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Gartell, Marie, Jans, Ann-Christin & Helena
Persson

The importance of education for the reallocation of labor

Evidence from Swedish linked employer-employee data 1986-2002

The importance of education for the reallocation of labor: evidence from Swedish linked employer-employee data 1986–2002*

Marie Gartell**, Ann-Christin Jans[¤], Helena Persson[#]

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Abstract

Using employer-employee data covering the whole Swedish economy over a uniquely long time period from 1986 to 2002, we examine how job flows and worker flows have been distributed both on an aggregate level and across educational levels. We find that job and worker flows vary by educational level, not only with respect to magnitude and variation, but with respect to direction as well. Our results show that analyses that do not account for the educational level of workers can be very misleading.

Keywords: Linked employer-employee data, job and worker flows, education
JEL-codes: J23, J21, I20

Sammanfattning

Med hjälp av länkade arbetsställe-arbetstagardata studeras hur jobb- och arbetstagarflöden har utvecklas i den svenska ekonomin under perioden 1986-2002. Flödena studeras dels på aggregerad nivå, dels för olika utbildningsgrupper. Vi finner att den totala omsättningen av jobb varit kontracyklisk för de lägst utbildade men procyklisk för de högst utbildade. Detta resultat kan tolkas som att det är dyrare att säga upp högutbildad arbetskraft. Vi visar också att både efterfråge- och utbudsförändringar är viktiga för att förklara sysselsättningsförändringar för olika utbildningsgrupper.

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1   Introduction

There has been a proliferation of literature on job and worker flows in recent years.[1] Evidence from several countries has shown that firms and workers are heterogeneous and that a great deal of job creation and destruction, as well as hirings and separations of workers, occurs simultaneously. The flows of jobs and workers give evidence of the complexity of the dynamics on the labor market even when net employment does not alter much.

A shortcoming of most previous studies is that they cover short periods of time, and/or are limited to only one or few industries in the economy, mostly manufacturing. Although the heterogeneity of establishments is often taken into account, workers are generally treated as homogeneous. However, analyses of job and worker flows that do not account for the heterogeneity of workers can be very misleading. We contribute to previous literature by studying a very long period from 1986 to 2002, covering both upturns and downturns in the economy. Moreover, this study considers how job and worker flows are distributed for the whole of the Swedish economy.[2] We find that job and worker flows are substantial across years, and with huge variations. In addition, we decompose the workers into educational groups, and demonstrate that job and worker flows vary by educational level, not only with respect to magnitude and variation, but with respect to direction as well. Further, the volume of worker flows is more than twice as high as that needed to match job flows, and increases with educational level. Thus, much of the mobility on the labor market cannot be explained by the reallocation of jobs.

Due to the long period studied, and the widely fluctuating business cycle during this period, we have had a unique opportunity to analyze the cyclical pattern of job and worker flows. The question of whether or not job and worker flows are countercyclical has been discussed in many previous studies. If a countercyclical pattern has been found, it has often been explained by recessions being periods of intense restructuring activity in the economy. A number of models have been developed to incorporate the cyclical pattern of job and worker flows. Mortensen & Pissarides (1994) present a matching model of unemployment with endogenous job creation

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[1] See Abowd & Kramarz (1999) and Davis & Haltiwanger (1999) for overviews of studies using linked employer-employee data on job and worker flows. Flows of workers are presented in e.g. Hamermesh et al. (1994), Lane et al. (1996), Belzil (1997), Albæk & Sørenssen (1998), Abowd et al. (1999) and Salvanes & Førre (2003). See Andersson et al. (1998), Persson (1999), Arai & Heyman (2000), Andersson (2003) and Nordström Skans et al. (2006) for studies using Swedish data.

[2] Persson (1999) also covers the whole economy, but for a shorter time period (1986–1995).

and job destruction processes. During upturns it takes time to fill vacancies while during downturns, job destruction occurs immediately. Job turnover is thus countercyclical. Garibaldi (1998) extends the Mortensen & Pissarides model by allowing for employment protection legislation in the form of fixed firing costs. When firing is costly and time-consuming, the asymmetry in the cyclical pattern of job creation and job destruction disappears and job destruction becomes less responsive. Higher firing costs can result in acyclical or even procyclical movement of job reallocation (both acyclical and procyclical patterns have been found for some countries). When workers are treated as homogenous, we find that job reallocation in Sweden is countercyclical, which, according to Garibaldi, would suggest that firing costs are quite low. However, when we estimate correlations for different educational groups, we find job reallocation to be countercyclical for the lowest educated, acyclical for the medium educated and procyclical for the highest educated workers.

Previous studies on job and worker flows for the Swedish labor market have showed that job reallocation rates were of the same order of magnitude in 1995 as in the mid 1980s while worker reallocation rates had declined by more than 15 percent. Due to the short period covered, it was not possible, however, to tell whether this was an effect of the severe downturn in the beginning of the 1990s or whether it was a structural change towards lower levels of worker mobility. When examining job reallocation rates for a considerably longer period (1986–2002) we find job reallocation rates to be stable both in order and magnitude.[3] Turning to worker flows, we find that worker reallocation rates have exhibited a more volatile pattern, but without a trend and consequently find no support for decreased worker mobility in the Swedish labor market. In addition, we find (confirming previous results) that both job and worker flows are dominated by flows corresponding to existing establishments, while job creation due to new establishments and job destruction due to exiting establishments constitute a minor part.

In Sweden and many other industrialized countries, the last decades of the 20th century have been characterized by a strong relative shift in employment towards more highly-educated employees. In the same period, the supply of highly-educated workers increased while the labor market situation deteriorated for less educated workers. As mentioned above, job and worker flows exhibit clear cyclical patterns. However, we also need to study the long-run, structural pattern of flows

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[3] Contrary to our findings, Davis et al. (2005) find that job reallocation rates in the U.S. have experienced a downward trend in recent decades.
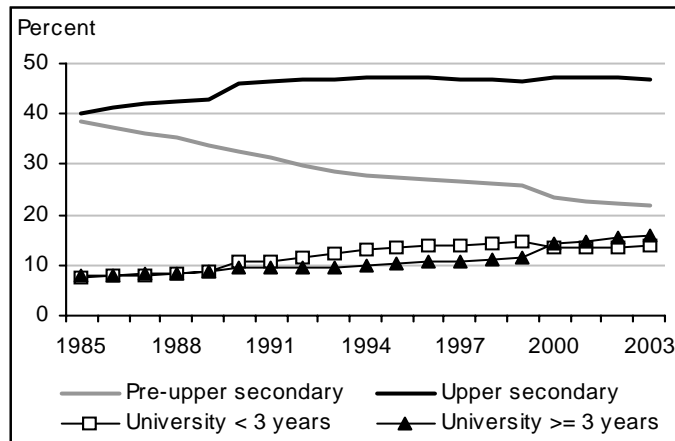
to increase the understanding of the underlying mechanisms responsible for the change in relative employment for different educational groups. A question previously addressed by Salvanes & Førre (2003) for Norway is whether it is supply or demand that is the driving force behind the change. The restructuring that went on during the 1990s could have been driven either by the birth of "new" jobs, where employers demanded new skills and assignments (demand effects), or by "old" jobs filled merely by more highly educated workers (supply effects), or by a combination of both. Our results indicate that the demand effect is important, but also that the increased supply of higher educated workers has been essential for the changes on the Swedish labor market.

We have structured the paper as follows: Section 2 presents a brief overview of the Swedish labor market, and Section 3 describes the data. Section 4 includes the definitions of job and worker flows. Section 5 presents the estimated flows for the whole population and Section 6 presents the estimated flows for educational groups. In Section 7, the long-run reallocation for different educational groups is investigated. The paper ends with conclusions in Section 8.

2   Characteristics of the Swedish labor market

Here follows a brief overview of the Swedish labor market to serve as a background to our findings. As in most other countries, the Swedish labor market has experienced a decrease in the supply of less educated workers. *Figure 1* shows that the supply of workers educated only to pre-upper secondary level, as a share of the total labor force, declined from 39 percent in 1985 to 22 percent in 2003. Conversely, the supply of university-educated workers increased from 15 percent in 1985 to 30 percent in 2003.

Figure 1. Educational distribution in the labor force among those aged 16–64 years, 1985–2003

Our study covers the period 1986-2002, which includes both upturns as well as downturns in the economy. Indeed, the period covers the deepest recession in Sweden since the Great Depression in the 1930s. Employment increased during the late 1980s and peaked in 1990 with more than 4.5 million employees. This period was followed by a deep economic downturn and a decline to 3.9 million employees at the end of the 90s. Although employment has recovered since 1997, employment is still lower than in 1987. Between 1987 and 2003, the total employment figure decreased by around 80 000. Unemployment increased from very low levels, from around 1.5 percent at the end of the 1980s to over 8 percent in 1993. At the beginning of the 2000s unemployment had fallen to around 4–5 percent.

The decline in employment has, however, not been evenly distributed across educational groups. Relative employment for different groups is presented in the left-hand section of *Figure 2*. People with the lowest levels of education have also had the lowest rate of employment throughout the period. Moreover, employment rates have declined for every educational group between 1987 and 2003, but the decrease has been most pronounced for the least educated group.

Figure 2. Employment and unemployment rates for different educational and age groups, 1987–2003

Percent	**Employment by educational level**	Percent	**Unemployment by educational level**

Pre-upper secondary — Upper secondary
University < 3 years — University >= 3 years
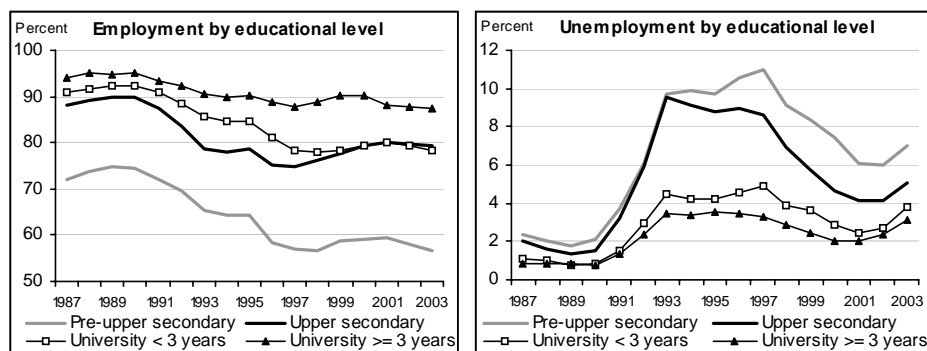
Source: AKU, Statistics Sweden.
Note: Between 1995 and 1996, of those outside of the labor force, 70 percent of the group with no defined education went on to receive a defined education. These people are therefore found in the other educational groups from 1996 and onwards. As a result, employment rates decreased in 1996 since the denominator then became larger for each educational group.

As is clear from *Figure 1*, the supply of lesser-educated people has fallen. Even so, from 1992 and onwards, unemployment for the less-educated has been higher than for all other educational groups. The unemployment rates for different groups is presented in the right-hand section of *Figure 2*.

3 Data

Annual employer-employee linked data from IFAU/Statistics Sweden has been used to study job flows and worker flows. The basic observational unit underlying job and worker flows is the establishment: the physical location where the production takes place. A company or firm is a legal economic entity that encompasses one or more establishments.

The Swedish Employment Register contains the whole population aged 16 or above, in November each year. The connection to the employer of all those employed or self-employed in November is denoted by the identity numbers of the firm and the establishment where each individual had his or her main work. These

identity numbers are taken from the Business Register (CFAR).[4] Establishment level data contains information on its geographical location, industry, total number of employees and form of ownership. In addition to information on the employer and the establishment, individual level data contains detailed information on various individual specific variables such as education, age, country of birth, annual earnings, and marital status.

Establishment-level data is preferred to firm-level data, since the former allows for observation of flows between establishments within one and the same firm. Nevertheless, we still fail to capture some flows within establishments, since aggregation at establishment level means that some of the turnover of jobs and workers is unaccounted for. Consequently, job gains and losses as well as hirings and separations within the establishment cancel each other out, while only those between establishments are accounted for. Although this is standard occurrence in the literature, it introduces a downward bias in the estimates of flows, as does the fact that we only observe the number of jobs and workers in November each year. The use of annual data means that we will not be able to observe if a job is created and destroyed, or whether a worker is hired and then quits the same establishment between the November of one year to the next. However, the annual flow measure provides a better indicator of permanent job reallocation activity. Moreover, since seasonal employment is low in November,[5] its selection as the month of observation means that the figures are not much affected by this phenomenon.

The establishment level panel was constructed by linking annual information for observed establishments over time.[6] By comparing successive years, existing establishments, entries and exits were defined in the following way: if a unit had a new establishment number or if the establishment number was not found during the preceding three years, the establishment was coded as an entry (new establishment); if a previous unit had disappeared and/or did not turn up during the following three years, the unit was considered to be an exit (closure). Units with the same establishment code as in the previous year were coded as existing establishments (survivors). The majority of the establishments, around 87 percent, had

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[4] Distinguishing the births and deaths of establishments from changes in organisational structure, ownership or administrative identifiers may be a problem when CFAR identity number are used, resulting in overestimated job and worker flows, especially due to "false" entries and exits.
[5] Davis et al. (1996) show that most of the job creation and job destruction captured by quarterly figures reflect establishments-level employment changes that are revised within a year, and Burgess et al. (2000) found that over 20 per cent of employment spells dissolves within a quarter.
[6] Note that we are not following workers over time, the basic observational unit is the establishment.

information for all years they existed. Those establishments where annual informa-
tion was missing for only one or at most two successive years were treated as
continuing. Finally, establishments where annual information were missing for
more than 2 successive years (around 2 percent of them) were coded as closures
and as new establishments when reappearing.

Some additional restrictions were also applied. Firstly, the analysis considers
only establishments that, on average, had at least 5 employees during the estab-
lishment's observation period. This restriction might mean that reported job and
worker flows will be somewhat biased downwards, since smaller establishments
tend to be more volatile with respect to employment. Secondly, employees with
several employers have been linked only to their main employer, the employer
from whom they have received the highest salary. Thirdly, employees with annual
earnings less than one base amount[7] have been excluded. Due to lack of informa-
tion in the data we can not distinguish between workers with full-time or part-time
jobs. Workers, as such, are given the same weight as long as the earnings restric-
tion is fulfilled.

After data cleaning and exclusions due to restrictions, annual information
regarding approximately 110 000 establishments and 3 000 000 employees
remained. The data consists of all establishments and their employees in Sweden
aged 16–64 years for the period 1986–1989, and 16–65 years for the period 1990–
2002. The strength of the data is the combination of detailed employee and estab-
lishment information and the very long observation period, covering both a deep
economic downturn and a subsequent recovery period. Until now, such detailed
data has not been used in analyzing job and worker flows for the Swedish labor
market.

4　Job flows and worker flows in Sweden 1986 to 2002

Changes in employment are a result of changes in the supply and demand of labor.
Compared to the extensive theoretical and empirical research that has been
conducted on labor supply, much less has been related to labor demand. The most

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[7] The amount differs across years. During the period studied, one base amount varied between 23 300
SEK in year 1981 and 37 900 SEK in year 2002. The base amount corresponded in 2002 to slightly less
than two monthly average full-time salaries.

important explanation for this is probably the difficulty in obtaining relevant data on establishments and firms. However, since the 1990s, there have been a number of international studies using large linked employer-employee data sets. Studies of several countries have shown that establishments are heterogeneous and that considerable job creation and job destruction flows co-exist at all phases of the business cycle and in all sectors. Some studies have covered both job flows and worker flows. They also find considerable numbers of hirings and separations taking place simultaneously. However, the research in this area is still relatively new.

The study of flows is important in many aspects. Higher rates of job creation and destruction mean larger numbers of workers are compelled to shuffle between jobs and, most likely, there is a greater incidence of unemployment.[8] For a given net growth rate, higher rates of job creation make it easier for displaced workers and labor market entrants to find employment, and higher rates of job destruction imply less job security for employed persons.

4.1   The concept of job flows

We follow the conventions adopted by Davis & Haltiwanger (1990, 1992) regarding the definitions of job creation and job destruction rates. A job means an employment position occupied by a worker. We use net employment changes as a measure of the business cycle.

Let $E_{(i,t)}$ be employment at establishment i in year t. Then "job creation" (JC) and "job destruction" (JD) are defined as:

$$JC_{(i,t)} = E_{(i,t)} - E_{(i,t-1)} = \Delta E_{(i,t)} \qquad \text{if } \Delta E_{(i,t)} > 0 \qquad (1)$$
$$JD_{(i,t)} = E_{(i,t)} - E_{(i,t-1)} = - \Delta E_{(i,t)} \qquad \text{if } \Delta E_{(i,t)} < 0 \qquad (2)$$

The size of the establishment in year t is defined as the average employment of the two years t and t-1. That is

$$\text{Establishment size} = X_{(i,t)} = \tfrac{1}{2}(E_{(i,t)} + E_{(i,t-1)}) \qquad (3)$$

Dividing JC and JD by the average employment, X, gives us the job creation rate (JCR) and the job destruction rate (JDR).

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[8] Davis et al. (1996), p.11.

JCR is the sum of all jobs created by new establishments (ENTRY) and by expanding establishments (EXP), that is, establishments increasing the number of employees between t-1 and t, divided by total employment. The $JCR_{(t)}$ is defined as:

$$JCR_{(t)} = \sum_{i \in I_t} \left(\frac{\Delta E_{(i,t)}}{X_{(t)}} \right) \text{if } \Delta E_{(i,t)} > 0 \tag{4}$$

$$X_{(t)} = \sum_{i \in I_t} X_{(i,t)} , \; I_t = \text{all establishments in year } t. \tag{5}$$

JDR is the sum of all jobs destroyed by closing establishments (EXIT) and by contracting establishments (CONT), that is, establishments reducing their number of employees between t-1 and t, divided by total employment. The $JDR_{(t)}$ is defined as:

$$JDR_{(t)} = \sum_{i \in I_t} \left(\frac{-\Delta E_{(i,t)}}{X_{(t)}} \right) \text{if } \Delta E_{(i,t)} < 0 \tag{6}$$

The *net employment change* (NET) is the difference between the job creation rate and job destruction rate:

$$NET_{(t)} = JCR_{(t)} - JDR_{(t)} \tag{7}$$

The *job reallocation rate* (JRR) is the sum of the creation rate and the destruction rate, and is a measure of employment reshuffle across establishments:

$$JRR_{(t)} = JCR_{(t)} + JDR_{(t)} \tag{8}$$

4.2 The concept of worker flows

The flows of workers are measured as the number of workers moving in and out of establishments, i.e. "hirings" and "separations".[9] Note that there may be hirings and separations even if the net job change at the establishment is zero.

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[9] We follow the definitions by Burgess et al. (2000).

Both individuals employed to replace separations, and those employed in new jobs are defined as hirings. Let $H_{(i,t)}$ denote the number of workers at the establishment in year t who did not work there in year t-1. The *hiring rate* ($HR_{(t)}$) can then be defined as:

$$HR_{(t)} = \sum_{i \in I} \left(\frac{H_{(i,t)}}{X_{(t)}} \right) \qquad (9)$$

Separations may be voluntary (quits) or involuntary (lay-offs). Let $S_{(i,t)}$ denote the number of workers at the establishment in year t-1 who do not work there in year t. The *separation rate* ($SR_{(t)}$) can then be defined as:

$$SR_{(t)} = \sum_{i \in I} \left(\frac{S_{(i,t)}}{X_{(t)}} \right) \qquad (10)$$

The difference between the hiring and separation rates is the same as the difference between job creation and job destruction rates, which is the net employment change. That is:

$$JCR_{(t)} - JDR_{(t)} = HR_{(t)} - SR_{(t)} = NET_{(t)} \qquad (11)$$

The *worker reallocation rate* ($WRR_{(t)}$) is defined as:

$$WRR_{(t)} = HR_{(t)} + SR_{(t)} \qquad (12)$$

The relation between worker flows, job flows and changes in employment can be described as follows:

$$WRR_{(t)} \geq JRR_{(t)} \geq NET_{(t)} \qquad (13)$$

The so-called *churning rate* ($ChR_{(t)}$) is the difference between worker flows and job flows. It shows the volume of worker flows in excess of what is needed to meet job flows and can be initiated by either the employer or the employee. The churning rate is defined as:

$$ChR_{(t)} = WRR_{(t)} - JRR_{(t)} \qquad (14)$$

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4.3 Flows across groups

So far, jobs and workers have been treated as homogeneous, but job and worker flows are not evenly distributed across groups. The types of workers who lose their jobs at contracting and closing establishments, need not be the same as those who get the new jobs at new and expanding establishments. In order to take this heterogeneity into account, we examine the educational level of workers who get new jobs and of those who lose old ones. We break down the flows further into four groups of educational level: pre-upper secondary, upper secondary, university less than 3 years, and university 3 years or more.

For each group of individuals, the sum of the changes in employment between two consecutive years at an establishment is divided by the total employment for the same group of individuals. The aggregate job creation rate of educational group j is the aggregate increase in jobs for group j for establishments expanding in group j, divided by the number of jobs for group j. The job destruction rate is defined in a similar way by the aggregate reduction of educational group j using the mean of the present and previous size of group j as the denominator.

$$\text{JCR}_{(j,t)} = \sum_{i \in I_t} \left(\frac{\Delta E_{(i,\,j,\,t)}}{X_{(j,\,t)}} \right) \text{if } \Delta E_{(i,\,j,\,t)} > 0 \tag{15}$$

$$\text{JDR}_{(j,t)} = \sum_{i \in I_t} \left(\frac{-\Delta E_{(i,\,j,\,t)}}{X_{(j,\,t)}} \right) \text{if } \Delta E_{(i,\,j,\,t)} < 0 \tag{16}$$

$$X_{(i,j,t)} = \tfrac{1}{2}(E_{(i,j,t)} + E_{(i,j,t-1)}), \ X_{(j,\,t)} = \left(\sum_{i \in I} X_{(i,\,j,\,t)} \right) \tag{17}$$

The hiring rates and separation rates for group j of workers are defined in a similar way:

$$\text{HR}_{(j,t)} = \sum_{i \in I} \left(\frac{H_{(i,\,j,\,t)}}{X_{(j,\,t)}} \right) \tag{18}$$

$$\text{SR}_{(j,t)} = \sum_{i \in I} \left(\frac{S_{(i,\,j,\,t)}}{X_{(j,\,t)}} \right). \tag{19}$$

The rates are presented separately for establishments that enter the market, that increase employment, that reduce employment, that have the same number of people working between two years (stable establishments) and, finally, that exit the market.

5 Estimated flows for the whole population

5.1 Job flows

The net employment change and estimated rates of job creation and job destruction for the period 1986/87 to 2001/02 are shown in *Figure 3*, the rates figures are presented in the appendix, Table A1. Net employment increased by an average of 0.2 percent each year, but with large variations between single years from 2.6 percent 1999/00 to -4.6 percent 1991/92. The net employment change results from large creations and destructions of jobs that occur simultaneously. Each year, on average 10.4 percent of all jobs were created and 10.2 percent were destroyed.

Figure 3. Annual rates of total job destruction and job creation, 1986/87 to 2001/02, percent
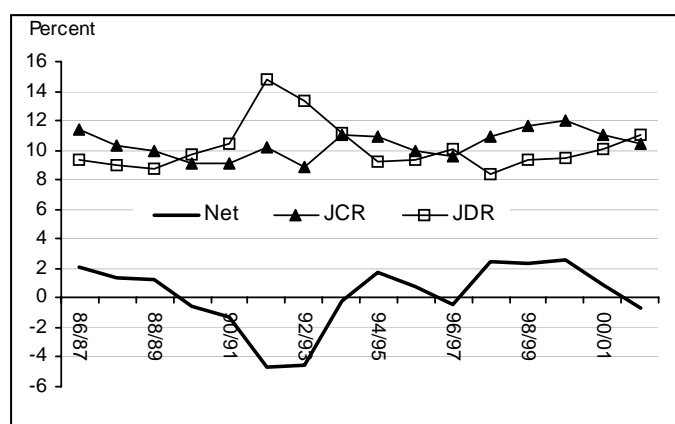
Source: The IFAU data base.

Figure 4. Annual rates of job destruction at contracting establishments and exits, and rates of job creation at expanding establishments and entries, 1986/87 to 2001/02, percent
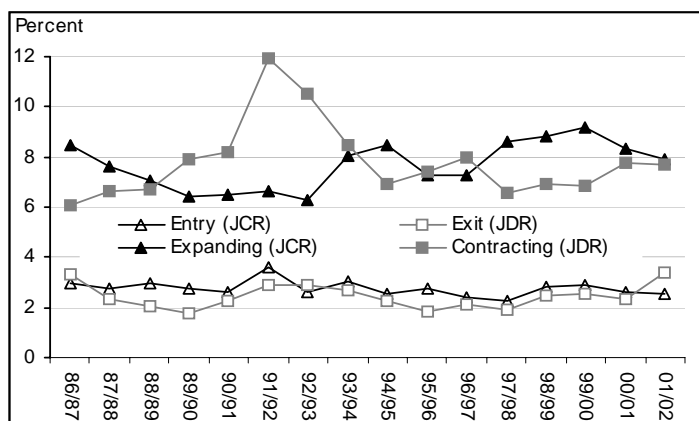
In *Figure 4*, job creation is further divided by new establishments and by expanding establishments, and job destruction is divided by closing establishments and contracting establishments (see Table A1 in the appendix for the figures). Job creation at new establishments (entries), as well as job destruction arising from the closure of establishments (exits) are fairly constant across years. The contribution from continuing establishments to job creation and job destruction is larger than the contribution from new and closing establishments. Three out of four jobs were created or destroyed by continuing establishments, while the remaining 25 percent comes from new and closing establishments.[10]

Some results exist for other countries, but a major problem in estimating cross-country differences is the lack of internationally comparable data. There are, for instance, differences in definitions, sampling intervals and sectors coverage, and we know that job flow rates differ across these factors. Gómez-Salvador et al. (2003) presents job flows of twelve European countries, including Sweden. Since that study includes firms instead of establishments, excludes firms with fewer than 10 employees and only investigates continuing firms, the estimated job flows will

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[10] In this study we exclude establishments with less than five employees on average, and we do not distinguish between different types of entries and exits. For a study focusing on entries, see Persson (2004).

be downward biased. Each one of these three factors lowers the job flow rates.[11] Nevertheless, Gómez-Salvador et al. presents comparable estimates *across* countries. Of the countries included, Sweden is revealed to have the second highest job reallocation rate.[12]

The correlations between the flows (JCR, JDR, JRR, NET) are presented below in *Table 1*. From the matrix we can see that the correlation between the net employment rate and the job reallocation rate is -0.56, meaning that job reallocation is countercyclical. Job destruction is countercyclical and job creation is procyclical, but the cyclical pattern is more pronounced in the case of job destruction, meaning job destruction is more volatile than job creation. The ratio of the variance in job destruction to the variance in job creation is 3.3.[13]

Table 1. Pearson correlation coefficients, p-values in parenthesis

(JRR,NET):	-0.56				
	(0.024)				
(JCR,NET):	0.69	(JCR_{entry},NET):	-0.31	$(JCR_{exp.},NET)$:	0.80
	(0.003)		(0.246)		(0.000)
(JDR,NET):	-0.92	(JDR_{exit},NET):	-0.29	$(JDR_{cont.},NET)$:	-0.94
	(0.000)		(0.267)		(0.000)
$Var(JDR)/$ $Var(JCR)$:	3.3	$Var(JDR_{exit})/$ $Var(JCR_{entry})$:	2.6	$Var(JDR_{cont.})/$ $Var(JCR_{exp.})$:	2.6

These results support Mortensen & Pissarides (1994) model that predicts job reallocation to be countercyclical. According to Garibaldi (1998) the results imply that firing costs (i.e. separation costs) are low in Sweden. Also note that there is no significant cyclical correlation associated with creation due to entries or destruction

[11] Gómez-Salvador et al. present an average JCR for Sweden of 8.1 percent and an average JDR of 3.6 percent. Comparable figures for the same time period in our study, excluding entries and exits, are an average JCR of 8.7 percent and an average JDR of 7.0 percent.

[12] The average JRR is 9.8 percent, with the lowest rate of 7.9 percent in Austria and the highest rate of 12.1 percent in Spain. The JRR for Sweden is 11.7 percent.

[13] Note that an implication of less fluctuation in job creation than in job destruction is that job reallocation is countercyclical. Since JRR is the sum of JC and JD, and NET is the difference between JC and JD, it follows that Cov (JRR,NET) < 0 → Var(JD) > Var(JC).

due to exits. The cyclical pattern found thereby emerges solely from continuing establishments.

The cyclical behavior of job reallocation, job creation and job destruction has attracted much attention in recent work. While job reallocation in manufacturing has been found to be countercyclical in the U.S. (Davis et al. (1996)), it was found to be non-cyclical in Denmark (Albæk & Sørensen (1998)) and Canada (Baldwin et al. (1998)). Davis & Haltiwanger (1999) present figures for the manufacturing sector in eight countries (U.S., Norway, Canada, U.K., Germany, Netherlands, Denmark and Colombia). Except for in Denmark and Colombia, job destruction was found to be more volatile than job creation, meaning job reallocation was countercyclical.

In this study, we consider how job and worker flows are distributed for the whole Swedish economy. For most countries, information about non-manufacturing industries is limited. One study is that of Foote (1998) who includes alls sectors in Michigan. He finds that job creation fluctuates more than job destruction over time in non-manufacturing sectors. His explanation is that declining sectors have higher variances in job destruction while growing sectors display high variances in job creation. On the other hand, Persson (1999) finds that growing sectors also have higher variances in job destruction, even though the ratio between variance in job destruction to the variance in job creation is smaller in growing sectors. The results found in this study, covering the whole economy and a uniquely long time period, show that job reallocation has been countercyclical despite the fact that net employment has been increasing by an average of 0.2 percent per year. Boeri (1996) presents evidence for 8 countries (U.S., Canada, Denmark, France, Germany, Italy, Norway and Sweden) that covers most or all of the private sector. He finds that apart from in the U.S. manufacturing sector, the job reallocation rate is either acyclical or mildly procyclical.

An explanation for the varying results could be that the time series for most countries covers a relatively short time period and that most studies refer to the manufacturing sector. The results found in this study, covering the whole economy and a long time period, show that the job reallocation has been countercyclical although net employment has been increasing by an average of 0.2 percent per year.

As described later, the results are sensitive to whether workers are treated as homogeneous or heterogeneous. When workers are treated as heterogeneous, different results are received for different groups of workers.

5.2   Worker flows

We have not discussed worker flows so far. The difference between job flows and worker flows consists in the number of workers leaving their jobs and being replaced by other workers. *Figure 5* reveals the figures for worker flows in Sweden during the period 1986/87-2001/02 (Table A2 in the appendix contains the figures for both Figures 5 and 6). Note that the difference between hiring and separation rates for each year in *Figure 5* is the same as the difference between job creation and job destruction rates for each year in *Figure 3*, meaning the net employment change.

Figure 5. Total annual hiring and separation rates, 1986/87 to 2001/02, percent

Average hirings amount to 23.5 percent of total employment each year, and separations amount to 23.3 percent, both somewhat more than twice the job creation and job destruction rates. On average, workers who start and quit in the course of a year (the worker reallocation rate), constitute 46.9 percent of total employment.

The hiring and separation rates at continuing establishments are further divided over expanding, contracting and stable establishments in *Figure 6*. Stable establishments are defined as establishments having the same number of employees in both years. Continuing establishments are responsible for 89 percent of hirings and

separations, while entries and exits are responsible for the remaining 11 percent.[14] The figure reveals that contracting establishments continue to hire workers. Hiring rates in establishments with declining employment are on average 5.6 percent per year. Establishments with expanding employment still lose 6.3 percent of their workers each year.

Figure 6. Annual hiring and separation rates at contracting, expanding and stable establishments, 1986/87 to 2001/02, percent
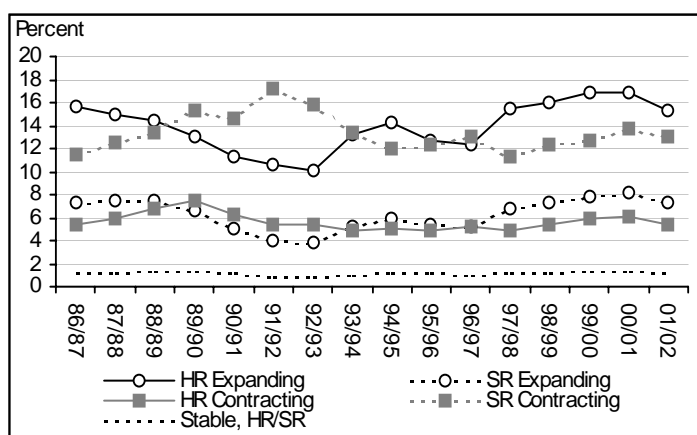
Source: The IFAU data base.

Studies covering both job and worker flows are scarce. An exception is Albæk & Sørensen (1998) who study worker flows in Danish manufacturing for the period 1980 to 1991. They find a hiring rate of 28.5 percent on average and a separating rate of 28.0 percent. As in Sweden, the worker flows are somewhat more than twice the job flows. The number of hired workers per job created (HR/JCR) and the number of separated workers for each job destroyed (SR/JDR) are both 2.4 in Denmark. In Sweden the numbers are very similar, 2.3 for both measures.

The number of workers who move in and out of establishments (WRR) is much higher than is required to account for the creation or destruction of jobs (JRR) (see *Figure 7*). The churning rate (ChR), defined as the volume of worker flows in excess of what is needed to match job flows, is on average 26 percent. Of the reallocation of workers, only 44 percent is explained by the reallocation of jobs.

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[14] Note that hirings and separations at entries and exits are by definition the same as job creation and job destruction at entries and exits.

Figure 7. Annual job reallocation rates (JRR), working reallocation rates (WRR) and churning rates (ChR), 1986/87 to 2001/02, percent
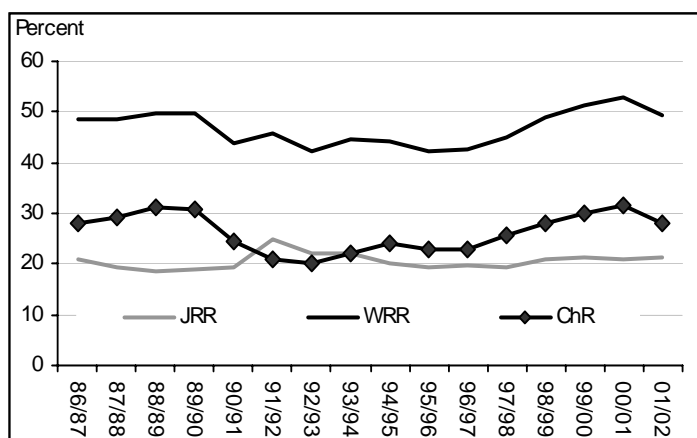
Source: The IFAU data base.

The correlations between the series of worker flows are presented in *Table 2*, where the correlation between worker reallocation and net employment change is positive but insignificant (0.42). However, from *Table 1* we find that job reallocation is countercyclical. While the reallocation of jobs is larger during downturns, this does not hold for reallocation of workers. *Table 2* also reveals that the number of people hired is larger during upturns while the number of people leaving displays no cyclical pattern.

Table 2. Pearson correlation coefficients, p-values in parenthesis

(WRR,NET):	0.42 (0.108)
(HR,SR):	0.43 (0.093)
(HR,NET):	0.76 (0.001)
(SR,NET):	-0.25 (0.345)
(ChR,NET):	0.61 (0.011)
Var(SR)/Var(HR):	0.4

One interpretation is that people are very careful not to leave their jobs during bad times: they only leave when their jobs disappear and they have no choice. Instead, they make the move to quit and find better jobs during upturns. The positive significant correlation between the churning rate and net employment change

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also supports the interpretation. The share of the reallocation that takes place in excess of what is needed to match job creation and job destruction is larger during upturns than during downturns.

6 Job flows and worker flows for different educational groups

To understand more closely the restructuring process that took place in the economy during the period from 1986/87 to 2001/02 we consider how job and worker flows have been distributed among workers with different educational levels.

In *Figure 8*, net employment changes are shown for the four educational groups: pre-upper secondary, upper secondary, university less than 3 years, and university 3 years or more. The change in employment has not been evenly distributed across educational groups. What is striking is the sharp decline in employment for those with the lowest level of education. While net employment for all workers increased by 0.2 percent each year on average, net employment for those with the least education declined by more than 3 percent each year. For those with a university education, employment increased by more than 2 percent on average, while employment rose by an average of 0.7 percent for workers with upper secondary education. The decline in employment for those with the least education started before the recession, accelerated during the recession and continued to decline during the recovery years.

Figure 8. Net annual employment changes, all establishments, percent
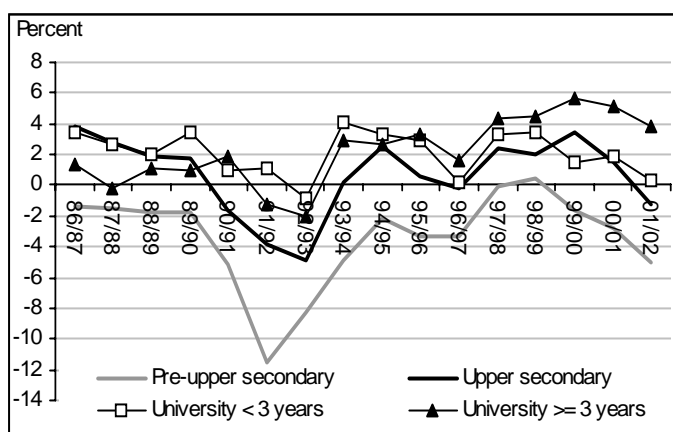
The study by Salvanes & Førre (2003) is the only study we are aware of that evaluates different educational groups in a similar way. They present figures for the Norwegian labor market during the period from 1987 to 1994 for workers with low, medium and high level education in two sectors; manufacturing and finance. Salvanes & Førre find that net employment changes differ over education categories and receive a negative net employment rate of 4 percent for the least educated (in both sectors) and a positive net employment rate for the higher educated of 5 percent in the manufacturing sector and 2 percent in finance. The figures for workers with a medium level of education are in between. Both Norway and Sweden have thus seen a substitution away from a less well-educated to a highly-educated work force.

6.1   Job flows

Figure 9 gives the estimated job creation and job destruction rates for the different educational groups.[15] When comparing job creation and job destruction rates for these four groups it becomes clear that not only were fewer jobs created for those with the least education, but more jobs were also destroyed. During the course of a typical year, 11.4 percent of the jobs were destroyed and 8.0 percent of the jobs were created for those with a pre-upper secondary education. In other words, for

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[15] The numbers are presented in Tables A3, A5, A7 and A9 in the appendix.

every one job destroyed for the least educated group, only 0.7 jobs were created (JCR/JDR); for the most highly educated group, 1.3 jobs were created for every one job destroyed. In Norway, the ratios are similar. For the least educated group, 0.7 jobs in manufacturing and 0.8 jobs in the financial sector were created for every one job destroyed. For the most highly educated, the corresponding numbers were found to be 1.4 and 1.1 respectively. The effect of the economic recession for those with a lower level of education is easily seen in *Figure 9*. Job destruction rates increased markedly during the recession years, while job creation rates remained relatively unaffected. This pattern is not found for those with a university education. Job destruction rates decrease with educational level. For more highly educated workers, fewer jobs were destroyed.

Figure 9. Annual job flows for different educational groups, 1986/87 to 2001/02, percent
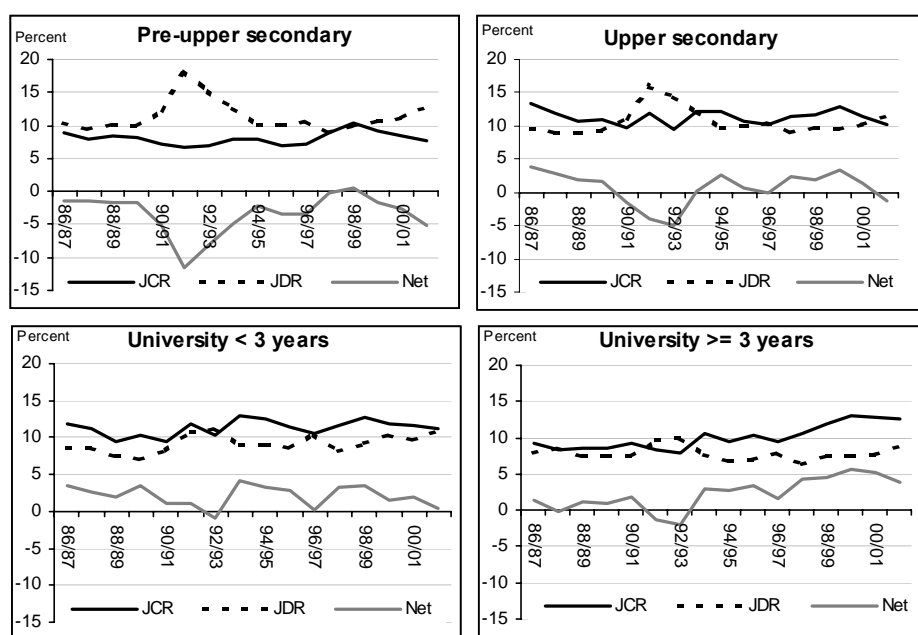
Source: The IFAU data base.

Even though Sweden and Norway show very similar figures overall, the driving force behind the decreased employment of the least educated workers differs. In Norway job creation rates are higher for highly educated workers, while job

destruction rates are more or less the same across education groups. In Sweden, on the other hand, more jobs were destroyed for the less educated than for more highly educated workers.

For the whole labor market, we found job reallocation to be countercyclical. However, when we disaggregate the correlations for different educational groups in *Table 3,* the results vary between groups. Countercyclical behavior is driven only by the lowest educated groups. Job reallocation among those educated to pre-upper secondary level is highly countercyclical, while those educated to upper secondary level also show a countercyclical pattern, although not as strongly. The group having completed less than 3 years of university education has an acyclical pattern, while the group having completed at least 3 years has a procyclical job reallocation pattern.

Table 3. Pearson correlation coefficients, p-values in parenthesis

	Pre-upper secondary	Upper secondary	University < 3 years	University ≥ 3 years
(JRR,NET):	-0.79 (0.000)	-0.54 (0.031)	-0.17 (0.538)	0.53 (0.034)
(JC,DC):	-0.57 (0.022)	-0.26 (0.337)	0.22 (0.407)	-0.33 (0.208)
(JC,NET):	0.76 (0.001)	0.64 (0.007)	0.54 (0.031)	0.91 (0.000)
(JD,NET):	-0.97 (0.000)	-0.90 (0.000)	-0.70 (0.002)	-0.69 (0.003)
Var(JD)/Var(JC):	6.3	3.2	1.4	0.3
(JC_{entry},JD_{exit}):	0.21 (0.444)	0.39 (0.131)	0.16 (0.549)	0.42 (0.105)
(JC_{entry},NET):	-0.03 (0.924)	-0.20 (0.458)	0.05 (0.849)	0.46 (0.075)
(JD_{exit},NET):	-0.65 (0.007)	-0.29 (0.272)	-0.21 (0.434)	0.28 (0.297)
$Var(JD_{exit})/$				
$Var(JC_{entry})$:	2.7	1.4	2.5	2.7

This is also seen by the fact that job destruction rates fluctuate much more than job creation rates for those with the least education. The variance of job destruction is more than 6 times that of job creation among those with a pre-upper secondary education. The ratio decreases with education and is less than 1 for those with at least 3 years of university education, meaning that the variance of job creation is higher than that of job destruction. The destruction of jobs held by workers with a pre-upper secondary education fluctuates much more with the business cycle,

revealing a correlation of almost -1 compared to job destruction rates for workers with the highest university education, which reveal a correlation of -0.7.

The differences between groups is down to the fact that the least educated group have had higher job destruction rates during downturns that has not been compensated by higher job creation rates during good times. These results are consistent with Garibaldi (1998) assuming separation costs to be higher for the more highly educated than for the less educated. When this is indeed the case, employers might use recessions for restructuring by separating less well-educated workers and keeping those with higher education.

As previously shown, around 75 percent of the jobs were created/destroyed by existing establishments that expanded/reduced their workforce.[16] The number of jobs that were created/destroyed in new/closed establishments contributes less to the observed net employment changes. This holds for all educational groups and implies that the observed increase in net employment for more highly educated workers has mainly been driven by jobs created and destroyed in continuing firms. (See Tables A3, A5, A7 and A9 in the appendix for figures.)

6.2 Worker flows

Worker flow rates are more than twice as high as job flow rates. In *Figure 10* hiring and separation rates are shown for the four educational groups.[17] Turnover (the sum of HR and SR) has been high for all workers, irrespective of their education. More than 40 percent of all the workers either separated and/or started a new job every year during the observed period. The highest worker flows, 52 percent, are found among those with a university education of less than 3 years. Not surprisingly, the lowest rates, 40 percent, are found among those with the lowest educational level. Corresponding figures for workers with upper secondary education and for workers with a university education of at least 3 years are 49 percent and 47 percent, respectively. Figures for Norway show the same pattern with worker flows of 42 percent for the least educated and over 50 percent for the highest educated.

Figure 10 clearly shows the different patterns for less and more highly educated workers. While the effect of the economic recession is easily seen for those with pre-upper and upper secondary education, the recession is not directly obvious for those with higher education. The numbers of workers hired per job created were

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[16] Comparable figures for Norway are 65-80 percent.
[17] The numbers are presented in Tables A4, A6, A8 and A10 in the appendix.

similar for all educational groups: 2.3 for those educated to pre-upper secondary level, 2.2 for those educated to upper secondary level and 2.4 for those having completed both shorter and longer university education. The numbers of separations per job destroyed are lower for the least educated workers (1.9, 2.2, 2.7 and 2.8 respectively).

Figure 10. Annual worker flows for different educational groups, 1986/87 to 2001/02
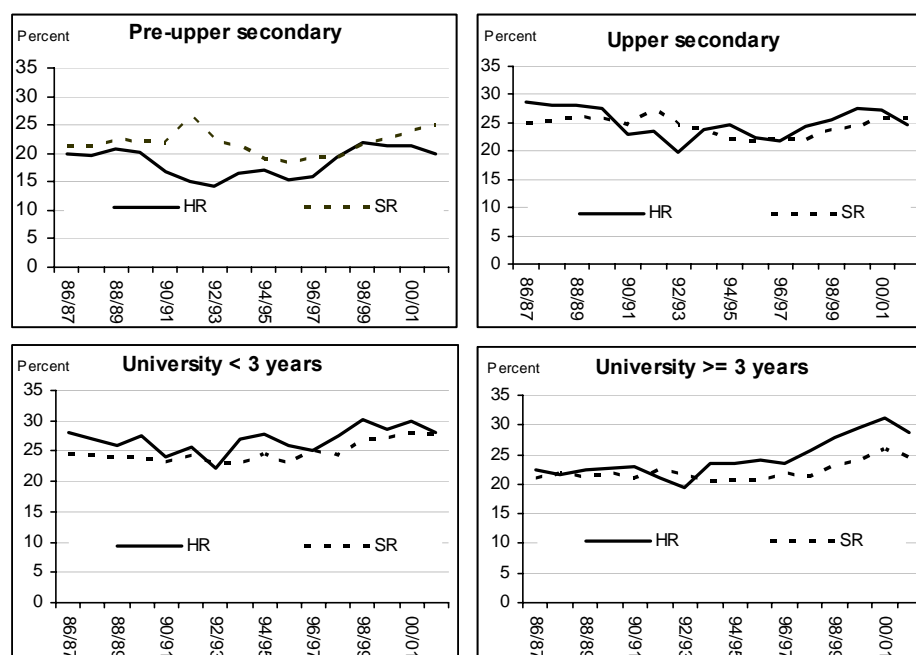
Table 4 presents the correlations for different educational groups. According to the table, worker reallocation is found to be acyclical or procyclical for all education groups, even if only the one corresponding to at least 3 years of university education is significant at a level of 5 percent. The correlation is very strong and positive for those with at least 3 years of education, implying that more people are hired and separated during upturns than during downturns. There is a positive correlation between the churning rate and the net employment rate for all groups, meaning that the share of the reallocation that takes place in excess of what

is needed to mach job creation and destruction is larger during upturns than during downturns. The effect is stronger for the most highly educated.

Table 4. Pearson correlation coefficients, p-values in parenthesis

	Pre upper secondary	Upper secondary	University < 3 years	University ≥ 3 years
(WRR,NET):	0.18	0.43	0.27	0.80
	(0.512)	(0.096)	(0.304)	(0.000)
(ChR,NET):	0.61	0.63	0.39	0.84
	(0.012)	(0.009)	(0.136)	(0.000)
(HR,SR):	0.17	0.40	0.71	0.80
	(0.538)	(0.127)	(0.002)	(0.000)
(HR,NET):	0.72	0.78	0.59	0.91
	(0.002)	(0.000)	(0.017)	(0.000)
(SR,NET):	-0.56	-0.27	-0.15	0.48
	(0.023)	(0.313)	(0.574)	(0.062)
Var(SR)/Var(HR):	0.7	0.4	0.7	0.2

Figure 11. Churning rates for different educational levels
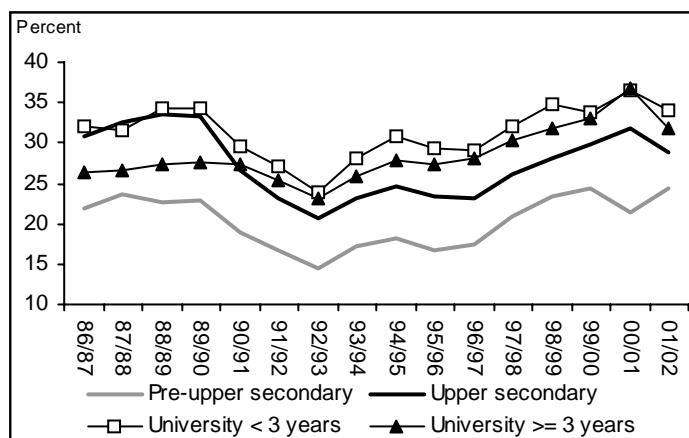
Source: The IFAU data base.

The churning rates (ChR) presented in *Figure 11* show the volume of worker flows in excess of what is needed to match job flows. The rate is given by the difference between the worker reallocation rates (WRR) and the job reallocation

rates (JRR). This rate is high: on average 26 percent for all workers. Much of the mobility that takes place on the labor market can therefore not be explained by the reallocation of jobs. As seen from *Figure 11* (and from Tables A4, A6, A8 and A10 in the appendix), churning rates are higher for those with a higher level of education, on average around 30 per cent for those with a university education. For those with the lowest level of education churning rates are considerably lower, around 20 percent. Thus, mobility that is not motivated by fluctuations in the number of jobs increases with education.

7 Education and the long-run reallocation of labor

During the 1980s and 1990s, the labor market situation for less educated workers deteriorated. At the same time, the supply of highly educated workers increased. The question is whether it is the supply or demand that is the cause behind the change on the labor market.[18] The restructuring during the last two decades could be an effect of a higher demand for the highly educated (highly educated workers have been hired for new jobs that require higher education), or an effect of a greater supply of highly educated individuals (highly educated workers have been hired for the same jobs that were previously filled by less well-educated employees), or a combination of both demand and supply effects.

Previous studies concerned with the restructuring process have found that the demand for highly educated workers has increased on the Swedish labor market. However, they have used methods focusing solely on demand effects and data materials other than linked employer-employee datasets. One explanation for the excess demand is the increased investment in new and more efficient capital equipment, which in turn has increased the relative demand for more highly educated workers through the capital skill complementary mechanism. Another explanation is the increased trade with developing countries.[19]

By using employer-employee data for the Norwegian labor market Salvanes & Førre (2003) analyze the employment shift in favor of highly educated workers.

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[18] See Salvanes & Førre (2003) for an overview of Norway, which has had a similar development to Sweden.
[19] See Lindquist (2005), Mellander (1999) and Hansson (2000) for studies of skill biased technology change. Hansson also estimates the effect of trade.

They attempt to disentangle the supply and demand effects for different groups by fixing the educational level for old and new cohorts of workers. They then evaluate the pattern of net employment changes for different educational categories within worker cohorts. The authors argue that if higher net employment rates can be found for more highly educated workers from both younger and older cohorts, it will support the explanation that the change in the educational composition has been caused by increased demand for more educated workers. If, on the other hand, only the most highly educated from the youngest cohort obtain the new jobs, this supports the explanation that the change in educational composition has been caused by a greater supply of more highly educated individuals. Salvanes & Førre find that the employment shift in favor of the highly educated in Norway has been caused by both an increased demand and an increased supply of more highly educated workers.

Following Salvanes & Førre we split the data into six two-year cohorts of workers.[20] We follow the cohorts from when the employees are 30 years old, assuming that very little education is acquired after the age of 30 (Salvanes & Førre follow the cohorts from the age of 25). We only use data consisting of workers aged 30 or older in 1986, which is the first year in our panel. We then follow the pattern of net employment changes for the four educational groups of different cohorts of workers. Since the two youngest cohorts were not 30 years old in 1986, they are followed from 1989 and 1993 respectively.

The following cohorts were defined:
cohort 1, born 1942–1943, aged 43–44 in 1986,
cohort 2, born 1946–1947, aged 39–40 in 1986,
cohort 3, born 1950–1951, aged 35–36 in 1986,
cohort 4, born 1954–1955, aged 31–32 in 1986,
cohort 5, born 1958–1959, aged 30–31 in 1989 (followed from 1989),
cohort 6, born 1962–1963, aged 30–31 in 1993 (followed from 1993).

For each cohort we assume that the educational level is fixed.[21] If net employment patterns for different cohorts is similar to the general picture for all cohorts

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[20] Salvanes & Førre (2003) split their data into four ten-year cohorts of workers. However, in order to control that educational levels are fixed within each cohort, we have chosen narrower intervals.

[21] The supply of education within the cohorts is fairly stable. For the two oldest cohorts, the proportion of those with a university degree is 31 and 33 percent respectively: for the other four cohorts it is about 37 percent. Figure A1 in the appendix shows the educational proportions for each cohort and year.

(with no controls for educational level) it will indicate that the restructuring process that has taken place has been due to an increased demand for highly educated workers. There might well be differences *across* cohorts, for example, that older workers may be more strongly connected to their jobs, but differences in net job creation between educational groups *within* cohorts, means that changes in demand are important.[22]

Table 5 presents the average net employment rates for the aggregate that does not control for the supply of education, and for the six cohorts (annual figures are shown in Figure A2 in the appendix).

Table 5. Average net employment rate for cohorts and educational level, 86/87–01/02[23]

	All	b. 1942/43	b. 1946/47	b. 1950/51
Pre-upper secondary	-2.90	-1.98	-1.14	-0.79
Upper secondary	0.92	-1.80	-0.84	-0.25
University < 3 years	2.37	-1.22	-0.36	0.21
University ≥ 3 years	2.65	-1.24	-0.52	0.03
		b. 1954/55	b. 1958/59	b. 1962/63
		-0.56	-0.44	1.16
		0.04	-0.01	1.24
		0.53	1.14	1.98
		0.69	1.30	2.87

Note: When calculating the average for those born between 1958–1959 and 1962–1963, fewer observations are used, since these cohorts are followed from 1989 and 1993 respectively.

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[22] In Sweden employment protection is greater for older workers. All workers in regular employment are covered by the Security of Employment Act (often abbreviated as LAS). The seniority rules (last in, first out) stated in LAS, together with more generous calculations of years of service for older workers, gives greater employment protection for older workers. In addition, older workers have a right to longer periods of advance notice than younger workers. Finally, only workers who have reached the age of 40 or over and who have been continuously employed for the last five years are eligible for severance pay. These regulations imply that older workers who quit for a new job will not only be more likely to lose their job if workers are being dismissed (if lay-offs occur) at their new workplace, but they will also lose their right to receive severance pay. From the employer's point of view, higher separation costs are likely to result in a lower demand for older workers, see Calleman (1999) and Jans (2002).

[23] Average net employment rates have also been calculated for shorter time periods, in order to compare the results for different periods of the business cycle. The results from these calculations confirm the overall results that more jobs have been created for highly educated workers (see Table A11 in the appendix for figures of net employment rates for shorter time periods).

The averages for the aggregate show a higher degree of net employment change for the more highly educated than for the less educated workers: a pattern that exists for all cohorts. Consequently, there has been a difference in demand for educational groups that has at least partly been responsible for the difference in net employment change shown earlier in *Figure 8*.

The implication that net employment rates should be higher for highly educated workers within all cohorts can be made operational by comparing Spearman rank correlations. If demand changes are important, rank orderings of net employment rates by level of education in a given cohort should be close to the corresponding rank ordering for the aggregate (all cohorts taken together). The correlation coefficients should be positive and different from zero. As is clear from *Table 6*, the correlations are positive and significant, which imply that the change in the educational composition has at least partly been caused by increased demand for educated workers.

Table 6. Spearman correlation coefficients, p-values in parenthesis

Cohorts	Correlations (p-values)	No. of obs.
1942–1943	0.50 (0.001)	64
1946–1947	0.65 (0.001)	64
1950–1951	0.65 (0.001)	64
1954–1955	0.52 (0.001)	64
1958–1959	0.51 (0.001)	52
1962–1963	0.49 (0.002)	36

Note: We rank the net employment rates by level of education for each cohort and year. We then test the correlation between the individual cohorts and the aggregate by using Spearman's rank correlation test with the null hypothesis that the correlation is zero.

Although the educational difference in net employment changes holds for each cohort, there is also, as seen from *Table 5*, a difference in the level of net employment changes *across* cohorts. Net employment changes are greater for younger than for older cohorts, and are also greater for the more highly educated than for the less educated. This indicates that the increased supply of highly educated workers might also have been important for the net employment changes on the labor market during the last two decades. However, supply effects are not the only explanation for the observed differences across cohorts. It partly reflects the effect

of older workers leaving the labor market (due to early retirement or retirement), a lower demand for older workers (due to outranged skill and/or higher separation costs), and the effect of entrance into the labor market of younger, more highly educated workers.[24]

In contrast to Salvanes & Førre, who found a negative net employment change for less educated workers that was of the same order and magnitude across cohorts, we find a larger decrease in net employment for the less educated in older rather than younger cohorts. For the youngest cohort (those born 1962–63) net employment actually increased for less educated workers, by nearly 1.2 percent on average. This might, however, be explained by the establishment investing in new technology, which may expand production in general and increase the demand for all workers, even if demand is relatively higher for more educated workers. Furthermore, the great number of jobs destroyed for less educated workers during the economic downturn in the beginning of the 1990s might have resulted in a reversed effect, that of an increased demand for younger and less educated workers in the years to follow.

All in all, we find support for the idea that the relative employment shift in favor of more highly educated workers has at least been driven by a greater demand for educated workers. The difference in net employment levels across cohorts, i.e. larger net employment changes for highly educated workers in younger rather than in older cohorts, does however suggest that the increased supply of highly educated workers might also have been important for development on the labor market. Nevertheless, the results found for the Swedish labor market give less support for supply effects[25] than the results presented by Salvanes & Førre for the Norwegian labor market.

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[24] For references concerning studies of early retirement among older workers and employers negative attitudes towards recruiting older workers, see National Social Insurance Board (2000).

[25] If the increased supply of highly educated workers has been an important cause behind the observed change in the educational composition of the workforce, one might argue that this would be reflected in higher rank orderings for more highly educated workers in younger than in older cohorts. Calculations of rank orderings for highly educated across cohorts are however only found to be higher for younger cohorts than older, in two out of sixteen years studied (1987 and 1990). Rank orderings across cohorts for more highly educated workers are presented in Figure A3 in the appendix.

8 Conclusions

In order to more closely understand the restructuring process that took place in the Swedish economy from 1986 to 2002, we consider how job and worker flows have been distributed both on an aggregate level and across educational levels. We contribute to the previous literature by studying a uniquely long period, a period that covers both downturns and upturns and the whole Swedish economy.

We find that job flows and worker flows are substantial across years, and with huge variations. Further, job reallocation rates are stable both in order and magnitude. Worker flows exhibit a more volatile pattern, but without a trend. We find no support for the idea that job and worker flows have decreased over time, or that flows are lower in Sweden than in other countries, something that has occasionally been stressed in debate and previous literature. Moreover, we confirm previous results that job and worker flows are dominated by flows corresponding to existing establishments, while job creation/hirings in new establishments and job destruction/separations in exiting establishments constitute a minor part.

Analyses of job and worker flows that do not account for the heterogeneity of workers can be very misleading. We contribute to previous studies by decomposing both job and worker flows into educational groups and demonstrate that flows vary by educational level, not only with respect to magnitude and variation but with respect to direction as well.

During the examined period, not only are fewer jobs created for those with the least education, but more jobs are also destroyed. While job destruction rates are found to decrease with educational level, job creation rates follow a more ambiguous pattern. The difference between job and worker flows consists in the number of workers leaving their jobs and being replaced by other others. Worker flows are more than twice as high as job flows for all educational groups and the lowest worker reallocation rate (the sum of hiring and separation rates) is found among the least educated workers. Finally, excess reallocation of workers, i.e. reallocation of workers that is not motivated by fluctuations in the number of jobs, is found to be highest among more highly educated workers.

Some previous studies have found job reallocation to be countercyclical, suggesting that downturns are periods of restructuring the establishment. Our results confirm those previous studies on an aggregate level and support the model by Mortensen & Pissarides (1994) predicting job reallocation to be countercyclical. According to Garibaldi (1998) this countercyclical pattern implies that firing costs (i.e. separation costs) are low. However, when examining the correlations between

different educational groups, the countercyclical behavior was only found among those with low educational level. For workers with the highest education, job reallocation rates were even found to be procyclical. Employers seem to use recessions for restructuring by separating less educated workers and by keeping more highly educated workers. The results are consistent with Garibaldi (1998) if assuming separation costs to be greater for the more highly educated, than for the less educated workers.

While the reallocation of jobs is found to be larger during downturns on the aggregate level, this does not hold for reallocation of workers. Instead worker reallocation exhibits an acyclical pattern. The number of people hired is larger during upturns while the number of people leaving displays no cyclical pattern One interpretation is that people are very careful not to leave their jobs during bad times and only leave when they have to, preferring to quit during upturns to find better jobs. There are some differences between educational groups. Worker reallocation for the most highly educated shows a strong procyclical pattern due to both more hirings and separations during up-turns. The least educated workers, on the other hand, have significantly more separations during downturns.

Following Salvanes & Førre (2003), we also examine the long-run reallocation of labor for different educational groups. To decide whether the reallocation of workers has been driven by an increased demand for more highly educated workers, an increased supply, or a combination of both, net employment rates for different cohorts were analyzed more closely. Our results indicate that the relative employment shift in favor of more highly educated workers has been driven by a higher demand for educated workers, but also that the increased supply of more highly educated workers might have been important.

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APPENDIX

Table A1. Job reallocation and its components, 1986/87 to 2001/02, percent

	Net	JCR			JDR			JRR
		Entry	Exp.	Total	Exit	Cont.	Total	
1986/87	2.07	2.97	8.49	11.46	3.34	6.05	9.39	20.85
1987/88	1.40	2.73	7.62	10.35	2.33	6.61	8.94	19.29
1988/89	1.19	2.93	7.03	9.96	2.05	6.71	8.77	18.73
1989/90	-0.53	2.73	6.43	9.15	1.79	7.89	9.68	18.83
1990/91	-1.28	2.64	6.48	9.12	2.24	8.16	10.40	19.52
1991/92	-4.64	3.57	6.62	10.19	2.93	11.90	14.83	25.02
1992/93	-4.53	2.58	6.25	8.83	2.88	10.48	13.36	22.19
1993/94	-0.16	3.00	8.02	11.02	2.69	8.50	11.18	22.20
1994/95	1.77	2.51	8.45	10.96	2.25	6.94	9.19	20.15
1995/96	0.71	2.74	7.27	10.01	1.87	7.44	9.30	19.31
1996/97	-0.50	2.37	7.26	9.63	2.14	7.99	10.13	19.76
1997/98	2.46	2.27	8.63	10.90	1.90	6.54	8.44	19.34
1998/99	2.30	2.79	8.85	11.64	2.44	6.89	9.34	20.98
1999/00	2.63	2.91	9.15	12.06	2.55	6.88	9.43	21.49
2000/01	0.90	2.63	8.36	10.99	2.35	7.74	10.09	21.08
2001/02	-0.66	2.52	7.89	10.41	3.37	7.70	11.07	21.47

Average	0.20	2.74	7.67	10.42	2.44	7.78	10.22	20.64

Table A2. Worker reallocation and its components, 1986/87 to 2001/02, percent

	Net	Hiring rates					Separation rates					WRR	ChR
		Entry	Exp.	Cont.	Stable	Total	Exit	Exp.	Cont.	Stable	Total		
1986/87	2.07	2.97	15.71	5.46	1.24	25.39	3.34	7.22	11.51	1.24	23.31	48.70	27.84
1987/88	1.40	2.73	15.02	5.97	1.29	25.01	2.33	7.40	12.58	1.29	23.60	48.61	29.32
1988/89	1.19	2.93	14.50	6.70	1.36	25.50	2.05	7.48	13.42	1.36	24.30	49.80	31.07
1989/90	-0.53	2.73	13.01	7.47	1.38	24.59	1.79	6.59	15.36	1.38	25.12	49.71	30.88
1990/91	-1.28	2.64	11.56	6.00	1.17	21.36	2.24	5.08	14.15	1.17	22.64	44.00	24.49
1991/92	-4.64	3.57	10.67	5.40	0.95	20.58	2.93	4.06	17.29	0.95	25.22	45.81	20.79
1992/93	-4.53	2.58	10.07	5.34	0.94	18.93	2.88	3.82	15.83	0.94	23.46	42.39	20.20
1993/94	-0.16	3.00	13.16	4.93	1.05	22.15	2.69	5.14	13.43	1.05	22.31	44.45	22.25
1994/95	1.77	2.51	14.32	5.00	1.20	23.02	2.25	5.87	11.94	1.20	21.25	44.28	24.12
1995/96	0.71	2.74	12.69	4.90	1.17	21.50	1.87	5.41	12.34	1.17	20.79	42.29	22.97
1996/97	-0.50	2.37	12.42	5.14	1.13	21.05	2.14	5.16	13.13	1.13	21.55	42.60	22.84
1997/98	2.46	2.27	15.46	4.79	1.22	23.73	1.90	6.83	11.33	1.22	21.28	45.01	25.67
1998/99	2.30	2.79	16.07	5.41	1.28	25.55	2.44	7.23	12.30	1.28	23.25	48.81	27.84
1999/00	2.63	2.91	16.92	5.88	1.36	27.07	2.55	7.77	12.76	1.36	24.44	51.51	30.02
2000/01	0.90	2.63	16.53	6.29	1.37	26.83	2.35	8.17	14.03	1.37	25.93	52.75	31.67
2001/02	-0.66	2.52	15.25	5.34	1.27	24.38	3.37	7.36	13.03	1.27	25.04	49.42	27.95

Table A3. Job reallocation and its components, 1986 to 2002; workers educated to pre-upper secondary level, percent

	Net	JCR			JDR			Stable	JRR
		Entry	Exp.	Total	Exit	Cont.	Total		
1986/87	-1.37	2.86	6.08	8.94	3.29	6.84	10.31	-0.18	19.26
1987/88	-1.49	2.61	5.31	7.93	2.25	6.99	9.42	-0.18	17.35
1988/89	-1.73	2.98	5.33	8.31	2.27	7.62	10.04	-0.15	18.35
1989/90	-1.80	2.76	5.36	8.12	2.04	7.82	9.92	-0.06	18.04
1990/91	-5.18	2.51	4.70	7.21	2.62	9.55	12.39	-0.22	19.60
1991/92	-11.54	2.85	3.85	6.70	3.34	14.49	18.24	-0.41	24.94
1992/93	-8.20	2.27	4.73	7.00	3.49	11.51	15.20	-0.20	22.20
1993/94	-4.90	2.49	5.31	7.80	3.10	9.33	12.70	-0.27	20.50
1994/95	-2.20	2.11	5.70	7.82	2.48	7.32	10.02	-0.22	17.84
1995/96	-3.30	2.00	4.88	6.89	1.96	7.96	10.19	-0.26	17.07
1996/97	-3.38	2.07	5.20	7.28	2.23	8.22	10.66	-0.21	17.93
1997/98	-0.11	2.11	6.72	8.84	2.11	6.69	8.95	-0.15	17.79
1998/99	0.43	2.75	7.64	10.38	2.45	7.44	9.96	-0.07	20.34
1999/00	-1.62	2.43	6.66	9.09	2.66	7.83	10.71	-0.21	19.79
2000/01	-2.74	2.22	6.22	8.43	2.46	8.53	11.17	-0.19	19.61
2001/02	-5.05	2.28	5.43	7.71	3.42	9.09	12.75	-0.24	20.46

| Average | -3.39 | 2.46 | 5.57 | 8.03 | 2.64 | 8.58 | 11.41 | -0.20 | 19.44 |

Table A4. Worker reallocation and its components, 1986 to 2002; workers educated to pre-upper secondary level, percent

	Net	Hiring rates					Separation rates					WRR	ChR
		Entry	Exp.	Cont.	Stable	Total	Exit	Exp.	Cont.	Stable	Total		
1986/87	-1.37	2.86	12.29	3.79	1.00	19.94	3.29	6.21	10.63	1.18	21.31	41.25	21.99
1987/88	-1.49	2.61	11.63	4.41	1.07	19.72	2.25	6.31	11.40	1.25	21.21	40.93	23.58
1988/89	-1.73	2.98	11.71	4.95	1.13	20.77	2.27	6.38	12.57	1.28	22.49	43.26	22.58
1989/90	-1.80	2.76	10.55	5.78	1.17	20.25	2.04	5.18	13.60	1.23	22.05	42.31	22.88
1990/91	-5.18	2.51	9.07	4.20	0.92	16.69	2.62	4.37	13.75	1.14	21.88	38.57	18.97
1991/92	-11.54	2.85	8.12	3.37	0.69	15.02	3.34	4.26	17.86	1.09	26.56	41.58	16.63
1992/93	-8.21	2.27	7.96	3.34	0.67	14.24	3.49	3.24	14.85	0.87	22.44	36.68	14.48
1993/94	-4.90	2.49	10.05	3.11	0.76	16.41	3.10	4.74	12.44	1.03	21.31	37.72	17.22
1994/95	-2.20	2.11	10.84	3.10	0.90	16.96	2.48	5.14	10.42	1.12	19.16	36.12	18.28
1995/96	-3.30	2.00	9.32	3.12	0.82	15.27	1.96	4.44	11.09	1.08	18.57	33.84	16.77
1996/97	-3.38	2.07	9.50	3.53	0.87	15.98	2.23	4.30	11.75	1.07	19.36	35.34	17.41
1997/98	-0.11	2.11	12.35	3.81	1.04	19.31	2.11	5.62	10.50	1.19	19.42	38.74	20.95
1998/99	0.43	2.75	13.69	4.42	1.17	22.03	2.45	6.06	11.86	1.24	21.60	43.62	23.28
1999/00	-1.62	2.43	13.53	4.18	1.12	21.26	2.66	6.88	12.01	1.33	22.88	44.13	24.34
2000/01	-2.74	2.22	12.97	4.85	1.21	21.25	2.46	6.75	13.38	1.40	23.99	45.24	25.63
2001/02	-5.05	2.28	12.35	4.21	1.11	19.95	3.42	6.92	13.31	1.35	24.99	44.94	24.48
Aver.	**-3.39**	**2.46**	**11.00**	**4.01**	**0.98**	**18.44**	**2.64**	**5.42**	**12.59**	**1.18**	**21.83**	**40.27**	**20.59**

Table A5. Job reallocation and its components, 1986 to 2002; workers educated to upper secondary level, percent

	Net	JCR			JDR			Stable	JRR
		Entry	Exp.	Total	Exit	Cont.	Total		
1986/87	3.86	3.32	9.96	13.36	3.59	5.91	9.50	0.08	22.86
1987/88	2.83	2.87	8.90	11.85	2.51	6.52	9.03	0.08	20.88
1988/89	1.83	3.17	7.58	10.79	2.09	6.87	8.96	0.04	19.75
1989/90	1.72	2.98	7.70	10.84	1.86	7.27	9.13	0.16	19.97
1990/91	-1.58	2.73	6.85	9.60	2.32	8.86	11.18	0.03	20.79
1991/92	-3.91	4.22	7.58	11.92	3.13	12.70	15.83	0.11	27.74
1992/93	-4.86	2.80	6.63	9.46	3.02	11.30	14.32	0.02	23.78
1993/94	0.17	3.38	8.81	12.24	2.83	9.24	12.08	0.06	24.32
1994/95	2.55	2.92	9.23	12.19	2.38	7.26	9.64	0.04	21.83
1995/96	0.61	2.90	7.69	10.61	1.99	8.01	10.00	0.02	20.61
1996/97	-0.17	2.57	7.70	10.29	2.19	8.27	10.46	0.02	20.75
1997/98	2.39	2.47	8.95	11.44	2.04	7.01	9.05	0.02	20.49
1998/99	1.98	2.82	8.79	11.61	2.39	7.23	9.63	-0.01	21.24
1999/00	3.39	3.06	9.67	12.78	2.56	6.83	9.39	0.05	22.18
2000/01	1.44	2.77	8.71	11.54	2.35	7.74	10.10	0.06	21.64
2001/02	-1.26	2.53	7.67	10.21	3.31	8.16	11.47	0.01	21.68
Average	**0.69**	**2.97**	**8.28**	**11.30**	**2.54**	**8.07**	**10.61**	**0.05**	**21.91**

Table A6. Worker reallocation and its components, 1986 to 2002; workers educated to upper secondary level, percent

	Net	Hiring rates					Separation rates					WRR	ChR
		Entry	Exp.	Cont.	Stable	Total	Exit	Exp.	Cont.	Stable	Total		
1986/87	3.86	3.32	17.74	6.25	1.42	28.72	3.59	7.77	12.16	1.34	24.86	53.59	30.73
1987/88	2.83	2.87	16.95	6.82	1.48	28.11	2.51	8.04	13.34	1.39	25.28	53.39	32.51
1988/89	1.83	3.17	15.80	7.48	1.53	27.97	2.09	8.22	14.35	1.48	26.14	54.12	34.36
1989/90	1.72	2.98	14.62	8.36	1.60	27.56	1.86	6.92	15.63	1.43	25.85	53.41	33.44
1990/91	-1.58	2.73	12.26	6.63	1.34	22.96	2.32	5.41	15.49	1.31	24.53	47.49	26.70
1991/92	-3.91	4.22	11.85	6.26	1.16	23.49	3.13	4.26	18.96	1.05	27.40	50.89	23.15
1992/93	-4.86	2.80	10.47	5.47	1.05	19.80	3.02	3.84	16.77	1.03	24.66	44.46	20.68
1993/94	0.17	3.38	14.15	5.13	1.20	23.86	2.83	5.34	14.37	1.15	23.70	47.56	23.24
1994/95	2.55	2.92	15.25	5.00	1.36	24.54	2.38	6.02	12.26	1.32	21.99	46.52	24.69
1995/96	0.61	2.90	13.16	4.94	1.32	22.32	1.99	5.47	12.95	1.30	21.71	44.03	23.42
1996/97	-0.17	2.57	12.88	5.13	1.29	21.87	2.19	5.18	13.41	1.27	22.04	43.91	23.15
1997/98	2.39	2.47	15.83	4.84	1.39	24.52	2.04	6.87	11.85	1.37	22.14	46.66	26.17
1998/99	1.98	2.82	16.08	5.37	1.40	25.66	2.39	7.28	12.59	1.41	23.68	49.33	28.09
1999/00	3.39	3.06	17.31	5.78	1.50	27.65	2.56	7.64	12.61	1.45	24.26	51.91	29.73
2000/01	1.44	2.77	16.60	6.45	1.57	27.39	2.35	7.89	14.20	1.51	25.95	53.34	31.71
2001/02	-1.26	2.53	15.14	5.56	1.42	24.65	3.31	7.46	13.72	1.41	25.91	50.56	28.87
Average	**0.69**	**2.97**	**14.75**	**5.97**	**1.38**	**25.07**	**2.54**	**6.48**	**14.04**	**1.33**	**24.38**	**49.45**	**27.54**

Table A7. Job reallocation and its components, 1986 to 2002; workers having received less than 3 years of university education, percent

	Net	JCR			JDR			Stable	JRR
		Entry	Exp.	Total	Exit	Cont.	Total		
1986/87	3.42	2.73	9.17	11.95	3.39	5.14	8.53	0.05	20.48
1987/88	2.71	2.82	8.41	11.23	2.27	6.23	8.51	-0.01	19.74
1988/89	2.04	2.51	6.98	9.50	1.74	5.72	7.47	0.01	16.97
1989/90	3.45	2.55	7.74	10.41	1.30	5.67	6.96	0.12	17.38
1990/91	1.00	2.43	6.84	9.33	1.73	6.60	8.33	0.06	17.66
1991/92	1.16	3.67	7.99	11.93	2.24	8.53	10.77	0.26	22.70
1992/93	-0.90	2.73	7.31	10.22	2.30	8.82	11.12	0.18	21.34
1993/94	4.05	3.11	9.77	13.05	2.32	6.68	9.00	0.17	22.05
1994/95	3.36	2.29	10.03	12.41	1.96	7.08	9.04	0.08	21.45
1995/96	2.94	3.15	8.12	11.38	1.60	6.84	8.44	0.12	19.83
1996/97	0.14	2.45	8.11	10.63	2.06	8.43	10.49	0.07	21.12
1997/98	3.33	2.14	9.37	11.54	1.68	6.52	8.21	0.02	19.75
1998/99	3.47	3.17	9.56	12.74	2.44	6.83	9.27	0.01	22.01
1999/00	1.45	2.98	8.85	11.82	2.58	7.71	10.37	-0.08	22.20
2000/01	1.94	2.73	8.88	11.69	2.30	7.44	9.75	0.08	21.43
2001/02	0.32	2.52	8.69	11.26	3.64	7.30	10.94	0.05	22.20
Average	**2.12**	**2.75**	**8.49**	**11.32**	**2.22**	**6.97**	**9.20**	**0.08**	**20.52**

Table A8. Worker reallocation and its components, 1986 to 2002; workers having received less than 3 years of university education, percent

	Net	Hiring rates					Separation rates					WRR	ChR
		Entry	Exp.	Cont.	Stable	Total	Exit	Exp.	Cont.	Stable	Total		
1986/87	3.42	2.73	17.44	6.52	1.28	27.97	3.39	8.28	11.66	1.22	24.55	52.51	32.03
1987/88	2.71	2.82	16.68	6.26	1.28	27.03	2.27	8.27	12.49	1.28	24.32	51.36	31.61
1988/89	2.04	2.51	15.02	7.15	1.34	26.02	1.74	8.03	12.87	1.34	23.99	50.01	33.04
1989/90	3.45	2.55	14.67	8.76	1.44	27.42	1.30	6.93	14.42	1.32	23.97	51.39	34.01
1990/91	1.00	2.43	12.91	7.52	1.29	24.16	1.73	6.08	14.12	1.23	23.16	47.32	29.66
1991/92	1.16	3.67	12.49	8.10	1.25	25.52	2.24	4.49	16.64	0.99	24.36	49.87	27.18
1992/93	-0.9	2.73	11.30	7.01	1.12	22.17	2.30	3.99	15.83	0.94	23.06	45.23	23.89
1993/94	4.05	3.11	15.49	7.21	1.30	27.12	2.32	5.72	13.88	1.14	23.06	50.18	28.13
1994/95	3.36	2.29	17.25	6.89	1.40	27.85	1.96	7.22	13.98	1.32	24.48	52.33	30.88
1995/96	2.94	3.15	15.00	6.47	1.43	26.05	1.60	6.88	13.31	1.32	23.11	49.16	29.33
1996/97	0.14	2.45	14.62	6.77	1.32	25.17	2.06	6.52	15.19	1.25	25.02	50.19	29.07
1997/98	3.33	2.14	18.03	6.05	1.34	27.56	1.68	8.66	12.57	1.32	24.23	51.80	32.05
1998/99	3.47	3.17	18.71	6.84	1.41	30.13	2.44	9.15	13.67	1.39	26.65	56.78	34.77
1999/00	1.45	2.98	17.65	6.71	1.33	28.66	2.58	8.81	14.41	1.41	27.22	55.88	33.68
2000/01	1.94	2.73	18.55	7.14	1.46	29.88	2.30	9.67	14.58	1.38	27.94	57.82	36.38
2001/02	0.32	2.52	17.70	6.51	1.45	28.18	3.64	9.00	13.81	1.41	27.86	56.05	33.85
Aver.	**2.12**	**2.75**	**15.85**	**6.99**	**1.34**	**26.93**	**2.22**	**7.36**	**13.97**	**1.27**	**24.81**	**51.74**	**31.22**

Table A9. Job reallocation and its components, 1986 to 2002; workers having received at least 3 years of university education, percent

	Net	JCR			JDR			Stable	JRR
		Entry	Exp.	Total	Exit	Cont.	Total		
1986/87	1.41	2.10	7.22	9.32	2.70	5.19	7.92	-0.02	17.24
1987/88	-0.18	2.27	6.12	8.39	1.89	6.66	8.58	-0.03	16.97
1988/89	1.10	2.19	6.45	8.64	1.68	5.82	7.54	-0.05	16.18
1989/90	0.96	2.01	6.40	8.48	1.22	6.31	7.53	0.07	16.01
1990/91	1.93	2.62	6.68	9.33	1.69	5.71	7.40	0.03	16.73
1991/92	-1.27	2.33	6.06	8.39	2.02	7.62	9.63	-0.03	18.03
1992/93	-2.06	2.05	5.89	7.94	1.88	8.12	10.00	0.00	17.93
1993/94	2.90	2.35	8.04	10.50	1.84	5.75	7.59	0.10	18.09
1994/95	2.68	1.88	7.60	9.52	1.78	5.06	6.84	0.04	16.35
1995/96	3.37	2.72	7.54	10.38	1.59	5.43	7.01	0.11	17.39
1996/97	1.64	2.00	7.36	9.48	1.85	6.00	7.85	0.12	17.33
1997/98	4.35	1.91	8.62	10.59	1.37	4.88	6.25	0.06	16.84
1998/99	4.52	2.36	9.51	11.98	2.59	4.87	7.46	0.11	19.43
1999/00	5.62	2.88	10.11	13.11	2.34	5.15	7.48	0.11	20.59
2000/01	5.11	2.56	10.06	12.78	2.21	5.46	7.67	0.16	20.45
2001/02	3.89	2.68	9.81	12.62	3.21	5.53	8.74	0.14	21.36
Average	**2.25**	**2.31**	**7.72**	**10.09**	**1.99**	**5.85**	**7.84**	**0.06**	**17.93**

Table A10. Worker reallocation and its components, 1986 to 2002; workers having received at least 3 years of university education, percent

	Net	Hiring rates					Separation rates					WRR	ChR
		Entry	Exp.	Cont.	Stable	Total	Exit	Exp.	Cont.	Stable	Total		
1986/87	1.41	2.10	14.13	5.28	1.02	22.53	2.70	6.91	10.48	1.04	21.13	43.66	26.43
1987/88	-0.18	2.27	12.96	5.46	1.03	21.73	1.89	6.84	12.12	1.06	21.91	43.64	26.67
1988/89	1.10	2.19	13.27	5.81	1.10	22.37	1.68	6.82	11.62	1.15	21.27	43.64	27.46
1989/90	0.96	2.01	12.30	7.25	1.13	22.70	1.22	5.90	13.56	1.06	21.74	44.45	28.44
1990/91	1.93	2.62	12.73	6.61	1.01	22.98	1.69	6.05	12.32	0.98	21.05	44.02	27.29
1991/92	-1.27	2.33	11.15	6.77	0.81	21.06	2.02	5.09	14.39	0.84	22.33	43.40	25.34
1992/93	-2.06	2.05	10.38	6.27	0.75	19.45	1.88	4.49	14.39	0.76	21.51	40.97	23.03
1993/94	2.90	2.35	13.77	6.37	0.97	23.47	1.84	5.73	12.12	0.87	20.57	44.04	25.95
1994/95	2.68	1.88	13.95	6.66	1.01	23.50	1.78	6.35	11.73	0.97	20.82	44.32	27.97
1995/96	3.37	2.72	13.97	6.36	1.04	24.09	1.59	6.42	11.79	0.92	20.72	44.82	27.43
1996/97	1.64	2.00	13.74	6.82	0.99	23.55	1.85	6.38	12.82	0.87	21.91	45.46	28.13
1997/98	4.35	1.91	16.95	5.85	1.01	25.72	1.37	8.33	10.73	0.95	21.38	47.10	30.26
1998/99	4.52	2.36	17.80	6.57	1.14	27.87	2.59	8.29	11.44	1.03	23.35	51.22	31.78
1999/00	5.62	2.88	18.43	7.13	1.22	29.66	2.34	8.32	12.27	1.10	24.03	53.69	33.10
2000/01	5.11	2.56	19.64	7.76	1.15	31.11	2.21	9.58	13.22	0.99	26.00	57.11	36.66
2001/02	3.89	2.68	18.36	6.36	1.18	28.58	3.21	8.55	11.89	1.05	24.70	53.28	31.92
Average	**2.25**	**2.31**	**14.60**	**6.46**	**1.04**	**24.40**	**1.99**	**6.88**	**12.31**	**0.98**	**22.15**	**46.55**	**28.62**

Table A11. Average net employment rate for cohorts and educational levels, different periods

Period 86/87–88/89	All	Born 1942/43	Born 1946/47	Born 1950/51	Born 1954/55	Born 1958/59	Born 1962/63
Pre-upper secondary	0,34	0,69	0,78	0,90	0,35	-	-
Upper secondary	3,80	0,52	0,91	1,28	0,95	-	-
University < 3 years	3,62	0,48	1,00	1,32	0,87	-	-
University ≥ 3 years	2,33	0,09	0,40	0,86	1,26	-	-

Period 89/90–92/93	All	Born 1942/43	Born 1946/47	Born 1950/51	Born 1954/55	Born 1958/59	Born 1962/63
Pre-upper secondary	-6,37	-2,25	-1,94	-2,22	-2,39	-2,63	-
Upper secondary	-2,01	-1,76	-1,42	-1,16	-1,21	-1,83	-
University < 3 years	1,43	-0,98	-0,14	0,30	0,74	1,01	-
University ≥ 3 years	0,19	-0,94	-0,59	-0,23	-0,01	0,26	-

Period 93/94–01/02	All	Born 1942/43	Born 1946/47	Born 1950/51	Born 1954/55	Born 1958/59	Born 1962/63
Pre-upper secondary	-2,44	-2,75	-1,43	-0,72	-0,05	0,53	1,16
Upper secondary	1,26	-2,59	-1,16	-0,36	0,30	0,80	1,24
University < 3 years	2,37	-1,89	-0,91	-0,19	0,32	1,19	1,98

| University ≥ 3 years | 3,85 | -1,82 | -0,80 | -0,12 | 0,82 | 1,76 | 2,87 |

Figure A1. The supply of education within cohorts
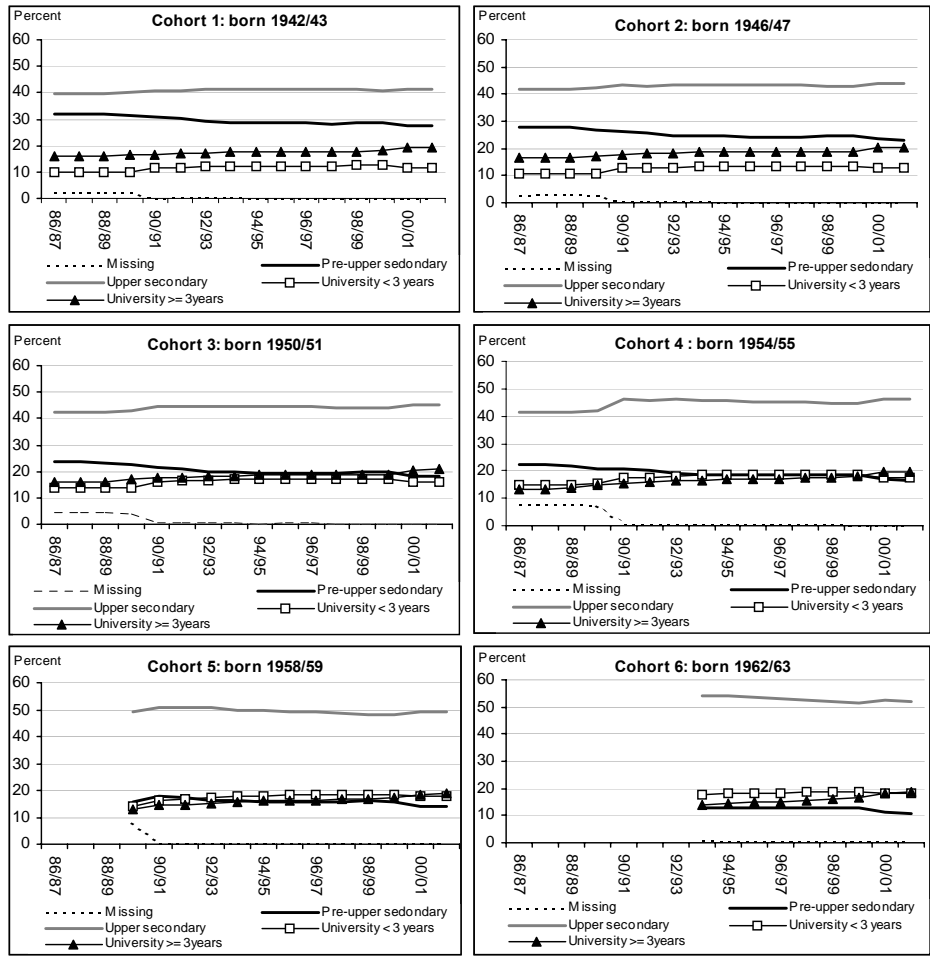
Figure A2. Annual net employment rates for all cohorts, and for six cohorts with respect to education, 1986/87−2001/02
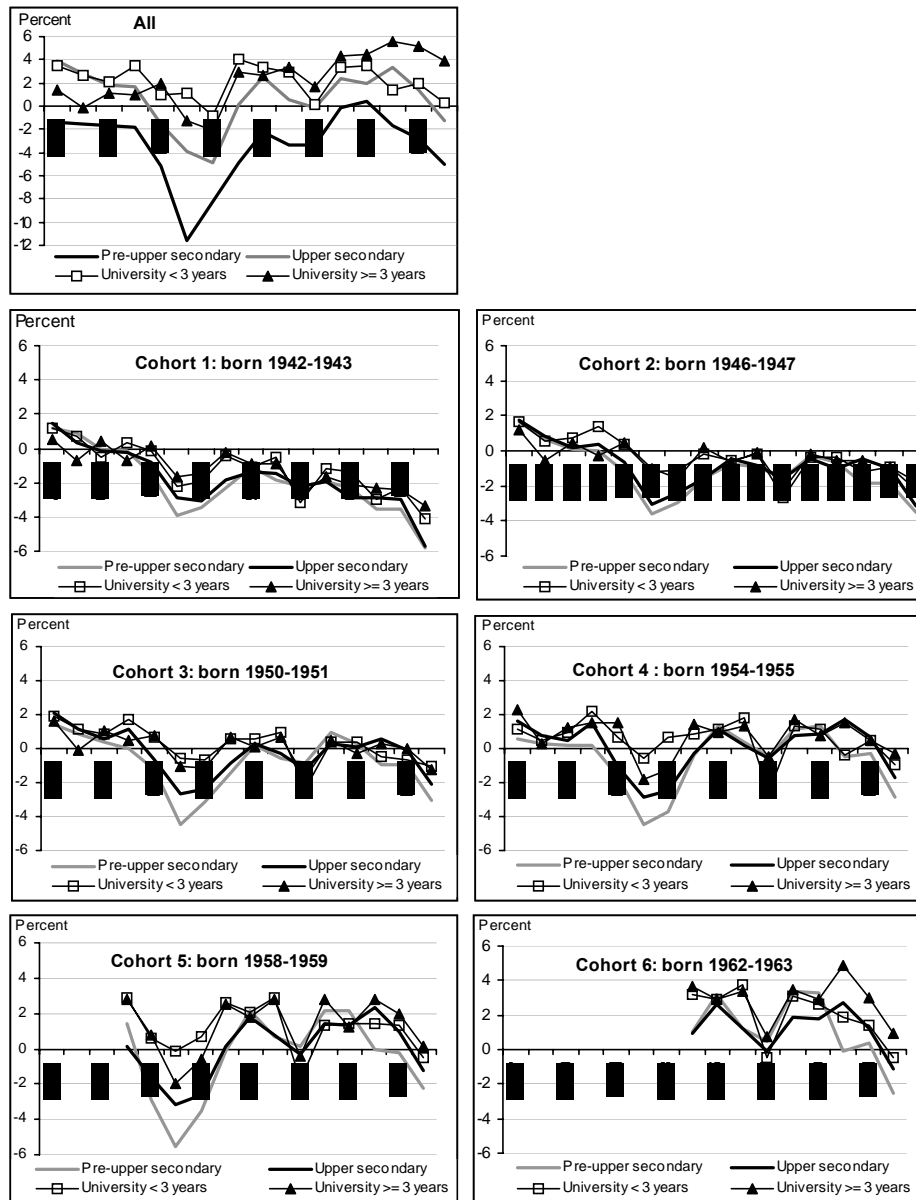
Figure A3. Rankorder correlations for different cohorts having received less than 3 years and 3 years or more of university education for the period 1986/87−2001/02
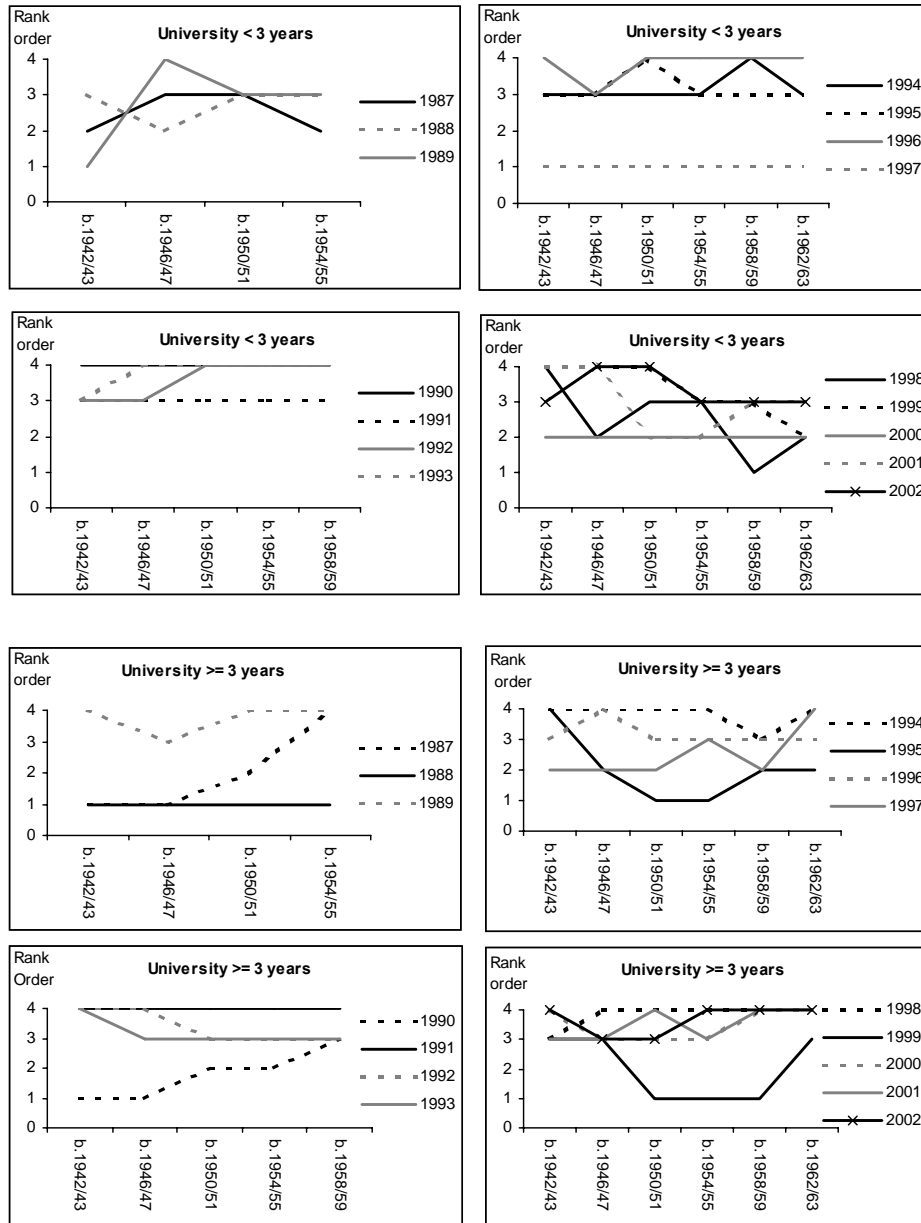
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