413	5 161	163 430	31.7	115.7
Health and social services	9 322	17 061	367 769	21.6	39.5
Personal services	10 233	12 606	71 228	5.7	7.0
Industry unknown	2 970	3 912	10 614	2.7	3.6

Note: Code of industry is based on NACE. All establishments within a specific firm need not have the same industry affiliation as the firm. Thus, the industry-specific number of employees may vary depending on whether establishment or firm is used as sampling unit. In the table, figures for industry-specific number of employees are based on establishment as sampling unit.
Source: Own calculation on CDDS.

After this short descriptive interlude, it is time to see what happens when we invoke certain limitations on this data set. Table 4.2 shows what happens when we demand that only units with at least five employees are included in our data, while table 4.3 shows the impact of a correction procedure.

We see in table 4.2 that the size distribution of Norwegian firms and establishments is strongly skewed to the left. By removing firms and establishments with less than five employees, we remove over sixty per cent of the firms and establishments. However, the remaining firms and establishments employ nearly ninety per cent of all the employees.

Again we see large differences between the different industries. Units in, e.g., the primary sector are small, thus removing units with less than five jobs, reduce the number of units by nearly ninety per cent. On the other hand, firms in, e.g., public administration and defence are big, thus only reducing the number of units by ten per cent. However, only sixty-seventy per cent of the establishments in the public administration and the defence sector have more than four employees.

When it comes to jobs, disregarding small units has the least impact in the public sector , i.e., education, health and social services and public administration and defence, and in the private industries of manufacturing and financing and insurance. It has the biggest impact in the primary sector and in personal services.

Table 4.3 shows the number of establishments and the number of jobs before and after invoking a correction procedure that is based on a threshold value of 30 per cent. Also, it shows the effect of focusing on establishments with at least five employees only.

Table 4.2 Ratio of establishments, firms and employees in 1996 and 1997 with at least 5 employees during either 1996 or 1997 of all establishments, firms and employees 1996 and 1997. Measured by per cent. Total and industry-specific. Correction procedure not invoked.

Industry	1996			1997		
	Ratio of firms	Ratio of establish-ment	Ratio of jobs	Ratio of firms	Ratio of establish-ments	Ratio of jobs
All	38.7	37.8	88.6	38.5	37.6	88.5
Primary	11.1	9.2	60.4	11.5	9.6	58.7
Oil extraction, mining, quarrying, electricity, gas and water supply	61.4	58.9	97.3	60.3	58.7	97.3
Manufacturing	56.8	53.1	95.3	56.2	52.6	95.2
Construction	40.3	36.0	83.0	39.3	35.3	83.3
Wholesale and retail trade,repair and household	44.8	40.4	80.0	44.5	40.2	80.1
Restaurants and hotels	59.9	53.5	90.2	58.1	52.0	89.7
Transport and communication	32.4	32.4	86.9	31.8	32.1	86.8
Financing and insurance	61.6	58.8	95.2	60.9	58.5	95.0
Real estate and business services	28.4	25.4	80.6	27.6	24.5	80.7
Public administration and defence	91.4	66.1	96.5	91.4	67.3	96.7
Education	46.3	72.3	98.0	46.4	72.0	97.8
Health and social services	35.3	47.7	94.3	35.7	47.9	94.3
Personal services	27.4	22.6	71.6	29.4	24.1	73.2
Industry unknown	15.7	11.4	49.7	16.0	9.8	49.1

Note: Code of industry is based on NACE. See note table 4.1. Own calculation on CDDS.

Table 4.3 The impact of correction procedure to eliminate entry and exit due to administrative changes.

	Without correction			With correction procedure, threshold value:30 per cent			
	Number of firms	Number of establish-ments	Number of jobs	Number of establishments		Number of jobs	
				All	≥5	All	≥5
1996							
Total	135 587	170 038	1 984 342	169 177	63 480	1 982 089	1 756 519
Primary	8.7	7.4	2.3	7.4	1.8	2.3	1.6
Oil extraction, mining, quarrying, electricity, gas and water supply	0.6	0.9	2.5	0.9	1.3	2.4	2.7
Manufacturing	8.6	7.8	14.9	7.8	11.0	14.7	15.8
Construction	9.3	8.0	5.5	8.0	7.7	5.5	5.1
Wholesale and retail trade, repair and household	26.1	24.9	15.4	24.9	26.7	15.2	13.7
Restaurants and hotels	4.3	3.8	3.7	3.8	5.4	3.7	3.7
Transport and communication	7.4	7.9	7.5	7.9	6.8	7.4	7.3
Financing and insurance	0.5	1.2	2.3	1.2	1.9	2.3	2.5
Real estate and business services	14.4	12.4	8.0	12.4	8.4	7.9	7.2
Public administration and defence	2.7	3.6	8.4	3.6	6.3	0.8	9.0
Education	1.0	2.8	7.7	2.8	5.3	7.6	8.4
Health and social services	6.9	9.9	17.9	9.8	12.3	18.9	20.2
Personal services	7.4	7.5	3.4	7.5	4.5	0.3	2.7
Industry unknown	2.2	2.0	0.5	2.0	0.6	0.5	0.3
1997							
Total	139 280	173 000	2 067 784	172 090	64 219	2 065 592	1 829 280
Primary	8.2	7.0	2.1	7.1	1.8	2.1	1.4
Oil extraction, mining, quarrying, electricity, gas and water supply	0.6	0.8	2.4	0.8	1.3	2.4	2.6
Manufacturing	8.5	7.7	14.7	7.7	10.8	14.5	15.5
Construction	9.5	8.2	5.9	8.2	7.8	5.8	5.5
Wholesale and retail trade, repair and household	25.9	24.7	15.5	24.7	26.6	15.3	13.8
Restaurants and hotels	4.4	3.9	3.7	3.9	5.4	3.7	3.7
Transport and communication	7.5	7.7	7.3	7.7	6.6	7.2	7.0
Financing and insurance	0.5	1.2	2.1	1.2	1.8	2.1	2.3
Real estate and business services	14.9	12.9	8.4	12.9	8.4	8.4	7.6
Public administration and defence	2.6	3.5	8.1	3.4	6.2	7.9	8.6
Education	1.0	3.0	7.9	2.9	5.6	7.7	8.5
Health and social services	6.7	9.9	17.8	9.8	12.4	19.0	20.3
Personal services	7.3	7.3	3.4	7.3	4.7	3.4	2.8
Industry unknown	2.1	2.3	0.5	2.3	0.6	0.5	0.3

Note: Code of industry is based on NACE. All establishments within a specific firm need not have the same industry affiliation as the firm. Thus, the industry-specific number of employees may vary depending on whether establishment or firm are used as sampling unit. In the table, figures for industry-specific number of jobs are based on establishment as sampling unit. Source: Own calculation on CDDS.

As anticipated, we see that the correction procedure reduces the number of establishments and the number of jobs. However, the effects are notoriously small, even in the aggregate figures. At the industry level, only health and social services are influenced and even here, the impact is very little. It should be noted that we expect that a correction procedure has a bigger impact before the 4. quarter 1995. The reason for this is that in the 4. quarter 1995, the register of employers and employees undertook a major change, in that the PIN-codes of the employer changed. From having one PIN-code representing both the firm and the establishment, two separate number series, i.e., one for the firm and one for the establishment, were introduced.

5. Job flows

In this section, we turn to our first topic, i.e., the impact of differences in limitations of data on job and worker flows. The impact on job flows is studied in this section, while the impact on worker flows is studied in section 6.

Table 5.1 presents job flows in Norway at the total economy level for the period from the 4. quarter 1996 to the 4. quarter 1997. The figures express yearly job flow rates measured in per cent of the period's mean number of jobs. Consider first job flows among establishments, with no size-limitations and no correction procedure. This is what we consider as our reference. We see that Norway experienced a boom in this period, with a net growth of 4.1 per cent.

Table 5.1 Job flows in Norway. Total economy. 4.quarter. 1996 – 4.quarter. 1997. Yearly rates in per cent.

Population	Unit	CP	Gross job creation	Gross job destruction	Net growth	Gross job reallocation	Excess job reallocation
T	E		13.2	9.1	4.1	22.3	18.2
T	F		12.0	7.9	4.1	19.9	15.8
T	E	30	12.5	8.3	4.2	20.8	16.6
T	E	50	12.6	8.5	4.1	21.1	17.0
T	E	60	12.6	8.5	4.1	21.1	17.0
T:≥5	E		12.3	7.3	5.0	19.6	14.6
T:≥5	F		11.2	7.2	4.0	18.4	14.4
T:≥5	E	30	11.5	6.6	4.9	18.1	13.2
T:≥5	E	50	11.7	6.7	5.0	18.4	13.4
T:≥5	E	60	11.7	6.8	4.9	18.5	13.6

Note: Population: T denotes total economy. Number after letter code for population, denotes minimum requirement regarding unit-specific number of employees. Unit: E denotes establishment, while F denotes firm. Column headed by CP denotes correction procedure: number in this column denotes the requirement for the percentage of identical employees observed on two different establishment identification numbers needed to merge these establishment identification numbers into one joint identification number. Own calculation on CDDS.

However, even in these boom times jobs are destroyed. Gross job destruction was 9.1 per cent, while gross job creation was 13.2 per cent. This gives a gross job reallocation of 22.3 per cent.

Gross job reallocation is the most commonly used measure of the reallocation of jobs that occurs in an economy. However, it has a weakness in that pure employment growth contributes to its measure of reallocation. In most cases, one considers pure growth as a reallocation. Thus, net job reallocation, i.e., gross job reallocation over and above what is needed to accommodate the net growth, is a better measure. In our data, we find an excess job reallocation of 18.2 per cent.

Next we study job flows among firms. As anticipated, all job flows except net growth become reduced. Gross job reallocation at the firm level is 19.9 per cent, while excess job reallocation is 15.8 per cent.

Also, table 5.1 shows that invoking a correction procedure reduces gross job flows. The biggest impact is achieved by using a threshold value of 30 per cent. In this case, gross job reallocation on the establishment level is measured to 20.8 per cent, while the corresponding value for excess job reallocation is 16.6 per cent. Higher values of the threshold value reduce the impact of the correction procedure. This effect is as anticipated, since higher threshold values mean that fewer establishments are linked together, thus making the establishments more equal to the case where no correction procedure has been invoked.

Then we invoke size limitations on the firms and establishments accepted into the analysis. Consider first gross job flow at the establishment level. All gross job flows are reduced compared to gross job flows from the unrestricted population. Gross job reallocation is now measured to 19.6 per cent, while excess job reallocation is measured to 14.6 per cent. This is a reduction from the unrestricted case of 2.7 and 3.6 percentage point, respectively.

Turning to job flows among firms, we see that the size limitation has less impact, but still we find lower job flows than in the unrestricted case. This implies that more establishments than firms have less than five employees. And from table 4.2 we know this is the case.

Finally we invoke the correction procedures on the restricted population. Once more this has a negative impact on the level of job flows, but that this impact is less than on job flows from the unrestricted population.

Table 5.2 presents job flows based on quarterly observations of firms and establishments in Norway in the period from the 4. quarter 1996 to the 4. quarter 1997. We report both mean quarterly job flow rates and the sum of job flow rates over all four quarters.

Table 5.2 Job flows in Norway. Total economy. 4.quarter 1996 – 4.quarter 1997. Mean and sum of quarterly rates measured in per cent.

Population	Unit	Gross job creation		Gross job destruction		Net flow		Gross job reallocation		Excess job reallocation	
		Sum	Mean	Sum	Mean	Sum	Mean	Sum	Mean	Sum	Mean
T	E	15.5	**!Synt aksfe il, ,**	12.2	**!Synt aksfe il, ,**	3.3	**!Synt aksfe il, ,**	27.7	**!Synt aksfe il, ,**	24.4	**!Synt aksfe il, ,**
T	F	14.4	3.6	10.2	2.6	2.2	1.1	24.6	6.2	22.4	5.1
T: ≥5	E	12.3	3.3	9.0	2.3	3.3	1.1	21.3	5.6	18.0	4.5
T: ≥5	F	13.4	3.4	9.4	2.4	4.0	1.0	22.8	5.7	18.8	4.7

Note: See note table 5.1. Sum and mean denotes sum and mean over quarterly rates, respectively. Own calculation on CDDS.

Table 5.2 shows that mean quarterly job flow rates are clearly less than the corresponding yearly rates. However, estimating yearly job flow rates by multiplying the mean job flow rates by four, overestimate the gross job flows compared with the observed yearly job flow rates. The sum of the quarterly rates over all four quarters is nearly four times as big as the mean quarterly rates. Even if the sum of quarterly job flow rates over all four quarters is less than four times the mean quarterly rates, the sum of quarterly job flow rates over all four quarters is still larger than the observed yearly gross job flow rates.

Table 5.2 shows that the impact of invoking different limitations on the population which the quarterly gross job flows are measured on, is comparable to the impact on the yearly gross job flow rates. This means that measuring quarterly gross job flows from a population of firms, gives lower gross job flow rates than measuring it from a population of establishments. Removing establishments or firms with less than five employees also lowers the reported gross job flow rates.

Previously, studies of job and worker flows have been influenced by what Bingley et al. (1999) have called Manucentrism, i.e., most studies have focused on the manufacturing sector. The reason for this is probably that this industry is where data systems first were developed. Thus, when one considers the comparative aspect, reporting gross job flows for the Norwegian manufacturing sector is of interest. This means that we repeat the exercises of table 5.1 and table 5.2 for establishments and firms in the manufacturing sector, only.

Table 5.3 presents yearly job flows rates, while table 5.4 presents the mean and the sum of quarterly job flow rates. We see that gross job flows in the Norwegian manufacturing sector are less than gross job flow for the total economy. Yearly gross job reallocation at the establishment level, with no size limitation and no correction procedure, is 15.9 per cent, which is 6.4 percentage points less than the corresponding figure for the total economy. This is also reflected in the excess job reallocation, which is 5.8 percentage points lower in the manufacturing sector than for the total economy.

Table 5.3 Job flows in Norwegian manufacturing. 4.quarter 1996 – 4.quarter 1997. Yearly rates in per cent.

Population	Unit	CP	Gross job creation	Gross job destruction	Net growth	Gross job reallocation	Excess job reallocation
I	E		9.4	6.5	2.9	15.9	13.0
I	F		8.6	6.0	2.6	14.6	12.0
I	E	30	8.7	6.1	2.6	14.8	12.6
I	E	50	8.9	6.1	2.8	15.0	12.2
I	E	60	8.9	6.1	2.8	15.0	12.2
I:≥5	E		8.4	5.8	2.6	14.2	11.6
I:≥5	F		8.2	5.7	2.5	13.9	11.4
I:≥5	E	30	7.8	5.4	2.4	13.2	10.8
I:≥5	E	50	8.0	5.4	2.6	13.4	10.8
I:≥5	E	60	8.0	5.4	2.6	13.4	10.8

Note: See note table 5.1. I denotes manufacturing. Own calculation on CDDS.

Table 5.4 Job flows in Norwegian manufacturing. Establishments. 4.quarter 1996 – 4.quarter 1997. Mean and sum of quarterly rates in per cent.

Population	Unit	Gross job creation		Gross job destruction		Net flow		Gross job reallocation		Excess job reallocation	
		Sum	Mean	Sum	Mean	Sum	Mean	Sum	Mean	Sum	Mean
I	E	12.8	**!Syntaksfeil, ,**	11.1	**!Syntaksfeil, ,**	0	**!Syntaksfeil, ,**	23.9	**!Syntaksfeil, ,**	22.2	**!Syntaksfeil, ,**
I	F	11.7	2.9	8.9	2.2	2.8	0.7	20.6	5.2	17.8	4.5
I: ≥5	E	11.3	2.8	9.2	2.3	2.1	0.5	20.5	5.1	18.4	4.6
I: ≥5	F	11.4	2.9	8.7	2.2	2.7	0.7	20.1	5.0	17.4	4.4

Note: See note table 5.1. I denotes manufacturing. Own calculation on CDDS.

Next we begin changing the populations which we measure the job flows on. In all cases, the qualitative results are the same as for the total economy, i.e., gross job flows in manufacturing become lower if one measures gross job flows for manufacturing firms instead of establishments etc.

We have now shown that measuring gross job flows for the manufacturing sector instead of the total economy, brings about the usual changes, i.e., job flows in the manufacturing sector are lower than job flows in the total economy. However, the qualitative changes in gross job flow rates when invoking different limitations on the populations, are comparable.

What about job flows in other industries? Is this the story there as well? To shed some light on this issue, we measure industry specific job flows for different populations. Also, we feel that to do so for all the different populations defined by table 5.1 and 5.2, will produce more figures than what is informative. So we choose to report only job flows for establishments, and when we invoke a correction procedure, we only report the results for a threshold value of 30 per cent. Our results are presented in table 5.5 and table 5.6, where the difference between the two tables is that the correction procedure is invoked in the latter.

Table 5.5 Industry-specific job flows in Norway. Establishments. 4.quarter 1996 – 4.quarter 1997. Yearly rates in per cent. Correction procedure not invoked.

Industry	Gross job creation		Gross job destruction		Net flow		Gross job reallocation		Excess job reallocation	
	All	≥5	All	≥5	All	≥5	All	≥5	All	≥5
Primary	12.4	6.5	18.0	11.5	-5.6	-5.0	30.4	18.0	24.8	13.0
Oil extraction, mining, quarrying, electricity, gas and water supply	10.5	10.0	9.0	8.6	1.5	1.4	19.5	18.6	18.0	17.2
Manufacturing	9.4	8.4	6.5	5.8	2.9	2.6	16.2	14.2	13.3	11.6
Construction	18.4	14.3	7.9	5.3	4.1	9.0	26.3	19.6	22.2	10.6
Wholesale and retail trade, repair and household	13.8	10.2	8.7	6.0	5.1	3.8	22.5	16.2	17.4	12.4
Restaurants and hotels	18.8	15.8	13.7	11.7	5.1	4.1	32.5	27.5	27.4	23.4
Transport and communication	14.8	12.0	13.8	11.2	-0.9	0.8	28.6	23.2	27.7	22.4
Financing and insurance	5.8	5.2	10.4	9.7	-4.6	-4.5	16.2	14.9	11.6	10.4
Real estate and business services	19.3	14.9	9.4	6.8	9.9	8.1	28.7	21.7	19.8	13.6
Public administration and defence	8.1	7.8	8.2	7.7	-0.1	0.1	16.3	15.5	16.2	15.4
Education	14.6	14.0	7.9	7.6	6.7	6.4	22.5	21.6	15.8	15.2
Health and social services	11.3	10.3	7.8	7.0	3.5	3.3	19.1	17.3	15.6	14.0
Personal services	18.8	13.6	12.7	7.5	6.1	6.1	31.5	21.1	26.4	15.0

Note: Code of industry is based on NACE. See note table 5.1. *All* denotes no size limitation on establishment population, while ≥5 denotes that only establishments with at least 5 employees are included in the population. Own calculation on CDDS.

First of all, notice the massive heterogeneity between industries concerning the level of job flows. This is in accordance with previous studies (Barth and Dale-Olsen, 1997, 1999, Bingley et al., 1999). Measured by gross job reallocation, table 5.5 identifies personal services and restaurants and hotels as high reallocation industries with gross reallocation rates of 31.5 per cent and 32.5 per cent, correspondingly, while manufacturing and financing and insurance are low reallocation industries with gross job reallocation rates of 16.2 per cent and 16.2 per cent, correspondingly.

As is discussed previously, excess job reallocation may be a better measure of job reallocation. However, taking into account industry differences in net growth rates, does not bring about massive changes in the industry ranking. Manufacturing and financing and insurance are still to be considered low reallocation industries. Personal services and restaurants and hotels are still among the top three industries regarding job reallocation. However, ranked as number one is transport and communication with an excess job reallocation rate of 27.7 per cent.

Does this picture change if we only consider establishments with at least five employees? The answer to this question has to be yes. Focusing on larger establishments only, has a major impact on the job flows of primary sector and of personal services. Gross job flow rate in personal services are reduced by 14.1 percentage points, while the corresponding reduction in excess job reallocation rate is 11.4 percentage points. Similarly, gross job reallocation in the

primary sector is reduced by 12.4 percentage points, while excess job reallocation is reduced by 11.8 percentage points. Thus these industries are no longer considered high reallocation industries. Still, restaurants and hotels and transport and communication are considered high reallocation industries. Focusing on larger establishments brings about changes in the bottom ranking as well. Manufacturing and financing and insurance are still low reallocation industries, but are joined by construction in having particular low excess job reallocation. Focusing on establishments with at least five employees only, reduces excess job reallocation rate in construction from 22.2 per cent to 10.6 per cent, i.e., a reduction in the excess job reallocation rate of more than 11 percentage points.

Finally, in table 5.6 we examine the impact of a correction procedure. Once more we see that this has a major impact on the gross job flows. The correction procedure has the biggest impact, measured in percentage points, in transport and communication and in personal services. Also, this is particular true for the ranking of establishments in the bottom half of the ranking. However, the position of the top ranking industries is more or less unchanged. The most reallocative industry is still restaurants and hotels. This is true regardless of size limitations. Invoking a correction procedure has the biggest impact on the ranking of the public sector industries, which now become low reallocation industries.

Table 5.6 Industry-specific job flows in Norway. Establishments. 4.quarter 1996 – 4.quarter 1997. Yearly rates in per cent. Correction procedure invoked, threshold value: 30 per cent.

Industry	Gross job creation		Gross job destruction		Net flow		Gross job reallocation		Excess job reallocation	
	All	≥5	All	≥5	All	≥5	All	≥5	All	≥5
Primary	12.3	6.4	17.8	11.3	-5.5	-4.9	30.1	17.7	24.6	12.8
Oil extraction, mining, quarrying, electricity, gas and water supply	8.4	7.9	6.2	5.8	2.2	2.1	14.6	13.7	12.4	11.6
Manufacturing	8.7	7.8	6.1	5.4	2.6	2.4	14.8	13.2	12.2	10.8
Construction	18.1	14.0	7.6	5.0	10.5	9.0	25.7	19.0	15.2	10.0
Wholesale and retail trade, repair and household	13.3	9.7	8.3	5.6	5.0	4.1	21.6	15.3	16.6	11.2
Restaurants and hotels	18.2	15.2	13.2	11.2	5.0	4.0	31.4	26.4	26.4	22.4
Transport and communication	13.6	10.7	12.9	10.4	0.7	0.3	26.5	21.1	25.8	20.8
Financing and insurance	5.8	5.1	10.4	9.7	-4.6	-4.6	16.2	14.8	11.6	10.2
Real estate and business services	18.9	14.5	9.1	6.5	9.8	8.0	28.0	21.0	18.2	13.0
Public administration and defence	7.3	7.0	7.7	7.1	-0.4	-0.1	15.0	14.1	14.6	14.0
Education	13.7	13.2	7.8	7.5	5.9	5.7	21.5	20.7	15.6	15.0
Health and social services	10.4	9.5	6.0	5.3	4.4	4.2	16.4	14.8	12.0	10.6
Personal services	18.0	12.8	11.4	6.3	6.6	6.5	29.4	19.1	22.8	12.6

Note: Code of industry is based on NACE. See note table 5.1. *All* denotes no size limitation on establishment population, while ≥5 denotes that only establishments with at least 5 employees are included in the population. Own calculation on CDDS.

This effect is strenghtened by focusing on establishments with five employees only. In this case, public administration and defence and health and social services have gross job reallocation rates of 13.2 per cent and 12.2 per cent, respectively.

In table 5.7 we focus on entry and exit of Norwegian establishments and firms, and the impact of size limitations and the correction procedure for these figures. For establishment figures, we also study industry differences as well.

Table 5.7 Job flows, entry and exits among Norwegian firms and establishments. Total economy and industry-specific. 4.quarter 1996 – 4.quarter 1997. Yearly rates in per cent..

Industry	Gross job creation				Gross job destruction			
	Entry		Expanding		Declining		Exit	
	All	≥5	All	≥5	All	≥5	All	≥5
No correction procedure								
Firms	2.5	1.6	9.5	9.6	6.1	6.1	1.8	1.1
Establishments	3.6	2.6	9.6	9.8	6.2	5.5	2.9	1.8
Primary	4.3	1.2	8.2	5.3	12.3	10.0	5.7	1.4
Oil extraction, mining, quarrying, electricity, gas and water supply	2.2	1.9	8.3	8.1	6.0	5.9	3.0	2.8
Manufacturing	1.5	1.0	7.9	7.4	4.9	4.6	1.6	1.2
Construction	6.4	4.1	12.0	10.3	4.9	3.7	3.1	1.6
Wholesale and retail trade, repair and household	3.4	1.5	10.4	8.7	5.6	4.4	3.1	1.5
Restaurants and hotels	6.8	4.8	11.9	10.9	8.2	7.5	5.4	4.1
Transport and communication	4.4	3.0	10.4	9.0	6.9	5.8	6.9	5.4
Financing and insurance	1.0	0.6	4.8	4.6	7.0	6.7	3.4	3.1
Real estate and business services	6.1	3.3	13.2	11.6	5.7	4.6	3.8	2.2
Public administration and defence	0.8	0.7	7.3	7.1	7.1	6.9	1.1	0.8
Education	4.7	4.4	9.9	9.6	6.8	6.7	1.1	0.9
Health and social services	2.2	1.7	9.1	8.6	6.4	6.1	1.4	1.0
Personal services	8.8	5.8	10.1	7.8	6.5	4.7	6.2	2.8
Correction procedure, threshold value: 30 per cent								
Establishment	3.4	2.4	9.1	9.2	5.8	5.1	2.6	1.6
Primary	4.2	1.1	8.2	5.3	12.2	9.9	5.6	1.4
Oil extraction, mining, quarrying, electricity, gas and water supply	2.1	1.8	6.3	6.1	5.0	4.9	1.1	0.9
Manufacturing	1.3	0.8	7.4	6.9	4.7	4.4	1.4	1.0
Construction	6.3	3.9	11.8	10.1	4.8	3.6	2.8	1.4
Wholesale and retail trade, repair and household	3.3	1.5	10.0	8.2	5.5	4.3	2.9	1.3
Restaurants and hotels	6.6	4.7	11.6	10.6	8.0	7.3	5.1	3.9
Transport and communication	4.4	2.9	9.2	7.8	6.5	5.4	6.4	5.0
Financing and insurance	1.0	0.6	4.8	4.5	7.0	6.7	3.4	3.1
Real estate and business services	6.0	3.2	13.0	11.3	5.4	4.3	3.7	2.1
Public administration and defence	0.7	0.6	6.6	6.4	6.7	6.4	1.0	0.7
Education	4.5	4.1	9.3	9.1	6.8	6.7	1.0	0.8
Health and social services	1.8	1.4	8.6	8.1	4.9	4.6	1.1	0.8
Personal services	8.0	5.0	10.1	7.8	6.1	4.3	5.3	2.0

Note: Industry-specific job flows calculated by establishment as unit. Code of industry is based on NACE. See note table 5.1. Own calculation on CDDS.

The figures for job creation and destruction presented in the paper previously, may be decomposed into one part arising from creation/destruction of jobs in existing units and one part arising from units that are established or destroyed. The table presents results from this decomposition. Once more, we examine a correction procedure with a threshold value of 30 per cent only.

Firstly, consider the firm analysis with no correction procedure invoked. A yearly gross job creation of 12 per cent may be decomposed into 2.5 per cent job creation due to entry, while 9.5 per cent is caused by expanding firms. Similarly, a gross job destruction of 7.9 per cent may be decomposed into 1.8 per cent job destruction due to exit, while 6.1 per cent is caused by declining firms.

Secondly, if we compare the firm level figures with the corresponding establishment figures, we see that even if all establishment level figures are higher, the relative proportion between job destruction due to exit and total job destruction and the relative proportion between job creation due to entry and total job creation, is higher. Thus, the differences between job destruction measured on establishments and job destruction measured on firms are caused by lower job destruction due to exit among firms than establishments. Similarly, the differences between job creation measured on establishments and job creation measured on firms are caused by lower job creation due to entry among firms than establishments.

Table 5.7 shows that including units with at least five employees only, has a major impact on job destruction due to exits and job creation due to entry, while it has little impact on job destruction among declining units and job creation among growing units.

Next we turn to a similar decomposition on job creation and destruction on the industry level. We see that job creation due to entry constitutes a larger part of total job creation in some industries than others. These industries are typical high reallocation industries of restaurants and hotels, construction, real estate and business services and personal services, but also in education in the public sector does job creation due to entry constitute a large part of total job creation. We find the opposite in public administration and defence, where almost all job creation are due to job creation in expanding establishments.

Table 5.7 shows equal heterogeneity between industries when it comes to job destruction. By that we mean that in some industries, job destruction due to exit constitutes half of the total job destruction in that industry, i.e., exits of establishments are of equal importance to job reduction in existing establishment as a source of job destruction. Industries where job destruction due to exits constitutes a large part of total job destruction are transport and

communication, wholesale and retail trade, restaurant and hotels and personal services, while exits are of less importance in the public sector.

Finally, we turn to the impact of a correction procedure. Not surprisingly, it has the biggest impact on the part of job creation or destruction that arises from entry or exit, respectively. However, it also has some impact on job destruction in declining establishments. On the industry level, the correction procedure does not change any of the previous conclusions in any qualitative way, it only reduces the gross job flow further. In particular, this strenghtens the previous findings that as a source for job destruction in the public sector exits is of minor importance.

6. Worker flows

In this section we are doing similar analyses as that in section 5, but we focus on worker flows. Even if the process of reallocation of jobs between establishments is a major source for labour mobility, worker flows exist well in excess of what is needed to explain the job flows.

Table 6.1 and table 6.2 present worker flows for the Norwegian total economy from the 4. quarter 1996 to the 4. quarter 1997. Table 6.1 presents yearly worker flow rates, while table 6.2 presents mean quarterly rates and the sum of quarterly rates over all four quarters.

Table 6.1 shows that the establishments' hires constitute slightly less than 25 per cent of mean number of jobs in the establishments, while the corresponding figures for separations are somewhat in excess of 20 per cent. Thus, we have a worker flow of 45 per cent in Norway in 1996-1997. However, taking account of the worker flow caused by a reallocation of jobs between establishments, gives the churning flow rate of 22.7 per cent. Notice also, that 24.3 per cent of the worker flow constitute for direct job-to-job shifts, i.e., in 1996-1997 11 per cent of all employees change employers. Next we turn to worker flows measured by using firm as unit.

As described in section 3, using firm as unit should reduce the worker flows since mobility within a firm is ignored. As anticipated, table 6.1 shows that both hires and separations are reduced, making the worker flow rate 5 percentage points less. Since the reduction in gross job reallocation rates arising from using firm as unit instead of establishment, is less than the reduction in hires and separation, the impact on the churning flow rate is less, but also this impact is reduced. Introducing a correction procedure reduces the worker flow rates slightly, while the churning flow rates remain more or less unchanged. For some threshold values the churning flow rates actually increase compared to the churning flow without any correction procedure.

Table 6.1 Worker flows in Norway. Total economy. 4.quarter. 1996 – 4.quarter. 1997. Yearly rates in per cent.

Population	Unit	CP	Hires	Separations	Job creation relative to hires	Job destruction relative to separations	Worker flow	Churning flow
T	E		24.6	20.4	53.7	44.6	45.0	22.7
T	F		21.7	18.2	55.3	43.4	39.9	20.0
T	E	30	23.8	19.7	52.5	42.6	43.5	22.6
T	E	50	24.1	20.0	52.3	42.5	44.1	23.0
T	E	60	24.2	20.0	52.1	42.5	44.2	23.1
T:≥5	E		21.5	17.9	57.2	40.8	39.4	19.8
T:≥5	F		21.5	18.0	52.1	40.0	39.5	21.1
T:≥5	E	30	20.8	17.2	55.3	38.4	38.0	19.9
T:≥5	E	50	21.1	17.4	55.5	38.5	38.5	20.1
T:≥5	E	60	21.1	17.5	55.5	38.3	38.6	20.2

Note: Population: T denotes total economy. Number after letter code for population, denotes minimum requirement regarding unit-specific number of employees. Unit: E denotes establishment, while F denotes firm. Column headed by CP denotes correction procedure: number in this column denotes the requirement for the percentage of identical employees observed on two different establishment identification numbers needed to merging these establishment identification numbers into one joint identification number. Own calculation on CDDS.

Next we ignore the small units, i.e., we measure the worker and churning flows based on information from establishments or firms with at least five employees only. Once more, we see that this has a clear negative impact on the levels of worker flow and churning flow. However, the negative effects of using firm as unit or invoking a correction procedure are less clear when we use larger units only. By including larger establishments only, these units are more equal to firms, thus making worker and churning flows less dependent on whether the reporting units are establishments or firms. Small establishments are also more likely to exit, and it is easier that the threshold values are satisfied for small establishments. This only confirms the importance of small units for worker and churning flows.

Finally, as a second measure for expressing worker turnover in excess of job creation and destruction in addition to the measure of churning flow, table 6.1 also presents figures for job creation relative to hires and job destruction relative to separations. Since the years 1996 and 1997 were boom years, job creation relative to hires is bigger than job destruction relative to separations. Job creation relative to hires for all units ranges from 52-55 per cent, while the ratio varies between 52-57 per cent when based on larger units only. Job destruction relative to separations for all units ranges from 42-45 per cent, while the ratio varies between 38-41 per cent when based on larger units only.

In table 6.2 we show the corresponding quarterly worker and churning flows. Once more, we se that the mean flow rates are clearly less than the yearly rates, and that the sum of the quarterly rates is larger than the yearly flow rates but less than 4 times the mean quarterly rates.

Table 6.2 Worker flows in Norway. Total economy. Total economy. 4.quarter. 1996 – 4.quarter. 1997. Quarterly rates in per cent. Correction procedure not invoked.

Population	Unit	Hires		Separations		Job creation relative to hires		Job destruction relative to separations		Worker flow		Churning flow	
		Sum	Mean	Sum	Mean	Sum	Mean	Sum	Mean	Sum	Mean	Sum	Mean
T	E	25.7	6.8	22.5	5.9	60.3	58.8	54.2	50.8	48.2	12.8	20.5	5.8
T	F	22.6	5.7	19.4	4.9	63.7	63.7	52.6	52.6	42.0	10.5	17.4	4.4
T: ≥5	E	23.0	5.8	20.0	5.0	53.5	57.8	45.0	45.0	43.0	10.8	21.7	5.2
T: ≥5	F	22.3	5.6	19.4	4.9	60.1	60.1	48.5	48.5	41.7	10.4	18.9	4.7

Note: See note table 6.1. Own calculation on CDDS.

Notice that since many international studies of worker and churning flows report mean quarterly rates while previous Norwegian studies have reported yearly rates. This shows that when comparing, one get better comparisons by making "yearly" rates of the quarterly rates by multiplying the mean quarterly rates by four. Notice also, that job creation relative to hires and job destruction relative to separations increase and are now around 60 per cent and 50 per cent, respectively.

In table 6.3 and table 6.4, we repeat the excercise, but this time we focus on establishments and units belonging to the manufacturing industry only.

Table 6.3 Worker flows in Norwegian manufacturing. 4.quarter. 1996 – 4.quarter. 1997. Yearly rates in per cent.

Population	Unit	CP	Hires	Separations	Job creation relative to hires	Job destruction relative to separations	Worker flow	Churning flow
I	E		19.9	17.0	47.2	38.2	36.9	21.0
I	F		18.5	16.0	46.5	37.5	34.5	19.9
I	E	30	19.3	16.5	45.1	37.0	35.8	21.0
I	E	50	19.5	16.7	45.6	36.5	36.2	21.2
I	E	60	19.5	16.7	45.6	36.5	36.2	21.2
I:≥5	E		18.7	16.1	44.9	36.0	34.8	20.6
I:≥5	F		18.3	16.0	44.8	35.6	34.3	20.4
I:≥5	E	30	18.1	15.6	43.1	34.6	33.7	20.5
I:≥5	E	50	18.3	15.7	43.7	34.4	34.0	20.6
I:≥5	E	60	18.3	15.7	43.7	34.4	34.0	20.6

Note: See note table 6.1. Own calculation on CDDS.

Table 6.4 Worker flows in Norwegian manufacturing. 4.quarter. 1996 – 4.quarter. 1997. Quarterly rates in per cent. Correction procedure not invoked.

Population	Unit	Hires		Separations		Job creation relative to hires		Job destruction relative to separations		Worker flow		Churning flow	
		Sum	Mean	Sum	Mean	Sum	Mean	Sum	Mean	Sum	Mean	Sum	Mean
I	E	23.5	6.2	21.7	5.5	54.5	47.2	51.2	40.4	45.2	11.6	21.3	5.6
I	F	21.1	5.3	18.6	4.7	55.5	55.5	47.8	47.8	39.7	9.9	19.1	4.8
I:≥5	E	23.2	5.9	20.5	5.1	48.7	47.7	44.9	45.3	43.7	11.0	23.2	5.9
I:≥5	F	21.0	5.3	18.7	4.7	54.3	54.3	46.5	46.5	39.7	9.9	19.6	4.9

Note: See note table 6.1. Own calculation on CDDS.

Supportive of previous studies, e.g., Barth and Dale-Olsen 1999a, table 6.3 and table 6.4 show that manufacturing is a typical low worker turnover industry. Both hires and separations are less frequent, thus making worker flow in manufacturing lower than the worker flow for the total economy. Notice that the difference between the total economy rates and the manufacturing rates is less as far as churning is concerned, and for the quarterly rates rather the opposite relationship is shown. This is also reflected in the figures for job creation relative to hires and job destruction relative to separations, which are lower than the similar figures for the total economy. Thus, this implies that given the reallocation of jobs, the mobility of workers in manufacturing is actually higher than for the mean employee in the total economy.

Table 6.3 and table 6.4 show that the impact of the differences in data definitions is basically the same for units in the manufacturing sector as for the units in the total economy, even if the effect is somewhat less. This means that worker flows measured on data on firms, on establishments or firms with at least five employees only or on establishments where a correction procedure has been utilised, all result in lower worker flows compared with worker flows measured on the reference population, i.,e., on all establishments where no correction procedure has been invoked.

In table 6.5 and table 6.6 we focus on worker flows in the other industries as well. As in section 5, we report yearly mean worker flows for establishments only. Table 6.5 shows figures when no correction procedure is invoked.

Table 6.5 Industry-specific worker flows in Norway. 4.quarter. 1996 – 4.quarter. 1997. Yearly rates in per cent. Correction procedure not invoked.

Industry	Hires		Separations		Job creation relative to hires		Job destruction relative to separations		Worker flow		Churning flow	
	All	≥5	All	≥5	All	≥5	All	≥5	All	≥5	All	≥5
Primary	22.2	13.7	27.8	18.7	55.9	47.4	64.7	61.5	50.0	32.4	19.6	14.4
Oil extr., mining, quar., electr., gas and water supply	16.2	15.6	14.7	14.2	64.8	64.1	61.2	60.6	30.9	29.8	11.4	11.2
Manufacturing	19.9	18.7	17.0	16.1	47.2	44.9	38.2	36.0	36.9	34.8	20.7	20.6
Construction	28.8	23.7	18.3	14.7	63.9	60.3	43.2	36.1	47.1	38.4	20.8	18.8
Wholesale and retail trade, repair,household	25.5	20.4	20.3	16.1	54.1	50.0	42.9	37.3	45.8	36.5	23.3	20.3
Rest. and hotels	36.4	32.3	31.3	28.2	51.6	48.9	43.8	41.5	67.7	60.5	35.2	33.0
Transp., comm.	25.7	21.5	24.6	20.7	57.6	55.8	56.1	54.1	50.3	42.2	21.7	19.0
Financing and insurance	12.0	11.1	16.6	15.7	48.3	46.8	62.7	61.8	28.6	26.8	12.4	11.9
Real estate and business services	33.6	28.2	23.7	20.0	57.4	52.8	39.7	34.0	57.3	48.2	28.6	26.5
Pub. Admin.,def.	19.8	19.2	19.9	19.1	40.9	40.6	41.2	40.3	39.7	38.3	23.4	22.8
Education	24.4	23.7	17.7	17.3	59.8	59.1	44.6	43.9	42.1	41.0	19.6	19.4
Health, social serv.	23.5	21.9	20.0	18.6	48.1	47.0	39.0	37.6	43.5	40.5	24.4	23.2
Personal services	29.3	21.7	23.2	15.6	64.2	45.6	54.7	48.1	52.5	37.3	21.0	19.9

Note: See note table 6.1. *All* denotes all establishments regardless of size, while *≥5* denotes establishments with at least 5 employees. Own calculation on CDDS.

It confirms restaurant and hotels as a high worker turnover industry, and with a yearly worker flow of over 67 per cent which is unparalleled in Norway. The closest industry as far as the level of worker flows is concerned, is real estate and business services with a worker flow of 57.3 per cent. These industries are also top ranked measured by the level of churning flow. We find yearly churning flows of 35.2 per cent and 28.6 percent in restaurant and hotels and real estate and busniess services, respectively.

On the lower end of the ranking scale when it comes to worker flows, reported previously, we find manufacturing and oil extraction, mining, quarrying, gas and water supply. The latter group of industries has a yearly worker flow of only 30.9 per cent, even in the boom years of 1996 and 1997. Oil extraction, mining, quarrying, gas and water supply are also low churning industries, with a yearly churning flow rate of 11.4 per cent. However, at the bottom ranking when it comes to churning, they are joined by financing and insurance with a churning flow rate of 12.4 per cent.

Next we focus on industry-specific worker flows among establishments with at least five employees only. Table 6.5 shows that this has no impact on the ranking of industries. Industries that were high turnover industries are still high turnover industries when small establishments are removed from the population. The same is true for low turnover industries. However, we see that focusing on larger establishments only, clearly has a negative impact on the level of worker flows. This is particularly true for personal services where the worker flow is reduced by 15 percentage points, but we see that worker flows are reduced by 8-9 percentage points in other industries as well. When it comes to churning flows, focusing on larger establishments only have a lower impact on the level of flows, but still churning in the primary sector and in wholesale and retail trade are reduced by 5 and 3 percentage points, respectively.

Finally in table 6.5, we turn to the measures job creation relative to hires and job destruction relative to separations. Job creation relative to hires ranges from roughly 41 per cent in public administration and defence to 64.8 per cent in the afore-mentioned oil extraction, mining, gas and water supply. Job destruction relative to separations ranges from roughly 38 per cent in manufacturing to over 64 per cent in the primary sector. Focusing on larger establishments only, has little impact except for lowering the ratios somewhat. Job creation relative to hires ranges now from 40.6 per cent in public administration and defence to over 64 per cent in the before-mentioned oil extraction, mining, gas and water supply, while job destruction relative to separations ranges from 34 per cent in real estate and business services to over 61.8 per cent in financing and insurance.

In table 6.6 we invoke the correction procedure with a threshold value of 30 percent.

Table 6.6 Industry-specific worker flows in Norway. 4.quarter. 1996 – 4.quarter. 1997. Yearly rates in per cent. Correction procedure invoked, threshold value: 30 per cent.

Industry	Hires		Separations		Job creation relative to hires		Job destruction relative to separations		Worker flow		Churning flow	
	All	≥5	All	≥5	All	≥5	All	≥5	All	≥5	All	≥5
Primary	22.0	13.5	27.7	18.6	55.9	47.4	64.3	60.8	49.7	32.1	19.6	14.4
Oil extraction, mining, quarrying, electr., gas and water supply	13.7	13.1	11.9	11.4	61.3	60.3	52.1	50.9	25.6	24.5	11.0	10.8
Manufacturing	19.3	18.1	16.5	15.6	45.1	43.1	37.0	34.6	35.8	33.7	21.0	20.5
Construction	28.5	23.4	18.0	14.1	63.5	59.8	42.2	35.5	46.5	37.5	20.8	18.5
Wholesale and retail trade, repair,household	24.8	19.8	19.9	15.8	53.6	49.0	41.7	35.4	44.7	35.6	23.1	20.3
Restaurants and hotels	35.7	31.7	30.6	27.6	51.0	47.9	43.1	40.6	66.3	59.3	34.9	32.9
Transport and communication	24.0	19.8	23.1	19.3	56.7	54.0	55.8	53.9	47.1	39.1	20.6	18.0
Financing and insurance	11.9	11.0	16.4	15.5	48.7	46.4	63.4	62.6	28.3	26.5	12.1	11.7
Real estate and business services	33.2	27.8	23.4	19.7	56.9	52.2	38.9	33.0	56.6	47.5	28.6	26.5
Public admin. And defence	19.4	18.9	19.6	18.9	37.6	37.0	39.3	37.6	39.0	37.8	24.0	23.7
Education	23.5	22.8	17.6	17.2	58.3	57.9	44.3	43.6	41.1	40.0	19.6	19.3
Health and social services	22.7	21.3	18.4	17.1	45.8	44.6	32.6	31.0	41.1	38.4	24.7	23.6
Personal services	28.4	20.8	22.5	15.0	63.4	61.5	50.7	42.0	50.9	35.8	21.5	16.7

Note: See note table 6.1. *All* denotes all establishments regardless of size, while *≥5* denotes establishments with at least 5 employees. Own calculation on CDDS.

Basically this has no qualitative impact on any of the previously reported findings. Worker and churning flows become somewhat smaller, particularly in the public sector industries. Since quarterly flows never before have been reported for Norwegian data, we end this section on worker flows by looking more closely at the quarterly flows.

Table 6.7 presents at the industry level mean quarterly hires, separations and churning flows. Also, we want to shed some light on the quarterly variations between industries' hires and separations. Thus, we report on the industry level both quarterly variance and quarterly coefficients of variation.

We begin by looking at the mean values. As the yearly rates have shown, restaurant and hotels and real estate and business are high turnover industries, while financing and insurance and oil extraction, mining, quarrying, electricity, gas and water supply are low turnover industries. This is true regardless of whether you look at hires and separations or churning flows.

Next we study the quarterly variations. The biggest quarterly variation in hires we find in education and in personal services, with a quarterly variance of 8.45 and 6.91, respectively. The lowest quarterly variations in hirings we find in transport and communication and in construction.

Table 6.7 Quarterly variation between industry-specific worker flows among Norwegian establishments. 4.quarter. 1996 – 4.quarter. 1997. Quarterly rates in per cent. Correction procedure not invoked.

Industry	Quarterly mean			Quarterly variance			Coefficients of variation		
	H	S	CF	H	S	CF	H	S	CF
Primary	6.48	8.00	3.73	2.41	42.30	3.38	0.37	5.29	0.91
Oil extraction, mining, quarrying, electricity, gas and water supply	4.08	3.78	2.73	2.11	2.94	0.17	0.52	0.78	0.06
Manufacturing	5.88	5.43	5.33	0.28	0.81	0.78	0.05	0.15	0.15
Construction	7.48	6.03	4.68	1.18	1.95	0.28	0.16	0.32	0.06
Wholesale and retail trade, repair and household	6.55	5.43	4.60	0.87	1.41	0.41	0.13	0.26	0.09
Restaurants and hotels	10.48	9.18	7.65	0.16	5.81	1.21	0.02	0.63	0.16
Transport and communication	6.80	6.30	6.35	0.09	1.36	0.40	0.01	0.22	0.06
Financing and insurance	3.13	3.83	2.75	1.10	2.36	0.14	0.35	0.62	0.05
Real estate and business services	9.75	7.30	8.40	1.99	1.51	0.29	0.20	0.21	0.03
Public administration and defence	5.30	5.55	5.68	1.27	1.95	4.62	0.24	0.35	0.81
Education	6.03	4.98	4.93	8.45	6.87	18.89	1.40	1.38	3.84
Health and social services	6.10	5.28	5.88	1.47	1.79	1.76	0.24	0.34	0.30
Personal services	7.98	6.85	4.40	6.91	2.95	1.04	0.87	0.43	0.24

Note: See note table 6.1. H denotes hires, S denotes separations and CF denotes churning of employees. Own calculation on CDDS.

The primary sector is in a special position when it comes to quarterly variations in separations, with a quarterly variance of 42.3. However, eduaction is ranked as number two, with a quarterly variance of 6.87.

The lowest variance we find in transport and communications and manufacturing. Recognise that big quarterly variations in the primary sector and education should come as no surprise. Both these sectors experience big flows during the summer months. After the end of the school year in June, it is not uncommon that teachers change schools, thus giving a positive impulse to both hires and separations for the 3. quarter. Also, since this changing of schools usually is not afflicted by a reallocation of jobs, this leads to a high variance in the churning flow as well.

Similarly, farmers have need of help during the harvesting and haymaking weeks during summer and early autumn, thus giving rise to increased hires in the 2. and the 3. quarter. However, this is not enough to result in an extremely high variance in hires. Most of these employment spells have only a short duration. However, many of these employment spells are removed from the register when a yearly control of the register of employer and employees terminates employment spells where the stop is unreported to the register. Most employment spells terminated this way, got assigned the same termination date. This date is usually in the 1. quarter. The problem of unreported endings of employment spells in the primary sector is well known. Thus, when the yearly control terminates these employment spells quite a number of separations are generated in the primary sector.

Finally we turn to the quarterly coefficients of variation. Since differences in the mean level are reflected in the variance measure, measuring variation by coefficients of variation is a way of normalising the variance. Coefficients of variation are quite simply variances divided by the mean.

Once more, we see that education stands out as an industry with a particular high variation in hires, separations and churning flows, while manufacturing belongs to industries with low quarterly variation in hires and separations. Recognise that table 6.7 shows that industries which experience big quarterly net growth changes, do not have to be those industries which have the strongest seasonal pattern in worker flows.

7. A cross-country comparison of job and labour flows

In this section we turn to the final topic in this paper, i.e., cross-country comparisons of job and labour flows, with a special focus on determining whether or not the Norwegian flows are lower than flows in comparable countries. As mentioned in the introduction, a plethora of works on aggregated job and worker flows have been published or made public during the 1980s and 1990s. We have surveyed some of these studies, and from the reported figures for job and worker flows constructed tables 7.1-7.6.

Most commonly reported are figures for job flows. Thus our tables for job flows, i.e., table 7.1-7.3, are based on information from over 40 studies from 21 countries and 6 states in the United States. We have chosen to present the flow figures in separate tables depending on whether the job flows reflect aggregate job flows on the total economy or the private sector level, or on the more disaggregated level of manufacturing (most common). Furthermore, we also differ between whether the job flows are reported as quarterly rates or yearly rates. In all the tables, we present information on area, years, population, unit, whether a correction procedure has been used, job flow figures and the source. In some cases, we have supplemented the reported figures with our own calculations, but this is noted whereever it occurs.

Table 7.1 presents mean yearly gross job flows for the total economy and for the private sector only, table 7.2 presents quarterly gross job flows for the total economy, the privat sector only and for manufacturing only, while table 7.3 presents mean yearly gross job flows for the manufacturing sector only. The tables show that in every country and at all times, a widespread reallocation of jobs occurs, and thus they confirm the view of an economy as a dynamic and turbulent system. Recognise that this is also the picture presented by Davis and Haltiwanger

(1999). But they do not utilise this infomation in a comparative analysis, since at this stage Davis and Haltiwanger (1999) refrain from doing further comparisons.

However, we are of the opinion that some comparisons can be made, when one utilises the knowledge of the impact of data limitations on job and worker flows from section 5 and section 6. Of course, not all aspects of data definitions on job and worker flows are explored in these sections, and for some characteristics of data, e.g., quality, no sensitivity analysis can be performed. Also, our analyses in section 5 and section 6 are based on Norwegian data only. Thus, we have to be careful not to draw too categorical conclusions from these comparisons.

All figures reported in table 7.1, except for figures from Norway, Finland, New Zealand and Estland are measured for boom years and recession years. Firm is the unit in the studies from Michigan, Canada, France, the Netherlands, Italy and Estland. Of these studies, the total economy figures are reported for Estland only. We see that roughly 22 per cent of all jobs in the Estonian economy are reallocated yearly.

Table 7.1 Job flow rates. Total economy and private sector. Mean. Yearly rates.

Region	Year	Pop.	Unit	CP	Gross job creation	Gross job destruction	Net flow	Gross job reallocation	Net job reallocation	Source
Norway	1990	T	E[a]		8.6	10.3	-1.7	18.9	17.2[b]	Barth and Dale-Olsen(1997,1999)
Norway	1990	P	E[a]		9.6	12.8	-3.2	22.4	19.2	Own calculations[c]
Denmark	1980-95	T	E	30	12.4	11.7	0.7	24.1		Bingley et al. (1999)
Denmark	1980-95	P	E	30	14.4	14.0	0.4	28.4		Bingley et al. (1999)
Sweden	1986-95	T[d]	E	50	11.2	12.1	-1.0	23.3	20.7	Persson (1998)
Michigan	1978-88	P[e]	F		10.0	9.6	0.4	19.6		Foote(1997)
US[g]	1979-83	T	ET[h]		11.4	9.9	1.5	21.3		Anderson and Meyer(1994)
Canada	1983-91	P	F		14.5	11.9	2.6	26.3		OECD (1996)
Canada	1978-92	P	F		12.7	13.1	-0.4	25.8		Picot and Dupuy (1998)
France	1984-92	P	F		13.9	13.2	0.6	27.1		OECD (1996)
Finland	1986-88	T	E					19.5		OECD (1996)
Netherlands	1990	T: ≥10	F		4.0	2.2	1.8	6.2	4.4	Hamermesh et al. (1996)
Germany	1983-90	T	E		9.0	7.5	1.5	16.5		OECD (1996)
Estland	1992-94	T	F		9.7	12.9	-2.2	22.6		Haltiwanger og Vodopivec(1997)
Italy	1984-93	P	F		11.9	11.1	0.8	23.0		Contini et al. (1995)
N.Zealand	1987-92	P	E		15.7	19.8	-4.1	35.5		OECD (1996)
Japan	1991-95	T: ≥5[f]	E		4.2	3.9	0.3	8.1		Genda (1998)

Note: Pop.: T denotes total economy, while P denotes private sector. Number after letter code for population, denotes minimum requirement regarding unit-specific number of employees. Unit: E denotes establishment, ET denotes both firm and establishment, while F denotes firm. Column headed by CP denotes correction procedure: number in this column denotes the requirement for the percentage of identical employees observed on two different establishment identification numbers needed for merging these establishment identification numbers into one joint identification number. [a] denotes that establishment is defined by employer's PIN-code in the register of employer and employees. Studies from Norway use 11-digit employer PIN-code that defines establishment, however this number may as an exception be linked to a firm. Establishment is also the unit in Finland. [b] denotes own calculation on published results. [c] denotes own calculation on data utilised in Barth and Dale-Olsen (1997, 1999). [d] denotes that in figures for the total economy construction is excluded. [e] denotes that only establishments attached to the unemployment insurance system are included. [f] denotes that only continuing establishments are included. [l] denotes that job flows are calculated in per cent of base year, and not in per cent of mean employment. Based on figures for the UK from Blanchflower and Burgess (1994), you may calculate mean 3 yearly rates for the period 1980-90. The resulting figures for gross job creation, gross job destruction, net growth and gross job reallocation are 4.2 per cent, 5.2 per cent, -1.0 per cent and 9.4 per cent, respectively. See Schøne et al. (1999), Anderson and Meyer(1994) and Persson (1998) for analysis of governmental sector, public sector and public sector, respectively.

Figures for gross job flows from Norway and Denmark, which are based on establishments as reporting units, show that the privat sector experiences higher gross job flows than the total economy. Thus, job reallocation in the Estonian privat sector is higher than job reallocation in the Estonian total economy, which implies that job reallocation in the Estonian private sector is probably on the same level as job reallocation in Canada, France and Italy. The figures for gross job reallocation in private sector in France and Canada, are about 26-27 per cent, while the Italian figure is a couple of percentage points less. Gross job reallocation in the private sector in Michigan is clearly lower, with 19.6 per cent.

Table 7.1 indicates that gross job reallocation in the Netherlands is extremely low. However, as we have seen in section 5, having firms as reporting units as well as invoking size limitations reduce the level of gross job flows. Thus, this explains the low Dutch reallocation rates. Establishments are used as reporting units in all the Nordic countries, Germany, New Zealand and Japan. Some of the countries have gross job flows that deviate from the mean gross job flows of these countries. Gross job reallocation is extremely high in New Zealand, but New Zealand is also the country that experiences the strongest recession. The lowest figures for gross job reallocation are reported from Japan and Germany, with mean yearly rates of 8.1 per cent and 16 per cent, respectively. Low reallocation in Japan is no surprise, since the use of worker lifetime-contracts reduces firm flexibility. If we compare the Nordic countries, we see that gross job reallocations in Sweden and Denmark are higher than the corresponding figures in Norway and Finland. From Swedish and Danish data, gross job reallocation rates of 29 per cent and 24 per cent respectively, are reported. A correction procedure has been used on both the Swedish and Danish data.

The private sector experiences bigger job reallocation than the total economy in both Danmark and Norway (about 4 percentage points in both countries). A comparison between private sector gross job reallocation in Norway with the corresponding Danish figures, shows 6 percentage points higher gross job reallocation in Denmark. In addition, the Danish figures are based on a correction procedure, while this procedure has not been invoked in calculation of the Norwegian figures. Also, the Norwegian private sector figures are from a period when the effect of a correction procedure should have been greater than what we show in section 5. The conclusion to this discussion, is that job reallocation in the Norwegian privat sector is lower than the job reallocation in the Danish private sector.

In table 7.2 we turn to mean quarterly job flows. As we have shown in section 5 and section 6, these figures are lower than the mean yearly rates.

Table 7.2 Job flow rates. Total economy, private sector and manufacturing. Mean.Quarterly rates.

Region	Year	Pop.	Unit	Gross job creation	Gross job destruction	Net flow	Gross job reallocation	Source
US	1947-93	I	E	5.8	6.0	-0.2	11.8	Davis and Haltiwanger(1998)
US	1930-40	I	E	11.5	10.3	1.2	21.8	Davis and Haltiwanger(1998)
US	1972-93	I:≥5	E	5.1	5.5	-0.4	10.6	Schuh and Triest(1998)
US[g]	1979-83	I:≥5	ET[h]	7.1	6.4	0.7	13.5	Anderson and Meyer(1994)
US[g]	1979-83	P	ET[h]	5.8	6.2	-0.4	12.0	Anderson and Meyer(1994)
Maryland	1985-93	I[e]	ET[h]	7.5	8.8	-1.3	16.3	Lane et al.(1996)
Maryland	1985-93	P[ei]	ET[h]	8.7	8.9	-0.2	17.6	Lane et al.(1996)
W.Virginia	1990-94	I	E	4.9	5.8	-0.9	10.7	Spletzer(1997)
W.Virginia	1990-94	T	E	8.4	8.0	-0.4	16.4	Spletzer(1997)
Spain	1993-94	T[j] ≥500	E	1.32	1.93	-0.49	3.25	Serrano (1998)

Note: Pop.: T denotes total economy, P denotes private sector, while I denotes manufacturing. Number after letter code for population, denotes minimum requirement regarding unit-specific number of employees. Unit: E denotes establishment, ET denotes both firm and establishment, while F denotes firm. [e] denotes that only establishments attached to the unemployment insurance system are included. [f] denotes that only continuing establishments are included. [g] denotes that for the US that only selected states are included. [h] denotes that unit-level varies among the reporting units, i.e., unit may be establishment, firm or other legal unit. [i] denotes that governmental sector and the primary, mining and construction industries are not included in the analysis. [j] denotes that public administration and defence, farming sector as well as social services, diplomatic, religious and philantropical organisations are not included.

However, transforming these into yearly rates by multiplying them by 4, make "yearly" gross job reallocation rates ranging from 40-60 per cent. This is obviously overestimates of the true "yearly" rates. Serrano's (1998) figures are an exception, but Serrano's figures are based on a population of very large establishments, thus having very deflated gross job reallocation rates.

Many studies report gross job flows from manufacturing only. This is probably due to historical reasons, i.e., manufacturing was the first industry where well-functioning data systems were developed. Table 7.3 reports the mean yearly gross job flows for the manufacturing sector from 23 studies. There is a massive heterogeneity regarding differences in data definitions. By that we mean that different size limitations are invoked, different correction procedures are invoked and different units are invoked. Some even choose to report figures from continuing establishments only. Of course, the heterogeneity regarding the level of gross job reallocation is equally massive. The level varies from 6.6 per cent, 7.2 per cent, 7.2 per cent and 9.7 per cent for Australia, Japan, the UK and Germany, respectively, to 29.3 per cent for Australia. Section 5 gives us some information so we can interpret the differences in gross job flows.

First, consider differences regarding the reporting unit. Borland (1996) uses industry as the reporting unit, which gives gross job flow figures that cannot be compared with the other figures. These conclusions also apply to the studies of Konings (1995), Wagner (1995) and Genda (1998), though for different reasons. Koning (1995) studies very large units only, while the two latter studies only focus on larger continuing units(size limitations of +5 and +20 employees in the Japanese and German study, respectively).

Table 7.3 Job flow rates. Manufacturing. Mean. Yearly rates.

Region	Year	Pop.	Unit	CP	Gross job creation	Gross job destruction	Net flow	Gross job reallocation	Net job reallocation	Source
Norway	1990	I	E[a]		9.5	10.7	-1.2	20.2	19.0[b]	Barth and Dale-Olsen(1997)
Norway	1977-86	I	E		7.1	8.4	-1.2	15.5	13.9[b]	Klette and Mathiassen(1996a,1996b)
Norway	1977-92	I	E		7.4	9.4	-2.0	16.8	14.6[b]	Salvanes(1997)
Norway	1990	I	E		8.6	10.9	-2.3	19.5	17.2[b]	Salvanes(1997)
Norway	1987-94	I:≥5	E		11.0[b]	13.0[b]	-2.0	24.0		Salvanes(1998)
USA	1973-93	I:≥5	E		8.8	10.2	-1.3	19.0	15.3[b]	Baldwin et al.(1998)
USA	1973-88	I:≥5	E		9.1	10.3	-1.1	19.4	15.4	Davis et al. (1996)
USA[g]	1979-83	I:≥5	ET[h]		10.2	11.5	-1.3	21.6		Anderson and Meyer(1994)
Michigan	1978-88	I[e]	F		6.2	8.5	-2.3	14.7		Foote(1997)
Denmark	1980-91	I	E	30	12.0	11.5	0.5	23.5	21.3[b]	Albæk and Sørensen(1998)
Denmark	1980-95	I	E	30	11.7	11.7	0	23.4		Bingley et al.(1999)
Sweden	1986-95	I	E	50	8.0	10.3	-2.2	18.3	13.5	Persson(1998)
Finland	1988-96	I	E[a]		12.3[b]	14.1[b]	-1.8[b]	26.4[b]	19.7[b]	Ilmakunnas and Maliranta(1999)
Finland	1988-96	I:≥5	E		6.7[b]	9.8[b]	-3.0[b]	16.4[b]	12.7[b]	Ilmakunnas and Maliranta(1999)
Australia	1984-85	I	E		16.1	13.2	3.9	29.3		Borland and Home(1994)
Australia	1979-92	I	Industry		2.3	4.3	-2.0	6.6		Borland (1996)
Canada	1974-92	I:≥5	E		10.9	11.1	-0.2	21.9	18.9[b]	Baldwin et al.(1998)
Canada	1978-92	I	F		9.4	10.3	-0.9	19.7		Picot and Dupuy (1998)
Chile	1976-86	I	E		13.0	13.9	-1.0	26.8		Roberts(1996)
Colombia	1977-91	I	E		12.5	12.2	0.3	24.6		Roberts(1996)
France	1984-92	I	F		11.6	13.6	-2.0	25.2[c]	23.2	Gourinchas(1999)
France	1985-91	I	F		10.2	11.0	-0.8	21.2		Nocke(1994)
Germany[g]	1979-93	I:≥20[f]	E		4.5	5.2	-0.7	9.7		Wagner(1995)
Ireland	1974-94	I	E		8.4	8.9	-0.5	17.3	14.9	Strobl et al.(1998)
Israel	1970-94	I	E		9.7	8.2	1.4	17.9		Gronau og Regev(1996)
Morocco	1984-89	I	F		18.6	12.1	6.5	30.7		Roberts(1996)
Netherlands	1979-93	I	F		7.3	8.3	-1.0	15.6		Gautier(1997)
UK	1973-86	I: kun store	F		1.6	5.6	-3.9	7.2	2.8[b]	Konings (1995)
Japan	1990-95	Industri:≥5[f]	B		3.2[k]	4.0[k]	-0.8[k]	7.2[k]		Genda(1998)

Note: Pop.: T denotes total economy, P denotes private sector and I denotes manufacturing. Number after letter code for population, denotes minimum requirement regarding unit-specific number of employees. Unit: E denotes establishment, ET denotes both firm and establishment, while F denotes firm. Column headed by CP denotes correction procedure: number in this column denotes the requirement for the percentage of identical employees observed on two different establishment identification numbers needed for merging these establishment identification numbers into one joint identification number. [a] denotes that establishment is defined by employer's PIN-code in the register of employer and employees. Studies from Norway use 11-digit employer PIN-code that defines the establishment, however this number may as an exception be linked to a firm. Establishment is also the unit in Finland. [b] denotes own calculation on published results. [c] denotes own calculation on data utilised in Barth and Dale-Olsen (1997, 1999). [d] denotes that in figures for total economy construction is excluded. [e] denotes that only establishments attached to the unemployment insurance system are included. [f] denotes that only continuing establishments are included. . [g] denotes that for the US that only selected states are included, while it for Germany denotes the state of Lower Saxon. [h] denotes that unit-level varies among the reporting units, i.e., unit may be establishment, firm or other legal unit. [i] denotes that governmental sector and the primary, mining and construction industries are not included in the analysis. [j] denotes that public administration and defence, farming sector as well as social services, diplomatic, religious and philantropical organisations are not included. [k] denotes that job flows are calculated in per cent of base year, and not in per cent of mean employment. The figures from Gautier (1997) are reported in Davis and Haltiwanger (1999). Dunne et al. (1989) report for the US mean 5 years gross job creation, gross job destruction, net growth and gross job reallocation rates for the period 1973-93 of 29.6 per cent, 30.9 per cent, -1.3 per cent and 60.5 per cent.

Gross flows from Michigan, France, Morocco, Netherlands and Picot and Dupuy's figures for Canada are based on firms as reporting units. Gross job reallocation rates based on firm as unit range from around 15 per cent in the Netherlands and Michigan to more than 30 per cent in Morocco. Morocco experiences a period of very strong net growth (over 6 per cent) during the period which the mean gross job reallocation rates are measured, and thus this study is rather difficult to compare to the other studies.

Nocke's study and Picot and Dupuy's study of French and Canadian manufacturing firms, respectively, report gross job reallocation rates of 20-21 per cent (Nocke, 1994, Picot and Dupuy, 1998). Gourinchas study of French manufacuring firms reports figures somewhat higher (+4 percentage points)(Gourinchas, 1999). A comparison between Picot and Dupuy's study of Canadian manufacturing firms with Baldwin et al.'s study of Canadian manufacturing establishments (Picot and Dupuy, 1998, Baldwin et al., 1998), shows once more that gross job flows among establishments are larger than gross job flows among firms. Also, Baldwin et al. have invoked a size limitation, i.e., they only consider establishments with at least five employees. Thus, the figures in Baldwin et al. (1998) are deflated.

The differences between the Nordic countries as far as the gross job flows are concerned, are greater at the industry level than for the economy as a whole. In particular, the Finnish figures from the Finnish equivalent of the register of employer and employees are large, with, e.g., a gross job reallocation of 26.4 per cent. The Finnish figures for gross job flows based on clearly defined establishments are less, with a gross job reallocation of 16.4 per cent. But here a size limitiation is invoked, in that the figures are based on establishments with at least five employees only. Figures from Sweden and Denmark are based on data where a correction procedure has been invoked, thus these figures are rather comparable. Gross job reallocation in Danish manufacturing is higher than the corresponding flows in Swedish manufacturing (23 per cent vs. 18 per cent, respectively), so therefore, the figures for the manufacturing sector in these countries do not deviate from what we found in the total economy.

Table 7.3 presents figures from several Norwegian studies. The reported figures for gross job reallocation range from 15.5 per cent to 24 per cent. This clearly shows the difficulties one meets when drawing inferences on institutional matter from aggregated job flows. However, we do know the explanation to some of the variation in the reported figures.

Firstly, the figures from Barth and Dale-Olsen (1997) for 1990 are based on employers as reporting units, where the employer's identifying number is defined on the establishment level. Due to the rules regarding the employer's ID-number in the registers of employers and employees, even if the employer's ID-number is defined on the establishment level, it is

vulnerable to institutional and legal changes at the firm level. Thus, the gross job flows in Barth and Dale-Olsen (1997) are inflated, and may be regarded as an upper limit. Salvanes (1997) uses establishments as reporting units, and reports lower figures for 1990 (19.5 per cent).

Secondly, Norway experienced a recession in 1990. Many studies identify a contra-cyclical pattern of gross job reallocation, thus this explains why Klette and Mathiassen (1996a) report lower yearly mean gross job reallocation than Salvanes (1997). The period Klette and Mathiassen (1996a) study, does not include the recession years that occurred late 1980s and early 1990s.

In some ways, Salvanes (1998) deviates somewhat from this pattern that we have sketched out above. A yearly mean gross job reallocation rate of 24 per cent is clearly the highest value reported for Norwegian manufacturing. However, this may be caused by the population of jobs being restricted to what is defined as main jobs. In Salvanes (1998) every individual is restricted to having one job only. Thus, since this reduces the total number of jobs, the denominator in the rates is lowered, making the rates larger. What we do not know, is whether or not the main jobs are more stable than the secondary jobs.[4] This of course, has an impact on the numerator in the rates. If the main jobs are more stable than the secondary jobs, this weakens the effect described above. If on the contrary, the main jobs are less stable than the secondary jobs, this strengthens the effect.

Another interesting question that would have an impact on our interpretation of table 7.3, is whether except for business cycle effects, the gross job flows are stable through time or if they are influenced by trend-effects as well.

The main impression we got from this survey of the Norwegian studies, is that the mean gross job reallocation among Norwegian manufacturing establishments is around 16 - 17 per cent. This is based on the figueres from the studies of Klette and Mathiassen (1996a, 1996b) and Salvanes (1997). Both studies reports mean goss job reallocation rates covering the longest periods. Salvanes (1998) deviates from this level, and possible reasons are discussed above. Introducing a correction procedure would lower this level further. Thus, this means that even if Norwegian manufacturing is not the least flexible compared with the manufacturing sector in other countries, it clearly belongs among the lower ranked.

Next we turn to worker and churning flows. Previously, we showed that a big heterogeneity in job reallocation rates existed between countries. Is this hetereogenity also reflected in worker and churning flows? Table 7.4 presents mean yearly worker and churning flows for the total economy and the private sector only. Recognise that studies of worker flows are less abundant, thus fewer countries are included in the cross-country comparison.

4 In our data it appears that the secondary jobs are more stable than the main jobs.

Table 7.4 Worker flow rates. Total economy and private sector. Mean. Yearly rates.

Country	Year	Pop.	Unit	CP	Hires	Sepa-rations	Job creation relative to hires	Job destruc-tion relative to separations	Worker flow	Churning flow	Source
Norway	1990	T	E[a]						36.8	17.9	Barth and Dale-Olsen (1999)
Norway	1990	T	E[a]						54.8[m]	35.9[m]	Barth and Dale-Olsen (1997)
Norway	1990	P	E[a]						40.3	17.9	Own calucaltion[c]
Denmark	1980-95	T	E	30	29.4	28.8	42.2[b]	40.6[b]	58.2	34.1[b]	Bingley et al. (1999)
Denmark	1980-95	P	E	30	31.9	31.5	45.1[b]	44.4[b]	63.4	35.0[b]	Bingley et al. (1999)
Sweden	1986-95	T[d]	E	50	24.7	25.6	45.3[b]	47.3[b]	50.3	27.0[b]	Persson (1998)
Netherlands	1990[g]	T:≥10	F		11.9	10.1	33.6[b]	21.8[b]	22.0	15.8[b]	Hamermesh et al. (1996)
Netherlands	1971-91	T[n]	F		16.3	15.7			32.0		Gautier(1997)
France	1990-91	P[f]	F						58.0	50.8	OECD (1996)
Germany	1985-90	T	E		31.6	30.4			62.0		OECD (1996)
Italy	1985-91	P[e]	F		34.5	33.5			68.0[b]	45.8	Contini et al. (1996a, 1996b), OECD(1996)
Japan	1991-95	T: ≥5[f]	E		20.2	18.9			39.1	30.9[b]	OECD (1996)

Note: Pop.: T denotes total economy, P denotes private sector and I denotes manufacturing. Number after letter code for population, denotes minimum requirement regarding unit-specific number of employees. Unit: E denotes establishment, ET denotes both firm and establishment, while F denotes firm. Column headed by CP denotes correction procedure: number in this column denotes the requirement for the percentage of identical employees observed on two different establishment identification numbers needed for merging these establishment identification numbers into one joint identification number. [a] denotes that establishment is defined by employer's PIN-code in the register of employer and employees. Studies from Norway use an 11-digit employer PIN-code that defines the establishment, however this number may as an exception be linked to a firm. Establishment is also the unit in Finland. [b] denotes own calculation on published results. [c] denotes own calculation on data utilised in Barth and Dale-Olsen (1997, 1999). [d] denotes that in figures for the total economy construction is excluded. [e] denotes that only establishments attached to the unemployment insurance system are included. [f] denotes that only continuing establishments are included. [h] denotes that unit-level varies among the reporting units, i.e., unit may be establishment, firm or other legal unit. [i] denotes that governmental sector and the primary, mining and construction industries are not included in the analysis. [j] denotes that public administration and defence, farming sector as well as social services, diplomatic, religious and philantropical organisations are not included. [g] denotes that the two yearly rates, i.e., from 1988 to 1990. [m] denotes that the worker flow rates are calculated from all hires and all separations, and not only as is customary from hires and separations of employment spells active on one of the sampling dates. [n] denotes that it is not known whether the reported figures for worker flows express total economy worker flows or manufacturing only. See Schøne et al. (1999) for analysis of governmental sector in Norway , and see Persson (1998) and Andersson and Meyer (1994) for analysis of public sector in Sweden and selected states in the USA, respectively. The figures from Gautier (1997) are reported in Davis and Haltiwanger (1999).

First, we focus on the Norwegian studies. We have not discovered studies of worker flows covering several years of neither the total economy nor the private sector in Norway. Thus, we have two sources only, that report total economy or private sector worker flows (Barth and Dale-Olsen(1999) for 1990, and our figures presented in section 6). Norway experienced a recession in 1990, while it experienced a boom in 1997. Thus, our figures represent two different phases of the business cycle.

The gross job flow figures are based on the same source of information, the register of employers and employees. However, direct comparisons are made difficult, since the 4.quarter 1995 saw a changing of what was defined as the reporting unit. As we have previously noted in section 3 and 4, we expect the figures for 1990 to be inflated due to the impact of institutional

and legal changes on the firm level. Thus, even if a difference of 8 per cent between the 1990 figures and the 1997 figures can be explained as business cycle effect, it should be noted that this difference should be even greater when taking into account the inflation of the job reallocation rates due to the impact of institutional and legal changes on the firm level. Notice also, that the private sector turnover is higher than the turnover in the total economy.

Only one of eigth countries appears to have lower worker flows than Norway, i.e., the Netherlands. In addition, Japan appears to have worker flows on level with worker flows in Norway. However, we know that both the Dutch studies are based on firms as reporting units, and one of the Dutch studies uses information from firms with at least ten employees only. Thus, the reported level of worker flows would be higher if the figures instead had been based on all establishments instead. The Japanese figures are based on continuing large establishments only. Since exit and entry of establishments create worker flows, the reported Japanese worker flows would have been higher if they had been measured for all establishments, instead of continuing large establishments only .

Thus, after this discussion, we conclude that worker flows in the total economy in Norway are lower than worker flows in many comparable countries. Is this true for the private sector as well? Studies from Italy, France and Denmark report figures that are clearly higher than the corresponding Norwegian figures.

While "manucentrism" resulted in several studies of job flows that focused on manufacturing only, this is not true for worker flows. Table 7.5 presents yearly mean worker and churning flows from the manufacturing sector. In Norway, turning to studies of the manufacturing sector only, brings new figures from only one more study (Salvanes, 1998). However, as for job flows, Salvanes (1998) deviates when it comes to the level of worker flows in the manufacturing sector. This deviation is explained previously in this paper, and in a comparison we have to regard these figures with certain caution.

With the exception of Salvanes (1998), Norwegian manufacturing has lower worker and churning flows than the manufacturing sector in most countries. Figures for Sweden appear to be at the same level. However, figures from Sweden are based on a correction procedure, but we know that in the Norwegian data this had lesser impact in the manufacturing sector than in many other sectors.

Table 7.5 Worker flow rates. Manufacturing. Mean. Yearly rates.

Region	Year	Pop.	Unit	CP	Hires	Sepa-rations	Job creation relative to hires	Job destruc-tion relative to separations	Worker flow	Chur-ning flow	Source
Norway	1990	I	E[a]						35.6	15.4	Barth and Dale-Olsen(1999)
Norway	1990	I	E[a]						61.8[m]	41.6[m]	Barth and Dale-Olsen(1997)
Norway	1987-94	I:≥5	E		21	23			44	21	Salvanes(1998)
Denmark	1980-91	I	E	30	28.5	28.0	42.1	41.0	56.5[b]	33.0[b]	Albæk and Sørensen (1995, 1998)
Denmark	1980-95	I	E	30	27.6	27.6	42.4[b]	42.4[b]	55.2[b]	31.8[b]	Bingley et al.(1999)
Sweden	1986-95	I	E	50	18.3	20.5	43.7[b]	50.2[b]	38.8	20.5	Persson(1998)
Finland	1988-96	I	E[a]		22.2[b]	24.0[b]	55.4[b]	58.8[b]	46.2[b]	19.7[b]	Ilmakunnas and Maliranta(1999)
Italy	1985-91	I[e]	F		29.3	27.9			57.2[b]		Contini et al. (1996a, 1996b)

Note: Pop.: T denotes the total economy, P denotes the private sector and I denotes manufacturing. Number after letter code for population, denotes minimum requirement regarding unit-specific number of employees. Unit: E denotes establishment, ET denotes both firm and establishment, while F denotes firm. Column headed by CP denotes correction procedure: number in this column denotes the requirement for the percentage of identical employees observed on two different establishment identification numbers needed to merge these establishment identification numbers into one joint identification number. [a] denotes that establishment is defined by employer's PIN-code in the register of employer an employees. Studies from Norway use an 11-digit employer PIN-code that defines the establishment, however this number may as an exception be linked to a firm. Establishment is also the unit in Finland. [b] denotes own calculation on published results. [c] denotes own calculation on data utilised in Barth and Dale-Olsen (1997, 1999). [d] denotes that in figures for the total economy construction is excluded. [e] denotes that only establishments attached to the unemployment insurance system are included. [f] denotes that only continuing establishments are included. [h] denotes that unit-level varies among the reporting units, i.e., unit may be establishment, firm or other legal unit. [i] denotes that the governmental sector and the primary, mining and construction industries are not included in the analysis. [j] denotes that public administration and defence, farming sector as well as social services, diplomatic, religious and philantropical organisations are not included. [g] denotes that the two yearly rates, i.e., from 1988 to 1990. [m] denotes that the worker flow rates are calculated from all hires and all separations, and not only as is customary from hires and separations of employment spells active on one of the sampling dates.

Table 7.6 presents mean quarterly worker and churning flow rates from the total economy, private sector and manufacturing only. These are mostly US studies, even if one focuses on Spain. These studies show that worker and churning flows are much higher in the US than in Europe (which is an assertion based on our figures from section 6 and Serrano (1998) only). This is as expected. The main difference between the US studies is a result of what kind of employment spells they include in their data. As Davis and Haltiwanger (1999) point out, Lane et al.'s data from Maryland eliminate employment spells of short durations. Thus, flows comparable to Anderson and Meyer's flows for permanent employees arise.

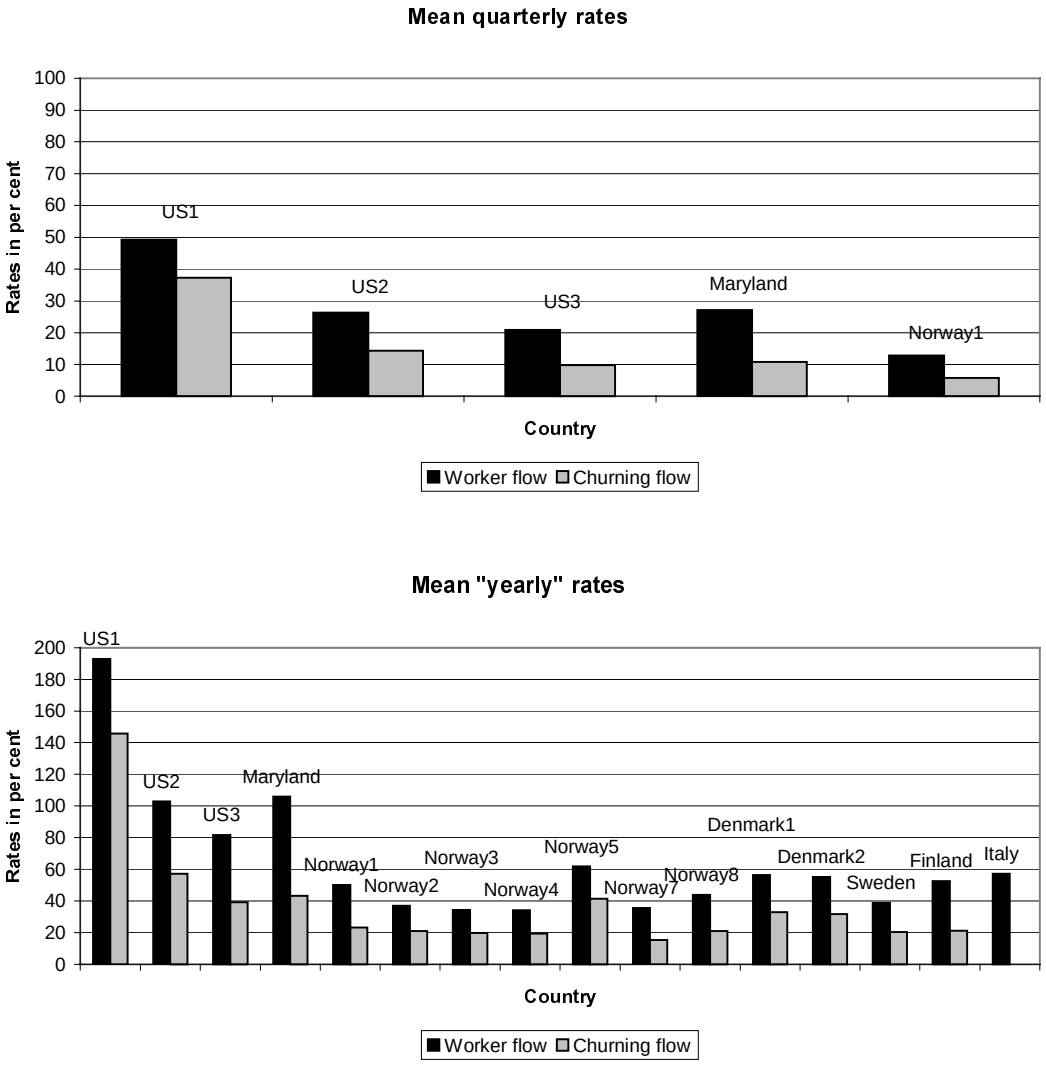
Table 7.6 Worker flow rates. Total economy, private sector and manufacturing. Mean. Quarterly rates.

Region	Year	Pop.	Unit	Hires	Separations	Job creation relative to hires	Job destruction relative to separations	Worker flow	Churning flow	Source
US[g]	1979-83	I[n]	ET[h]	24.7	24.6	23.5 [b]	25.2 [b]	49.3	37.3 [b]	Anderson and Meyer(1994)
US[g]	1979-83	I[n]	ET[h]	13.0 [k]	13.3 [k]			26.3 [k]	14.3 [kb]	Anderson and Meyer(1994)
US[g]	1979-83	T[n]	ET[h]	22.3	21.4	31.8 [b]	29.9 [b]	43.7	30.2 [b]	Anderson and Meyer(1994)
US[g]	1979-83	T[n]	ET[h]	16.2[k]	15.4[k]			31.6[bk]	18.2[kb]	Anderson and Meyer(1994)
Maryland	1985-93	I[e]	ET[h]	12.9	14.2	42.1	41.1	27.1	10.8	Lane et al.(1996)
Maryland	1985-93	P[ei]	ET[h]	18.4	18.7	49.1	49.7	37.1	18.8	Lane et al.(1996)
US	1972-81	I	E					20.9	9.8[b]	Davis and Haltiwanger (1998)
Spain	1993-94	T[i] ≥500	E	6.7	7.1	19.9	27.1	13.8	10.5	Serrano (1998)

Note: Pop.: T denotes the total economy, P denotes the private sector and I denotes manufacturing. Number after letter code for population, denotes minimum requirement regarding unit-specific number of employees. Unit: E denotes establishment, ET denotes both firm and establishment, while F denotes firm. Column headed by CP denotes correction procedure: number in this column denotes the requirement for the percentage of identical employees observed on two different establishment identification numbers needed to merge these establishment identification numbers into one joint identification number. [a] denotes that establishment is defined by employer's PIN-code in the register of employer and employees. Studies from Norway use an 11-digit employer PIN-code that defines the establishment, however this number may as an exception be linked to a firm. Establishment is also the unit in Finland. [b] denotes own calculation on published results. [d] denotes that in figures for the total economy construction is excluded. [e] denotes that only establishments attached to the unemployment insurance system are included. [f] denotes that only continuing establishments are included. [h] denotes that unit-level varies among the reporting units, i.e., unit may be establishment, firm or other legal unit. [i] denotes that the governmental sector and the primary, mining and construction industries are not included in the analysis. [i] denotes that public administration and defence, farming sector as well as social services, diplomatic, religious and philantropical organisations are not included. [g] denotes that the two yearly rates, i.e., from 1988 to 1990. [m] denotes that the worker flow rates are calculated from all hires and all separations, and not only as is customary from hires and separations of employment spells active on one of the sampling dates. [n] denotes that the study is limited to cover only units that employ at least 50 employees once during the period of study.

We wish to compare the US quarterly flows with the European yearly flows. Thus, we annualise the quarterly flows by multiplying them by the ratio of yearly flow to quarterly flow, where the yearly and quarterly flows are from the Norwegian figures of section 6. This gives us a very rough estimate on the US yearly rates. The result is presented in figure 7.1. We see that the worker and churning flows in the US manufacturing establishments are larger than the corresponding European flow rates.

Figur 7.1 A cross-country comparison of worker and churning flows in the manufacturing sector.



Note: Figures are from table 6.2, table 6.3, table 7.5 and table 7.6. Studies are denoted the same in both figures. The difference between the two figures, is that the mean quarterly rates in the uppermost figure, are transformed into yearly mean rate, by multiplying the mean quarterly rates by the ratio between yearly rates and quarterly rates in section 6. US1 and US2 refer to Anderson og Meyer (1994) based on all employment spell and permanent employment spells, respectively. US3 refers to Davis and Haltiwanger (1998). Maryland refers to Lane et al. (1996). Norway1 refers to figure from table 6.1 for all establishments. Norway2, Norway3 and Norway4 refer to figures from table 6.1 for all establishments, all firms, firms and establishments with at least five employees only. Norway5 and Norway7 refer to Barth and Dale-Olsen (1997) for all establishments inclusive employment spell starting and stopping between the stock sampling dates and all establishments, respectively. Norway 8 refers to Salvanes (1998). Denmark1 and Danmark2 refer to Albæk and Sørensen (1998) and Bingley et al. (1999), respectively. Sweden, Finland and Italy refer to Persson (1998), Ilmakunnas and Maliranta (1999) and Contini et al. (1996a, 1996b).

8. Conclusions

This paper had two goals. Firstly, we wanted to explore the impact of decisions made during data construction on job and worker flows. Secondly, we wanted to utilise this knowledge in a cross-country comparative analysis of job and worker flows. We feel we have achieved both our goals.

We show that decisions taken during data construction clearly influence the reported job and worker flows. Calculating gross job and worker flows on firm data lowers the rates compared to using establishment data. Invoking a lower cut-off by focusing on establishments or firms with at least 5 employees only, lowers the reported job and worker flows compared to using unrestricted data. Utilising data sampled on a quarterly basis, and comparing mean quarterly job and worker flow rates to mean yearly rates, show that mean quarterly rates are lower than yearly rates. However, making "yearly" rates by adding the quarterly rates over all four quarters or multiplying the mean quarterly rates by four, makes a "yearly " rate that is an overestimate of the true yearly job and worker flow. Finally, by invoking a correction procedure to eliminate job creation and job destruction due to administrative changes, clearly reduces the job and worker flows.

The comparative analysis shows that the job and the worker mobility in Norway is lower than job and worker flows in many other countries. This conclusion deviates somewhat from conclusions in previous studies. While these studies usually conclude that Norway has lower worker flows, most studies identify job flows in Norway as comparable to what we find in other countries. However, while our conclusion deviates from previous studies, it should be noted that the differences between the job flows in Norway and other comparable countries are not considerable. Also, no tests for statistical significance have been conducted. Thus, we have no way of knowing whether these differences that we have identified, are statistically significant. This is explored further in Dale-Olsen (2000).

Can we utilise our knowledge in drawing inferences about cross-country differences in policy and institutional matters? At this stage, one should take the warnings of Davis and Haltiwanger seriously. But one should also remember that the limitation in the availability of comparable micro data from several countries, makes it rather inextricable to analyse institutional matters. In addition, one may infer that the impact of differences in the data creation process has the same impact on micro level analysis as on aggregated figures. That said, we do not advocate that cross-country micro level comparisons should not be conducted. That is exactly what future research should focus on.

However, until these data are available, one has to "glean" out whatever information that is possible from the available aggregate measures. This paper shows the effects of some of the most common differences in comparative data on job and labour flows on the level of the flows. It also utilise this knowledge in a cross-country comparison of gross job and worker flows. However, it refrains from drawing inferences on institutional matters. But by utilising this knowledge, one may also draw qualitative inferences on institutional matter, and by using meta-analysis, one may utilise this knowledge in a quantitative multivariate comparative analysis of job and worker flows. This is explored more closely in Dale-Olsen (2000).

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