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UNEMPLOYMENT AND EARLY RETIREMENTS OF THE AGED WORKERS IN FINLAND***

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*** This study is a part of two projects: i) Time-use of aged and early exit from workforce (Ikääntyneiden ajankäyttö ja poistuminen työmarkkinoilta) financed by the Ministry of Labour, and ii) the Helsinki School of Economics and Business Administration and Statistics Finland joint project: "Labour Demand and Wage Formation in SMEs and Clusters" financed by the Academy of Finland.

Abstract: This paper contains an empirical analysis of gross job flows in the context of the great depression of the early 1990s in Finland. The job flows are characterised in terms of employee age and education. The outflow of workers from employment occurs mainly through unemployment, unemployment pensions or disability pensions. The purpose is to examine how the pressures for change, caused by depression and restructuring during the 90s, were reflected in the use of the aged labour force. The study shows that the aged workers had a considerably higher propensity to loose their jobs than Finnish employees in general. The unemployment pensioners and disability pensioners tend to have shorter educational histories than the Finnish workers in general. The withdrawal into unemployment and retirement as a whole does not depend on firm size. Firms instead use the method which is least costly. Firms' share of pension payments depend on the firm size and the chosen pension scheme. Therefore, large firms channel their older workers to unemployment or unemployment pension rather than to disability pension. We find that withdrawal of aged workers is rather weakly related to the long run productivity and profitability of the firm. Instead, we find persistence in high job destruction, especially in manufacturing, that may relate to skill-biased-technical change.

Tiivistelmä: Tämä tutkimus sisältää empiirisen analyysin Suomen laman aikaisista työvoimavirroista. Työvoimavirroilla tarkoitetaan syntyneiden ja tuhoutuneiden työpaikkojen määriä. Tässä tutkimuksessa työvoimavirrat rinnastetaan työntekijöiden koulutustasoon ja ikään. Tarkoituksena on selvittää, miten laman aiheuttamat rationalisointi- ja muutospaineet heijastuivat ikääntyneiden työntekijöiden käyttöön. Ikääntyneiden siirtyminen pois työllisyydestä tapahtuu yleensä työttömyyden tai varhaiseläkejärjestelyjen, kuten työttömyys- ja työkyvyttömyyseläkkeiden kautta. Tuloksien mukaan ikääntyneiden mahdollisuus menettää työpaikkansa oli tarkasteluajanjaksona keskimääräistä oleellisesti suurempi. Työttömyys- ja työkyvyttömyyseläkeläisille on tunnusomaista alhainen koulutus – suuri osa näistä eläkeläisistä oli pelkän peruskoulun käyneitä. Yrityksille ei ole yhdentekevää, mitä varhaiseläkekanavaa heidän työntekijänsä käyttävät. Työnantajan kustantama osuus rahastoitavasta työttömyys- tai työkyvyttömyyseläkkeestä on riippunut yrityksen koosta sekä varhaiseläkkeen muodosta. Tästä syystä suuret yritykset ovat suosineet työttömyyseläkettä työntekijöidensä eläkekanavana, kun taas työkyvyttömyyseläkkeet ovat yleisempiä pienille yrityksille. Yrityksen ikääntyneen henkilöstön vähentämisellä ei ole selvää yhteyttä yrityksen kokonaistuottavuuteen tai kannattavuuteen. Ikääntyneen väen vähentäminen on sen sijaan ollut yleisintä teollisuudessa, mitä voi selittää teknologinen muutos.

Summary: This study contains an empirical analysis of gross job flows in the context of the great depression of the early 1990s in Finland. The gross flows of jobs and workers are measured as the number of jobs created or destroyed. The job flows are characterised in terms of employee age and education. The purpose is to examine how the pressures for change, caused by depression and restructuring during the 90s, were reflected in the use of the aged labour force. The outflow of workers from employment occurs mainly through unemployment, unemployment pensions or disability pensions. Due to the lack of appropriate data in earlier studies it was not possible to examine how workers with different age and education in different sectors of industry use early retirement channels. This study applies a linked employee and establishment data over the period 1988 to 1996. The measures of underlying job creation and destruction are calculated for the main industries of the economy.

The results show that the demand for older workers remained weak for the whole decade of the 1990s. The aged workers had a considerably higher propensity to loose their jobs than Finnish employees in general. In the recession period 1991-1994 half of jobs were lost. Particularly in the manufacturing sector the treatment of older workers differed from other age groups. Of the workers who leave the workforce, the unemployment pensioners and disability pensioners are the ones with shorter educational histories. The severity of unemployment treated workers from different age groups more equally in the construction sector, which was most severely hit by the recession.

We show that the withdrawal from employment into unemployment and retirement as a whole does not depend on firm size. Firms instead use the method which is least costly. Job destruction of aged workers into unemployment/unemployment pensions is concentrated in large firms. Large firms also create less jobs for unemployed than the small firms do. In small firms disability benefit pension system including individual early retirement scheme is used more generously. Job destruction into unemployment/unemployment pension is high among the age group 55-59. The reason is the attractiveness of the “unemployment pension tunnel” for both employers and employees. Since firms start to contribute to the unemployment pension payments only when the unemployed enter the unemployment pension scheme at the age of 60, the unemployment pension tunnel is favoured instead of disability pension in large firms. The firm characteristics turn out to be important explaining disability pension entries of under 58 year old individuals rather than over 58 year olds. This is because a special feature of disability pension, individual early retirement, becomes available when workers turn 58.

Job destruction for unemployed has some positive association with total factor productivity. We, however, conclude that labour mobility related to early retirement or unemployment is rather weakly related to the long run average productivity or profitability of the firm. We instead find persistence in high job destruction, especially in manufacturing, that may relate to skill-biased-technical change.

Theme: Pension Schemes, Labour Market Policy
Keywords: job flows, aged workers, education, Finnish depression, early retirement
JEL Classification numbers: H55, J14, J26

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1. Introduction

The available empirical evidence on the underlying dynamics of labour demand by establishments strongly suggests that market economies seem to be in a state of continuous turbulence. In fact, Joseph A. Schumpeter (1942) called this underlying process of capitalism "creative destruction". The view that recessions revitalise the economy was indeed prominent in pre-Keynesian economics (see, for example, De Long 1990). Of course, the flux of jobs and workers in the economy is closely tied to the evolution of establishments. Continuous reallocation and the reorganisation of scarce resources culminates in the function of labour markets, where the reallocation of resources takes the form of gross job flows (i.e. job creation and destruction), and gross worker flows (i.e. hirings and separations of workers).

Recessions may not only be seen as beneficial in restructuring the economy (see, for example, Cabarello and Hammour 2000). The low job and worker turnover and the decrease in voluntary separations, (see Böckerman and Piekkola 2000), inhibit matching of workers into the right workplaces. The ongoing restructuring of jobs is a key to solid long-term economic growth, because technology – taken in its broadest sense – is more or less embodied in capital, in the experience of the labour force, and in the organisation of production[1].

The motivation of the applied approach to the elaboration of gross job and worker flows in the Finnish economy can be understood from the point of view of the large and growing economic literature on the relative demand shifts between unskilled and skilled workers during the 1990s[2]. This has a direct bearance on the growing concern of the early labour market exits of aged employees. Piekkola and Böckerman (2000) have discovered that there are strong signs of persistent decline in demand for the population of employees with only basic education and for the most experienced employees (i.e. employees with 25 years of experience or more). This was seen most likely as a reflection of the fact that the skill requirements for the employees induced by establishments had risen due to continuous technological upgrading.

This study disaggregates gross job and worker flows by industry and by employees' education and age in the Finnish economy over the period of investigation from 1988

[1] Ramey and Shapiro (1998) provide an analysis of gross capital flows and find that the gross flows of capital are large and comparable to the gross flows of jobs.
[2] Atkinson (2000) provides a summary of the literature.

to 1996. Accordingly, worker flows between employment, unemployment, disability- and unemployment pension channels are examined. In addition to job flows *from* employment, flows back to working life are also examined. The setting goes along with the principles appointed in the National Age Program (1998-2002 Ministry of Social Affairs and Health) based on The Council of State's decision in principle (6th of Feb, 1997). This study extends present literature, discussing European restructuring and retirements, as former studies have mostly been done at the firm level or by using census data[3]. The period of study includes the great depression of the early 1990s in Finland (see, for example, Honkapohja & Koskela 1999 and Appendix 1). The great Finnish depression constitutes an excellent opportunity for the elaboration of gross job flows during the period of extreme business cycle fluctuations.

It is proposed that during the great depression of 1990s the early pension schemes and the unemployment pension tunnel provided a soft channel for companies to let their older employees go and to concurrently cut-off costs and reorganise. Additionally, it is put forward in some articles that large employers might have favoured unemployment pension in comparison with disability pension (Romppanen 2000). The reason is that in the period large employers previously carried full burden of disability pension costs. The costs from unemployment pension fall only after a long period of unemployment and are not fully deductible. Higher cost and the increasing risk of disability for the aged is seen to encourage employers to keep their labour force young. The cronyism of younger workers could be the fashion especially in industry sectors, where production technologies develop expeditiously. (See also Hytti 1998 page 103 and Ahituv & Zeira 2000). Thus, it is possible that the older workers underwent only the destructive part of the "creative destruction" and were left outside of the job-creating element.

It is shown that the aged workers had a considerably higher propensity to loose their jobs than Finnish employees in general. Of the workers who enter unemployment, the unemployment pensioners and disability pensioners are the ones with a shorter educational history. This indicates a persistent decline of the least-skilled in the workforce. Approximately 50 percent of the jobs held by people aged 55-59 vanished in the first half of the 90s. This is because the withdrawal rate from employment was more than 16 percent both in 1992 and 1993 for individuals aged 55-64 (see Figure 1). The aforementioned retirements appeared especially in

construction and manufacturing sectors. Relative to other age groups, the treatment of older workers differed especially in the manufacturing and trade sector.

The withdrawal rate from employment is lower in skill-intensive firms. The worker mobility between employment and non-employment is low. This also implies low chances that of unemployed to become employed in skill-intensive firms. Instead, the excess demand for skilled, caused by "skill-biased technical change", implies that the remuneration of educational competencies associate with high worker flow between unemployment and employment. This has resulted to low unemployment, and the low educated stick out as the main group drawing disability or unemployment pensions.

We find that the *total flow* into unemployment and pension systems does not depend on firm-size, not even for the aged. Instead, we show that job destruction in the form of unemployment- and disability pensions *is* closely related to firm size. The basic difference is the concentration of job destruction into unemployment pension in large firms, and disability pensions in small firms. Firms adjust employment through channels that are less costly, as expected. Large firm effect relates to the attractiveness of the "unemployment pension tunnel" for both employers and employees. Since firms start to contribute to the unemployment pension payments only when the unemployed enter the unemployment pension scheme at the age of 60, the unemployment pension tunnel might be favoured instead of disability pension. Small firms seem to use disability pensions as an important way to adjust the number of personnel. The reason behind that is the low share in the funding of the disability pension. The firm characteristics turn out to be important explaining disability pension entries of under 55 year old individuals rather than over 58 year olds. This is because a special feature of disability pension, individual early retirement, becomes available when workers turn 55 (58 after 1995) and might confuse the calculations[4]. Finally, in all firms high social security payments contribute to job destruction. In this respect, there is no clear firm-size difference..

Job destruction out of employment has a positive effect on total factor productivity, but no effect on profitability. The restructuring of jobs for aged has not been a key to solid long-term firm performance.

[3] Hytti 1998 provides a review on findings
[4] Our variable indicating flows to disability pension includes the individual retirements

The demand for older workers remained weak for the whole decade of the 1990s and not only during the restructuring, which took place in recession years 1991-1993. The persistence of high job destruction for older workers, especially in manufacturing, may though relate to skill-biased-technical change.

This study appears in six parts. The sectoral composition of the study follows Ilmakunnas and Maliranta (2000), beyond narrow "manucentrism". Thus, the study includes a number of service sectors from 1988 to 1996[5]. The second section creates an insight into the Finnish unemployment benefit and early pension system. The third section of the paper articulates some main underlying properties of the applied linked longitudinal employer-employee data. The fourth section provides the applied measures of gross job flows. The fifth and sixth section includes the empirical analysis of gross job flows (i.e. job creation and destruction) in the context of the great depression of the early 1990s. The seventh section concludes.

2. Institutional Setting

In this section we describe the Finnish public pension system for the people who retire or become unemployed before the age of 65, the old-age pension limit. The system comprises of unemployment benefits and disability- or unemployment pension. Unemployment benefits might either be paid on a fixed daily or earnings related daily basis. The receivers of unemployment benefits have to fulfil a so-called "period of employment condition" (työssäoloehto). That condition is fulfilled when the unemployed person has been working 26 weeks during the last 24 months' period before the unemployment started. The maximum number of days for which the earnings related benefits are paid is 500. Likewise in the earnings related benefits, the basic benefit is paid only for the first 500 days of unemployment. After 500 days, a 6 months' period of employment is required in order to renew the benefits. After 1997 the renewal condition was extended to 10 months (in two years), and before 1994, the basic daily benefit was paid for the whole period of unemployment, without restriction. The people who are eligible for earnings related unemployment benefits have to be members for an unemployment benefit fund. (Pyy-Martikainen 2000, 37-39)

[5] Piekkola and Böckerman (2000) provide the comprehensive tabulation of gross job and worker flows over the period of investigation.

The two main paths for early retirement in Finland open through decreased working ability or longer period of unemployment. For the age group 60-64, those receiving disability or unemployment pension benefits were about 60 per cent of the age group in 1998. People of 60 years of age who have received unemployment benefits for 200 days, during the last 450 days, or who have received the maximum amount of earnings related unemployment benefit, are entitled to unemployment pension. A special feature of the unemployment pension is that the people who turn 57, years during the unemployment period, i.e. when unemployment starts at the age of 55, are entitled to an extension of unemployment benefits until they turn 60 and start to draw unemployment pension. In other words, they do not have to fulfil the renewal limit to have an extension of unemployment benefits after 500 days of unemployment. This feature is the so-called "unemployment retirement tunnel". Before 1997 "the tunnel" was open for individuals aged over 53 years and 1 month and before 1990 the age limit for unemployment pension was 56 years. (Hakola 1999, 25) The employer contributes to the unemployment pension funding since the employees receives the age of 60 and the amount of contribution increases with firm size.

An individual who is suffering from reduced working ability because of an illness, a handicap or an injury is entitled to disability benefits. Reduced working ability is the most common cause for early retirement in Finland. Almost one quarter of Finnish 59-olds received disability benefits in the year 1998. (Ministry of Social Affairs and Health 2000, 30-31; OECD 2000a, 89-91). Both unemployment pension and disability benefits are considered "fully effective". Thus, the time between the pension-qualifying event and the official retirement age, the so-called post-contingency period, is also accrual time for the old-age pension which starts at the age of 65 in Finland. The future time's pension accumulation is usually tied to the wage of the recent job. This, in fact, might cause a disincentive to accept a new job with a lower wage than the one before the unemployment period and to constrain further the job creation of the unemployed. (Hakola 2000, 24)

The individual early retirement pension is a special type of disability pension paid to someone between 58 and 64 with a long working career, whose working capacity has been significantly reduced. Before 1995, the age limit was 55 – 64 years.

2.1 Employer's excess of the pension costs

From firms point of view it is not insignificant how workers use the early retirement channels. The employer's excess of the pension costs is the part of the pension payments which are deductible to employer. The amount of those costs depend on firm size (see figure 2.1). Therefore, there is a rationale for firms to use, if possible, the retirement channel which is less costly. One of the key findings of the paper in hand is that this kind of selective channelling of workers actually happen. Since the beginning of the year 2000, the employer's excess of the early pension payments is harmonised (like shown on figure 2.1). (Työeläke 1999)

== figure 2.1 here ==

3. The Data

The Nordic countries, along with Finland, seem to have a number of advantages for the application of linked employer-employee data compared with other nations (see, for example, Ilmakunnas, Maliranta & Vainiomäki 1999, 5). In particular, the size of the country is quite small, making it possible to form various registers, which cover the entire population of establishments and employees.

This study applies a longitudinal data of all employees and establishments in the industries studied over the period from 1988 to 1996. Employment Statistics constitutes the backbone of this study[6]. Employment Statistics cover information on employment status in the second week of December for the entire population.

Employment Statistics allow a way to measure gross job and worker flow with respect to various employees' characteristics, in this case, education and age. The earlier literature is scarce in this respect. The recent study by Persson (1998) has provided these kinds of measures of gross job and worker flows for Sweden. In fact, Persson (1998, 21) observes that the rate of job creation for the least educated group is lower compared to the other groups from 1986-1995. However, Persson (1998) covers only the manufacturing sector of the Swedish economy. The influential tradition established by Davis, Haltiwanger and Schuh (1996) typically does not take

[6] Kyyrä (1999) and Korkeamäki and Kyyrä (2000) provide a documentation of the applied data.

into account firms' characteristics (such as age and size) in the analysis of gross job and worker flows either. The interaction between the re-structuring of market economies and early retirements from working life has also been seldomly made.

This study examines gross job and worker flows at the establishment level. Appendix 2 includes a description of the applied demographic analysis of establishments to define underlying births and deaths of establishments in the Finnish economy. We find that the total effect of artificial births and deaths on job reallocation never exceeds 0.5 percent.The measures of underlying job creation and destruction, and worker flows of the Finnish economy in employees' education and age groups are calculated for the main industries of the economy. The sectors of the empirical investigation into gross job and worker flows are defined as follows: (i) manufacturing, (ii) construction, (iii) trade, and (iv) business services. However, the public sector is excluded from the analysis as in a number of earlier studies on gross job and worker flows. The calculation of underlying gross job and worker flows naturally requires the set-up of a base year. This means that, for example, in the case of manufacturing, the measures of annual gross job and worker flows are calculated from 1989 to 1995.

Also, some new variables were constructed to meet the needs of the elaboration of gross job and worker flows in terms of employees' education and age. The education code was reduced to four groups following Vainiomäki (1999); (i) only basic education, (ii) vocational certificates, (iii) lower university and non-university degrees, and (iv) higher university degrees. The age code in the calculations is more focused on the aged labour force. Therefore, the first group includes all the workers (i) 49 or younger, whereas the rest of the groups are divided into five-year sequences; (ii) 50-54 (iii) 55-59 (iv) 60-64 and (v) 65+.

There were 23 861 856 observations over the period from 1988 to 1997, and 21 534 266 observations after eliminating employer-years that have an inconsistent plant code in some years or missing variables. After dropping the year 1997, due to the lack of plant codes, we were left with 19 618 318 observations in the calculation of industry level flows. The regressions are based on 8,021,902 person-year observations from total data on employees (that work at least one year) in firms covered in the sample of financial statistics collected by Statistics Finland.

4. The Applied Measures of Gross Job and Worker Flows

The gross flows of jobs and workers are measured as the number of jobs created or destroyed, or workers moving in and out of establishments (i.e. hirings and separations of workers). This means that the measure of the job creation rate (JC) is calculated as follows:

$$(1)\ JC_t = \sum_i (H_{it} - S_{it})^+ / ((\sum_i E_{it} + \sum_i E_{i,\,t-1}) /2),$$

where E denotes employment in firm i year t, and H_{it} is the number of workers at the establishment at time t who were out of employment at time $t-1$ and S_{it} is the number of workers at the establishment at time $t-1$ who are out of employment at time t and the superscript "+" refers to positive changes. We calculate equal figures for unemployment, unemployment and disability pensions. The number of employees is measured by the average of period t and $t-1$ employment. In other words, to convert time-t job creation and destruction measures to rates, job creation and destruction are divided by the average of employment at t and $t-1$. This is done in order to achieve several technical advantages over more conventional growth rate measures (see, for example, Davis, Haltiwanger & Schuh 1996, 189-190). Hirings may relate to employment of those under unemployment, unemployment pension or disability pension and similarly for separations.

Unlike the conventional growth rate measures, which divide employment change by lagged employment and range from –1.0 to ∞, the applied growth rate measure ranges from –2.0 to 2.0 and the growth rate measure is symmetric around zero. For example, job creation receives the value of 2 if the plant is newly established and all workers were formerly out of employment (period t-1 employment is zero). Job destruction receives the value of 2 if plant is closed and all workers run out of employment into unemployment. This average measurement also removes part of the bias induced by transitory movements of the economy.

The measure of the job destruction rate (JD) is calculated as follows:

$$(2)\ JD_t = \left| \sum_i (H_{it} - S_{it})^- \right| / ((\sum_i E_{it} + \sum_i E_{i,\,t-1}) /2)$$

Thus, the job destruction rate is defined as the absolute value of the sum of negative hirings less separations in flows in and out of workforce, divided by the average number of employees. The

superscript "-" refers to negative changes. The definitions of job creation and destruction mean that the withdrawal rate or net change of employment (NET) is simply the difference of the measures of job creation and destruction:

(3) $NET_t = JC_t - JD_t = HR_t - SR_t$

where hirings HR_t and separation rates SR_t use the same denominators as job creation and destruction rates. The sum of the job creation and destruction rates is called the gross job reallocation rate (JR):

(4) $JR_t = JC_t + JD_t$

The excess worker reallocation rate (WRR), equal to half of churning, equals worker reallocation (the sum of hirings and separation rates) less job reallocation rate:

(5) $WRR_t = 0.5\ (HR_t + SR_t - JR_t)$

At firm level this is equal to the difference between separation rate and job destruction rate. These definitions mean that the excess worker reallocation rate ties worker flows and job flows together and, therefore, completes the picture of the underlying dynamics of labour adjustment at the establishment level in the Finnish labour markets. This is a particularly useful estimate in unemployment flows, since it measures the extent to which unemployed are replaced by other unemployed keeping total employment the same. One reason for the "recycling" of the unemployed is the expiration of unemployment benefits after 500 days.

5. Withdrawal from Employment

Figures 1 a and b represent the net employment rates[7] between 1989-1996 in four Finnish industries (manufacturing, construction, trade and business services). Changes are calculated for five age and four education groups. It is seen that withdrawal was concentrated on the uneducated and aged segment of workforce. Approximately 50 percent of the jobs held by people aged 55-59 vanished in the first half of the 90s. In both 1992 and 1993, more than 16 percent of the working individuals aged 55-64 ended up in unemployment.

[7] The difference of job creation– and job destruction rates

== Figure 1 here ==

To some extent, our calculations confirmed that the treatment of aged labour differs in relation with the sector of industry. Although the aged workers met higher job destruction and lower creation rates in every sector, there were differences in the magnitude of that phenomenon between sectors. In manufacturing and trade, separations were mostly concentrated on the older employees. Manufacturing sector's aggregate job destruction rate has been below 11 percent while workers aged 55-59 have encountered job destruction rates of 15-25 percent during the depression. A contrary development was experienced in construction sector, however, where workers were laid off in masses but more evenly from all age groups than in the other sectors. This is illustrated in figures 2.

== Figures 2 here ==

After 1994, in the majority of firms, the amount of recruits of young unemployed has been larger than the amount of young workers who have been laid off. At the same time, job creation rates for older age groups remained relatively low. In the beginning of recovery (1994) improvement in job creation was experienced, but unlike the younger age groups, the net employment rate for older unemployed remained negative. When looking at age group 3's (55-59) figures (figure 3), one finds that in trade sector the job creation was minimal while most of new jobs were created in construction and business service sectors. Some new jobs were created also for the last two age groups (60-64 and 65+ years old), especially in business services sector.

== Figure 3 here ==

We can see that the probability of retiring through disability pension increases with age. The disability pension job destruction rates rise to a higher level with age level (see figure 3). For age group 1 (0-49 years old) the amount of disability pensioners is low, but when the age of 50 or higher is reached, the job destruction rates in disability pension become substantial. Disability pensions are most common in the construction sector. The second largest source of disability pensioners is the manufacturing sector. Supposedly, these sectors include more jobs where the

physical stress is appreciable. Controlling firm characteristics in the econometric analysis, we also find that business services contribute to disability pensions.

Job creation rates in all the sectors have been rather low although some improvement was experienced in 1994 and 1995. For some reason the age group 60-64 has a higher job creation than 55-59 olds.

To some extent, one might expect that the large public deficits of the early 90s would have led to tightened disability pension control. As the so-called automatic stabilisers, like income support, raised the public spending, the social security authorities might have been forced to establish hidden extortion on disability pension entrance conditions. However, during the darkest depression in 1991-1993, the job destruction rates in disability pensioners were stagnant or slightly increasing in all of the four sectors. Thus, it seems that any serious hidden constraints were not established. Since the period of darkest recession, job destruction through disability pension has turned into decline in every sector. Overall, disability pension flows seem to be fairly non-cyclical.

The share of unemployment pensioners has been quite low in the age group 60-64 during the depression, as the job destruction rate has only been around one or two percent[8]. Unemployment pension follows longer periods of unemployment, and, as the heavy increase in unemployment only began in 1991 the number of unemployment pensioners start to increase one or two years later (as can be seen in figure 4). It is also worth noting that the construction sector's figures do not heavily stick out from other sectors' job destruction rates in unemployment pension flows as they do with unemployment flows.

== Figure 4 here ==

Unemployment flows follow the economic cycles quite closely, both in manufacturing and business services. We see net employment creation in both industries in 1994 when the GDP growth turns positive after three years of recession in which GDP dropped by 12% altogether. There was also a recovery of employment flow in the business sector. The increase in unemployment in 1994 is on major part explained by the lengthening of unemployment periods that we do not measure here.

8 The unemployment pensioners' eligibility age is 60, therefore an examination for younger age groups is not carried out.

It is evident that unemployment (and disability benefits in particular) do not exactly follow economic cycles. In particular, there seems to be no substantial improvement in employment flow since the recession. This also relates to the permanently negative employment creations throughout the period for the aged workforce, that did not drastically deteriorate in the recession. Furthermore, the impact of the recession years on disability and unemployment pension figures may be delayed and become more evident outside the time span of this study.

5.1 Unemployment, pensions and education[9]

The results of this study are in line with Piekkola and Böckerman (2000) where education was found to be the most significant factor explaining job flows in Finnish establishments. In 1998, Finland had the sixth highest unemployment rate for people with upper secondary and post-secondary non-tertiary education (13 percent), but the unemployment rate for high educated (8 percent) was rather close to the average in OECD countries.[10] Education was also found to be related to job flows between employment and early retirements. Hakola's (2000) study supports these findings as well. The job flows, by education level, are illustrated in figure A1 in appendix 4. In 1991, the job destruction rates for less educated people jumped to a level which is 3-4 times higher than in 1990 and stayed there until 1994. The university degree holders' position in labour market was much more favourable.

In the construction and manufacturing sector the job destruction rate for the individuals with only basic education has been five times higher than for the holders of higher university degree. Furthermore, in the construction sector, where the aggregate job destruction rate was running close to 40 percent (1991-1993), the same rate for high educated was around ten percent. Job creation rates have been the highest for category 2, workers with vocational certificates, bringing their job reallocation rate close to category 1.

The low educated stick out as the main group drawing disability benefits no matter which sector of industry is considered. Even if burn-outs and depression have become a more common cause for decreased working capacity, these are still much more common among the uneducated. Kalimo and Toppinen (1997) show that burn-outs are linked with low education and high age. The amount of burn-outs increase

[9] Figures demonstrating unemployment, pensions and education can be found in appendix 4 (figures A1-A3)

slightly in the over 55-year old age group otherwise age has no significance for burn-out. Moreover, individuals with no vocational qualification were found to suffer from burn-outs more likely than their associates with higher education. If burn-outs were the dominant reason for disability pensions, these pensioners would probably have split up in to youngest and oldest age group, since it has been found that burnout is more common in the beginning or of career or after 35 years of working. This study is more focused on job flows among the elderly and therefore disability pension flows in the beginning of careers cannot be further examined. Besides the concentration of disability to uneducated we later show these to be strongly related to firm performance. Persistent decline in demand for the population of employees with only a basic education has led to an increasing number of disability pensioners that have low educational background.

In the last section, it was mentioned that the flow to disability increases as the workers' age increases. In Finland, the older generations tend to have lower education than the members of younger age groups (Ministry of Labour Ministry of Social Affairs and Health). This could partly explain the large share of low educated persons in disability pensioners. It could even be possible that the differences in education level between generations could be the reason why education seems to have such a significant effect on disability pension flows. Nevertheless, in the Ministry of Social Affairs and Health's[11] Implementation Report (2000, 76) it is seen that higher education lowers the disability pension flows even inside a certain age group, especially in the age of 55-57. Therefore, the relevance of education can not be ruled out with the foregoing argument.

Education also has a strong influence in unemployment pension flows (see figure 10). This was most evident in trade and service sectors although in all four sectors the individuals with the lowest level of education were the ones most likely to enter unemployment pension scheme.

Job creation for disability pensioners is rather exogenous. When occurring, the return flow from disability pension back to working life most often involves the low educated persons.

[10] (the high unemployment rate countries for upper secondary and post-secondary education were Greece, Italy, Poland, Spain and Finland in decreasing order).
[11] Present report only in Finnish. Forthcoming English translation in http://www.vn.fi/stm/english/publicat/publications_fset.htm

5.2 Unemployment, early pensions and establishment deaths

Figure A4 in Appendix shows the role of establishment deaths. The total unemployment flows arose mainly from establishments which survived the depression without closing down. Only a very small fraction of job destruction and creation emerged from death or birth of a company (see figure A.4). As the recovery started in 1994 the role of births and deaths became surprisingly more prominent especially in the trade sector. The Finnish trade sector went trough a strong re-structuring process during the 90s, which partly explains the considerable job destruction through plant or firm "deaths". The brackets are used since in this case it is more likely that job destruction is due to movement from smaller establishments to larger and more efficient ones. In the construction sector the role of firm deaths was more powerful than in other sectors. During the time of recession, half of the job destruction was derived from close downs.

Another interesting feature occurred in the manufacturing sector when comparing job flows between firm deaths and continuing firms. The ratio unemployment pensioners/unemployed is higher in firm deaths than in continuing ones. During the depression the ratio disability pensioners/unemployed is also higher in firm deaths than in continuing firms.

6. Withdrawal and Firm Characteristics

In this section, we match the total data of employees to the firm sample of Financial Statistics held by Statistics Finland. The idea is to examine what are the firm characteristics, including the quality of personnel, that describes firms, where withdrawal take place. The list of variables used in the analysis for person i and firm j, at time t is presented in appendix no. 3.

The original sample of Financial Statistics consists of 6,092 firms and the final data of 5,361 observations, of which there are information of job flows in 5,220 firms. We use as weights the sample weight multiplied by the average number of employees (corrected for the loss of small firms due to only one year entering data, which are thus omitted, see the third column). Following the method by Baldwin, Dupuy and Penner (1992), we consider birth and death of plants as a mere transfer of the plant, when persons employed either at the old plant at date t-1, or the new plant at date t, amount to more than 60 percent of all persons working in these plants at

dates t-1 and t. Using this criterion, unreal deaths and births are less than two percent of all plant births and deaths and these plants are linked. Plant deaths and births are roughly one fourth of all job flows, so that the worker reallocation rate is around 0.5 percent lower after this correction. The employee data on personnel in the selected 5,361 firms, cover 3,099,342 observations and 791,437 persons. (for a closer description, see Piekkola 2000).

The basic model is:

$$\ln(w_{ijt}) = \theta_i + \psi_j + \beta x_{it} + e_{ijt}, \qquad (6)$$

where the wage is explained by time-varying person characteristics: experience and time dummies, hence βx_{it} contains time dummies, a dummy indicating whether person i has switched jobs and experience up to the fourth power. The dummy is included to measure whether the time-varying compensations on experience are higher for persons that switch jobs more often. The subscript *j* refers to the firm as before, θ_i is the individual fixed effect, ψ_j the firm-specific payment, and e_{ijt} represents a statistical error term. The estimation proceeds by firstly estimating an equation where the wage is explained, in addition to experience, and also by variables *Z,* which include interactions of person average and firm characteristics (interactions of average experience, seniority, firm size (average number of workers) and industry dummies). The model is estimated in deviations from the individual means, to purge the person fixed effects. The results of the estimation are shown as Table A.2 in the Appendix. The subsequent error term includes, in addition to the original error e_{ijt}, the projection of the firm effects on the interaction variables. The person average of the original error e_{ijt} is the person effect. We decompose this person effect into unobserved and education effects:

$$\theta_i = \alpha_i + u\,\eta_i + \varepsilon_i, \qquad (7)$$

using the variance of θ_i as the weight. α_i is the unobserved person effect and η_i is the education/sex effect for group *u*.

We explain average firm level excess worker reallocation, employment and performance over time. The average person effects α_j and η_j for firm *j* are also

reconstructed using information on the person's entire work history. The estimation equation for average excess worker reallocation EWR_j in firm j is:

$$EWR_j = b_1 x\beta_j + b_2\alpha_j + b_3 u\eta_j + b_4\kappa_j + \varepsilon_{jt}, \quad (8)$$

where $x\beta_j$ is the average predicted effect of time-varying personal characteristics, α_j is the average of unobserved individual effects, $u\eta_j$ is the average of education/sex effect, κ_j measures the firm-level factors: skilled share of labour, quasi rent, borrowing ratio and market share, and ε_{jt}, is a statistical error. We leave the firm effect ψ_j from the estimations given the lower explanatory power. The average of unobserved individual effects, α_j, and the average of education effect, $u\eta_j$, are from equation (7). The variables used are shown in Appendix 3. Using financial statements of firms, the study includes two measures of firm performance, net profits and total factor productivity; borrowing ratio that measure expenditures on interest-bearing debts (divided by cash-flow and market share, which is real sales relative to sales at the two-digit industry level (NACE95)). The mean values of variables used, are shown as table A.1 in Appendix 3.

The results derived from the regressions are illustrated in tables 1-3. Job Creation is calculated for firms that on average employed more unemployed than shedded labour into unemployment. The majority of firms, two-thirds, shedded more labour into unemployment than recruited unemployment (job destruction figures cover there firms). Firms are divided analogously in table 3 into two categories. Only 10 percent of firms recruit disability pensioners more than create them. It is also clear that only few enter the labour force again once under unemployment pension scheme. Table 2 shows employment change instead of job destruction figures, for around 200 firms, since the net employment change was negative in almost all firms (job creation is zero).

6.1 Withdrawal into Unemployment or Pensions

The figures in table 1 include all flow into and out of the employment, including unemployment and both unemployment- and disability pensions.

== table 1 here ==

Column 2 shows job creation and column 4 job destruction between employment and non-employment for age group 55-59. A large majority of the latter consists of unemployed entering the unemployment pension tunnel, leading to unemployment pension at the age of 60. Table indicates that job creation of unemployed and job destruction into unemployment are both decreasing with variables indicating compensations on unobserved human capital, the share of educated workforce and capital intensity. Skill-intensive firms neither employ unemployed nor contribute to unemployment. In skill-intensive firms, including large firms (having on average higher capital intensity and skilled workforce), excess worker mobility of unemployed people is low (fifth column). The unobserved human capital and the share of educated decrease excess worker reallocation. This implies that it is less common to replace unemployed with another unemployed person.

It is interesting to note that in firms with high average compensations on education payments worker reallocation is large (i.e. education effect has positive sign). The excess demand for skilled caused by “skill-biased technical change” may have lead to the remuneration of educational degrees but has also raised worker mobility. As seen before, this has resulted to low unemployment, and the low educated stick out as the main group drawing disability or unemployment pensions.

We can see from firm-size dummies in table that vast differences do not exist in firms of different size in job creation nor destruction for young or aged persons (compare columns 1 and 2 or 3 and 4). This is supported by following figure 5b showing that job destruction for all age groups is slightly decreasing with firm size. The generous use of individual early retirement for the elderly in small firms matches the use of unemployment pension system in large firms. Figure 5c for aged and Figure 5d for all age groups in total show that job destruction in disability benefits is strongly decreasing with firm size. Similarly, the use of unemployment pension tunnel is increasing in firm size (not shown).

== Figure 5 here ==

What are the other factors that are related to firm size effect in flows to pensions? One possible factor is the higher social security payments in large firms, that unambiguously increases job destruction in the estimations. There is an social security payment factor in the model. It interacts weakly with the firm-size dummies

both for total flows (including unemployment and early pensions) and flows of aged individuals. Above average social security payments create more job destruction for aged in large and very small firms.

A firm-size effect should also emerge in large firms, as they are better able to co-ordinate personnel policy and to minimise social security payment expenditures. In large firms, unions and employers might together create savings in labour costs by channelling the aged high-wage earners to the unemployment pension tunnel (which is silently accepted by unemployment officials). However, in our calculations this is not controlled and we do not find this to create any firm size effect.

The second last column shows that excess worker reallocation is significantly lower in small firms[12]. This indicates that in small firms it is less common to replace a person by another unemployed. From columns 3 and 4 it is seen that liquidity constraints and high borrowing ratio raise job destruction of the unemployed. Liquidity problems also create some excess worker reallocation. One should keep in mind that this show firm variation and do not capture the very large contribution of borrowing ratio and liquidity constraints in recession on unemployment when borrowing ratio doubled.

Finally, we can see that firms which create high job destruction for aged into unemployment and pensions are located in certain industries: consumers goods, non-metallic mineral products and construction. In all the figures job creation and destruction are significant in construction. Not only the job reallocation (sum of job creation and destruction) but also excess worker reallocation is exceptionally high.

6.2 Unemployment pension flow

Table 2 shows job destruction into unemployment:

== Table 2 here ==

It can be seen from table 2, that the model explains around 13 percent of the employment pension flows and the number of firms with unemployment pension flow is limited to around 250. As a matter a fact, firm characteristics (table 3) appear

to explain substantially more, around 30 percent, of disability pension flows (number of firms is around 2400). We conclude that the unemployment pension scheme is not more related to wage compensations than disability pensions.

We can see that large firms stand out as firms where a large share of unemployment pensioners emerge (see also table A.1). This is a result from the fact that the costs from unemployment pension schemes are lower than disability pension costs for large firms. Firms with more than 1000 employees must cover half of the contribution of the unemployment pension from age 60 until 65. With disability pension the share is no less than 100 percent[13]. One should also add to these figures the unemployed that first enter the unemployment pension tunnel and are registered as unemployment and included in the unemployed in table 1. Unemployed at age 55-59, have a higher probability of receiving unemployment pension at age 60. Hence, column 4 of table 1 also characterise the (future) unemployment pension flows. We can see that social security payments also have a negative effect on the number of employees entering the unemployment pension tunnel before age 60.

6.3 Disability benefits

Table 3 shows job creation and destruction for disability benefits:

== Table 3 here ==

As discussed in earlier cahapter, firm characteristics explain a surprisingly high share of job destruction to disability pensions; 40 percent of job creation and 30 percent of job destruction. This is surprising since, after all, disability should relate to a person rather than to firm characteristics.

Disability entries are substantially larger for small firms. Job destruction in disability pensions is around 2 percent points higher in small firms (less than 7 employees), which is double the average destruction rate of 2 percent (see table A.1 in Appendix and figures 5c-d). This is somewhat less so for the aged group 55-59. The fact that disability pensioners emerge largely from small firms, is also well founded, since the burden in disability pension payments for the small firms is lower than for the large

[12] excess worker reallocation measures the replacement of workers in and out of workforce in excess of the size of personnel.
[13] New regulations to harmonise these costs are put forward

firms.

The share of social security payments from total sales has a positive effect on job destruction only in small firms. We can conclude that a typical person receiving disability benefit has been working in a small firm that has i) relatively high social security payments relative to sales and ii) aged workers with high experience compensation. This firm is located in either the consumer goods producing industry, in energy and water industry or in construction. Furthermore, we can see that the disability pension probability is increasing with compensations on experience and social security payments, and decreasing with the share of educated workforce.

The job destruction to disability pension usually leads most of the employees permanently out of the workforce. There is, however, clear evidence of firms of size less than 7 employees and largest firms to recruit those with disability benefits. The recruitment of large firm may reflect the fact that the burden of disability benefits is still relatively high compared to unemployment pensions.

From column 4, it is noted that the estimated model explains relatively low share of disability pensions of those aged 55-59, compared with disability pensions in all age groups. This might be because for workers from 55 (nowadays 58) to 65 years of age, individual early retirement (which in our data is included in disability pensions) is easier to enter than the disability pension and also least related to firm factors. In addition, lower health or handicaps become more common among the older age groups and this might give explanation power towards personal factors rather than firm characteristics. Disability pensioners are now more definitely concentrated in industries where the real risks of disability are greatest: construction, energy and water. *Firm-size* difference also appears to be lower for aged. One reason for this is that disability cost payments extend only to the age of 64, i.e. the cost difference between small and large firms decrease the older the disabled person is.

6.4 Firm Performance and Early Exit

We find some evidence that job destruction out of workforce is related to productivity. From column 1, in table 4, job destruction, whether leading to unemployment or to disability pension, associates with an improvement of total factor productivity.

The last column in table 4 shows that job destruction out of workforce is unrelated to profitability. We, hence, conclude that labour mobility related to early retirement or unemployment is rather weakly related to the long run average productivity or profitability of the firm.

7. Conclusions

We show that withdrawal of aged from workforce has been persistent throughout the period, also leading to very high job destruction in recession years. The total withdrawal from workforce does not depend on firm-size but is less common in skill intensive firms. Large firms contribute to “unemployment pension tunnel” and small firms to disability pensions. There is no particularly high negative effect emerging from the higher social security payments in the large firms. We also show that withdrawal of aged workforce has no direct effect on the profitability of the firms, but the persistent high figures in manufacturing may be related to technical change. The positive effect on total factor productivity may also be explained by very strong lessening of all factor inputs during the recession, having only modest positive effect on long-run firm profitability.

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Appendix 1. Background for the study: The great depression 1991-1993

The Finnish economy was hit by a deep recession in the early 1990's, with a 14% drop in GDP in the years 1991-1993. In addition, the tight monetary policy and relatively high interest rate level from the March 1989 revaluation of the Finnish mark until the shift to the floating exchange rate in September 1992 imposed fiscal restraint on firms along with external shocks that hit Finland, including the drop in trade with Russia (see Pohjola, 1998).

The unemployment rate rose rapidly from 3 percent at the end of 1980's up to 18 percent in 1994. Subsequently unemployment rate has gone down rapidly and is not below 10 percent and the EU average. The approximately 10 percent reduction of employed personnel in surviving firms results in 200 000 unemployed in the private sector. At the same time, the doubling of the number of bankruptcies on average from 2 to over 4 percent of firms caused 70 000 fired employees (bankruptcies increased by 8000 firms in the years 1991-1994). To sum up, jobs lost through financial constraints explain half of the rise in unemployment up to a half million persons (more than half of the 350 000 unemployed in the private sector). Similarly, Pohjola et al. (1998) finds that the rise of the interest rate up to 7 percent for four years explains half of the mass unemployment. The magnitude of the employment effect of the rise in the real interest rate has been found to be even higher in Sweden in Holmlund (1997).

Appendix 2. The Demographic Analysis of Underlying Establishment Dynamics

In the register of establishments, the unique identity number remains unchanged when two of the following criteria are unchanged: (i) the ownership, (ii) the geographical location, and (iii) the activity. Also, the above criteria may be more loosely applied to smaller establishments. It is not always possible to distinguish between real births or deaths and "articifial births and deaths" from mergers.

Following the method by Baldwin, Dupuy and Penner (1992), Persson (1998), and as applied by Mustaniemi (1997) for the population of Finnish enterprises, we consider birth and death as a mere transfer of establisment when

$$N_{i,j}/N_i > 0.6 \text{ and } N_{i,j}/N_j > 0.6$$

where $N_{i,j}$ is the number of persons employed at establishment i in the first year and at establishment j in the following year. N_i is the number of persons employed at establishment i, and N_j at the establishment j. If $N_{i,j}/N_i > 0.6$ and $N_{i,j}/N_j < 0.6$ the establishment(s) has/have merged to become a larger establishment, referred to as an artifical birth. If $N_{i,j}/N_i < 0.6$ and $N_{i,j}/N_j > 0.6$ the single establishment(s) have dispersed to a (smaller) establishment(s), referred to as artifical death.

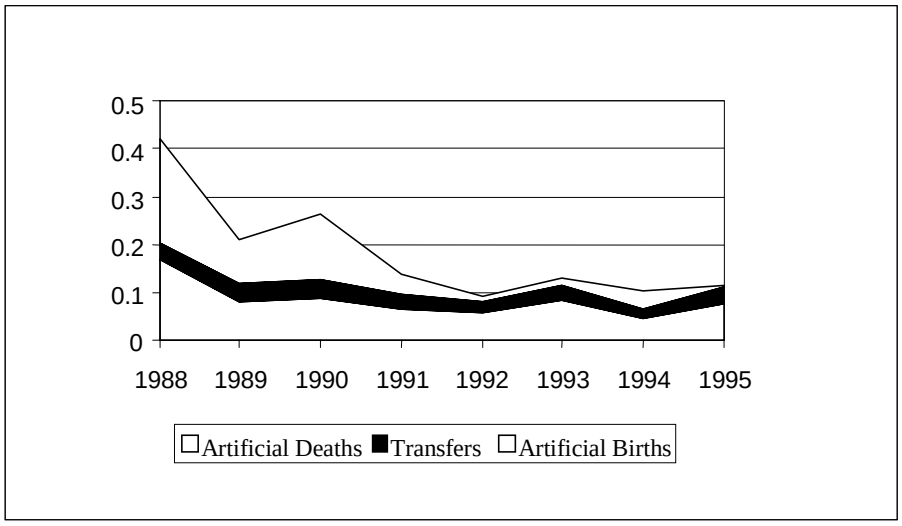
The demographic analysis reveals that there are 108 669 different identity numbers from 1988 onwards and 401 729 combinations of establishments where at least one employee is moved from one establishment to another. In these establishments there are 187 040 out of 5 340 024, or about 3.5 percent of employees, that shift plants (in the years the employee either leaves or enters the plant). Hence, from the 401 729 combination of establishments, 15 042 occur in a way that the joint share of employees exceeds 60 percent of the personnel in the firm where employees are leaving (artificial birth) and 16 763 occur in a way that the joint share of employees exceeds 60 percent of the personnel in the firm where employees are entering (artificial death). A mere transfer takes place on 6169 occasions. Figure 1A illustrates artificial births, deaths and transfers of establishments in the Finnish economy. These numbers are shown as a percentage of total job reallocation. The denominator is divided by two, since removing an artificial occurrence eliminates both an establishment birth and death.

An interesting feature of the imputed demography of establishments is that the number of underlying artificial establishment births/deaths has substantially declined over the period of investigation from 1988 to 1995. In addition, there appear to be quite large differences across the industries of the Finnish economy. Thus, the number of artificial births and deaths seems to be at a higher level within non-manufacturing industries of the Finnish economy. We can see that the total effect of artificial births and deaths on job reallocation never exceeds 0.5 percent. Thus, the inclusion of establishment demography is not an essential part of the analysis of gross job and worker flows in the case of the Finnish economy[14]. In fact, this

[14] However, the application of demography by Korkeamäki and Kyyrä (2000) to firm-level data reveals that the inclusion of the detailed demography is certainly an essential part of the analysis of underlying gross job and worker flows in the Finnish economy.

observation substantially differs from the results found by Persson (1998) in Sweden. In her investigation, the population of small establishments, especially, turned out to be a significant cause for the artificial births or deaths.

Figure A: Artificial plant births, deaths and transfers of the Finnish economy as a percentage of job reallocation / 2.



Appendix 3. The variables

The variables used in the analysis for person i and firm j at time t from the data are described in appendix.

- *Annual employment* L_{jt}: Average number of salaried and hourly employees in firm *j* over the course of the calendar year in Financial Statistics.

- *Capital* K_{jt}: Accumulated investment with 15 percent depreciation for machinery and 7 percent for other capital from 1987 using initial stock values in Financial Statistics.

- *Annual wages* W_{it}: Real compensation (wage) for person i divided by months worked and multiplied by 12, and deflated by the consumer price index (1990=1.00) in Employee Statistics.

- *High Educated/Employees:* The share of employees with bachelor's degree (lower university and non-university degrees) or higher

- *Value added per worker (part of quasi-rent)*: Value added divided by the producer price index at the two-digit level.

- *Market share*: Real sales relative to sales at the two-digit industry level (NACE95).

- *Borrowing ratio*: Expenditures on interest-bearing debts divided by cash-flow (Nickell and Nikolitsas, 1999, use all long-term interest payments). The borrowing ratio is set at the minimum zero or at the maximum four if it deviates more than five standard deviations from the estimated value.

The OLS regression using borrowing recession as regressand yielded $R^2 = 0.019$ with the following explanatory variables: unobserved individual effect, education effect, hirings effect, seniority effect, seniority squared effect, real sales per capita, short-term loans per capita, interest-bearing debt per capita, return on capital, dividends per capita, exports per capita, total factor productivity, market share and 32 industry dummies (see definitions later). 1.7 percent of observations receive the maximum value 4 for the borrowing ratio (426 observations out of 25,016).

Net profits: Gross profits (sales less wages, salaries, rents etc.) less interest on loans and depreciation.

The log of relative total factor productivity:

$$\ln TFP = \ln(\frac{Y_{jt} / L_{jt}}{\overline{Y} / \overline{L}}) - \frac{S_{jt}^{pre} + \overline{S}}{2} \ln(\frac{K_{jt} / L_{jt}}{\overline{K} / \overline{L}}) \ , \qquad (1)$$

where Y_{jt} is value added and S_{jt}^{pre} is the predicted cost share of the capital input obtained by a fit from estimating following:

$$S_{jt} = S_j + \beta_j \ln(K_{jt} / L_{jt}) \ , \qquad (2)$$

where the cost share of the capital input in year t is

$$S_{jt} = \frac{KCOST_{jt}}{KCOST_{jt} + LCOST_{jt}} \ , \qquad (3)$$

and where $KCOST_{jt}$ is the nominal capital costs, $LCOST_{jt}$ is the costs of labour (wages and social security payments, all from Financial Statistics) and S_j is the average cost share of the capital input. The share of capital in value added using firm-level data is rather volatile over time. This suggests measurement error, and we smooth the observed shares of capital by using a predicted value from estimation of (2). This follows Harrigan (1997) that uses the properties of translog production function to smooth the observed shares of capital. $\overline{S}$ denotes the average capital cost share among all plants in a given two-digit industry. The capital costs are the sum of depreciation of the total capital stock and 5 percent of the net capital stock in current price. The TFP of the benchmark plant is equal to one. $\overline{Y}$, $\overline{L}$ and $\overline{K}$ are the geometric means of value added, labour and capital, respectively, in each industry (Caves et al., 1982).

Appendix 4: Additional tables and figures

Table A.1 Summary Statistics: Mean, Standard Deviation

Variable	Mean	Standard Deviation	Mean Small Firms	Standard Deviation Small Firms	Mean Large Firms	ST Large Firms
Firm Size	412	12472	9	64.8	923	24154
Real Wages	106274	438139	100668	469973.5	109887	578695
Excess Separations	0.10	1.07	0.09	1.12	0.10	1.40
Separation Rate	0.17	1.49	0.16	1.55	0.18	1.91
Hirings Rate	0.33	3.99	0.28	2.91	0.40	6.61
Job Destruction All Unemployed	0.08	1.20	0.09	0.97	0.07	1.71
Job Destruction 55-59 Unemployed	0.23	3.66	0.23	4.55	0.23	3.83
Net Employment Pension Flow	-0.0001	0.02	-0.0001	0.02	-0.0001	0.01
Net Employment Pension Flow 60-64	-0.0018	0.53	-0.0042	0.90	-0.0008	0.16
Job Destruction All Disability Benefit	0.012	0.17	0.023	0.237	0.009	3.01
Job Destruction 55-59 Disability Benefit	0.096	2.46	0.181	4.168	0.076	2.69
Experience	21	63	20	71.2	21	75
Seniority	9	63	7	51.2	10	92
$Seniority^2$	9	175	8	282.6	9	89
Average Predicted Effect of x Variables ($x\beta$)	0.76	2.70	0.70	3.32	0.79	2.87
Average Individual Effect (α)	0.13	2.79	0.08	3.34	0.16	3.01
Average Education Effect ($u\eta$)	10.68	1.86	10.69	1.82	10.68	2.69
Average Firm Intercept (ϕ)	-0.06	6.93	-0.07	7.83	-0.06	1.78
Average Hirings Effect	0.00	2.87	0.01	3.14	0.00	1.28
Average Seniority Effect (γ+2*seniority*γ^2)	-0.03	4.10	-0.12	5.55	0.02	3.47
Skilled Workers/Employees	0.15	2.64	0.16	2.90	0.16	3.44
Log(Capital/L)	6.71	21.19	6.08	19.07	7.25	28.56
Market Share	2.73	103.42	0.14	29.44	5.93	208.89
Borrowing ratio	0.29	6.76	0.27	5.75	0.30	10.40
Return on Equity	0.29	49.03	0.41	78.40	0.23	11.35
Value Added/Employees/100	0.01	0.29	0.01	0.43	0.01	0.26
Profits/Employees/100	0.28	61.26	0.31	42.51	0.32	124.64
Exports/Employees/100	0.001	0.10	0.0020	0.14	0.0005	0.02

Calculations use as weights the sample weight times the average number of employees, as regressions. Wages, opportunity income, valued added, net profits and exports per labour and quasi rent in thousands of 1990FIM.

Table 1. Estimates of Withdrawal from Employment

Dependent Variable	Job Creation		Job Creation age 55-59		Job Destruction		Job Destruction age 55-59		Excess Worker Reallocation		Excess Worker Reallocation age 55-59	
Variable	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Average Predicted Effect of x Variables (xb)	-0.002	(0.1)	0.018	(0.3)	-0.009	(0.7)	-0.044	(0.8)	-0.014	**(4.4)**	-0.002	(0.4)
Average Unobserved Human Capital (α)	-0.040	**(4.4)**	-0.046	(1.6)	-0.044	**(6.1)**	-0.104	**(3.7)**	-0.015	**(8.6)**	-0.010	**(3.5)**
Average Education Effect (uη)	0.047	**(2.2)**	0.093	(1.4)	0.041	**(2.5)**	0.036	(0.6)	0.010	**(2.6)**	0.001	(0.2)
High Educated/Employees	-0.086	**(6.2)**	-0.084	**(2.0)**	-0.071	**(6.3)**	-0.182	**(4.3)**	-0.020	**(7.6)**	-0.002	(0.4)
Log(Capital/L)	-0.003	**(2.4)**	0.000	(0.1)	-0.003	**(3.4)**	-0.003	(0.7)	-0.001	**(3.8)**	-0.001	**(1.7)**
Borrowing ratio	-0.006	(1.3)	0.013	(0.9)	0.014	**(5.0)**	0.023	**(2.2)**	0.001	(0.9)	0.003	**(2.4)**
Market Share	0.000	(1.2)	0.001	(0.9)	-0.001	**(4.7)**	-0.001	**(1.9)**	0.000	**(2.5)**	0.000	(0.7)
Average employees < 7	0.005	(0.5)	-0.019	(0.6)	0.032	**(3.7)**	-0.033	(0.8)	-0.007	**(3.6)**	0.003	(0.9)
Average employees 7-19	0.001	(0.1)	0.018	(0.6)	0.009	(1.2)	0.027	(0.9)	-0.003	**(1.7)**	-0.001	(0.2)
Average employees 50-99	-0.025	**(1.7)**	0.004	(0.1)	0.011	(1.2)	0.071	**(2.3)**	-0.002	(1.0)	-0.004	(1.1)
Average employees 100-499	-0.021	(1.5)	0.000	(0.0)	0.019	**(2.7)**	0.034	(1.4)	-0.001	(0.4)	0.002	(0.6)
Average employees > 500	-0.022	(1.5)	-0.013	(0.3)	0.006	(0.9)	-0.002	(0.1)	-0.002	(1.2)	0.001	(0.3)
Consumer goods	-0.013	(1.3)	0.022	(0.9)	0.014	**(2.8)**	0.049	**(2.8)**	0.000	(0.2)	0.000	(0.1)
Pulp and paper, chemical	-0.006	(0.9)	-0.004	(0.2)	-0.001	(0.3)	-0.025	(1.5)	0.001	(0.9)	0.003	(1.5)
Non-metallic mineral products	0.013	(1.4)	0.018	(0.8)	0.040	**(6.0)**	0.053	**(2.3)**	0.002	(1.2)	0.003	(1.2)
IT manufacturing and services	-0.003	(0.4)	-0.005	(0.2)	0.002	(0.4)	-0.012	(0.5)	-0.003	**(2.0)**	0.001	(0.5)
Energy and Water	-0.030	(1.6)	-0.019	(0.4)	-0.023	**(2.6)**	-0.095	**(3.1)**	-0.007	**(2.8)**	0.002	(0.5)
Construction	0.105	**(12.9)**	0.107	**(4.5)**	0.093	**(19.0)**	0.101	**(5.8)**	0.028	**(21.8)**	0.017	**(8.8)**
Trade, Hotels, Restaurants	-0.023	**(3.5)**	0.002	(0.1)	-0.011	**(2.5)**	-0.032	**(1.9)**	-0.003	**(2.8)**	-0.001	(0.8)
Non-business services	-0.007	(0.7)	-0.036	(1.2)	-0.015	**(1.9)**	-0.081	**(2.9)**	0.014	**(7.5)**	0.004	(1.4)
Social security	-0.084	(0.7)	0.305	(1.0)	0.262	**(3.6)**	0.531	**(2.0)**	0.000	(0.1)	0.012	(0.4)
Social security, Employees < 7	0.163	(1.2)	0.030	(0.1)	-0.360	**(3.5)**	0.786	**(1.7)**	0.000	(0.0)	-0.086	**-(1.9)**
Social security, Employees 7-19	0.100	(0.8)	-0.331	(1.0)	-0.085	(0.9)	-0.532	(1.4)	0.000	(0.0)	-0.028	-(0.9)
Social security, Employees 50-99	0.365	**(2.0)**	-0.398	(0.9)	-0.074	(0.7)	-0.551	(1.4)	0.000	(0.0)	0.072	**(1.7)**
Social security, Employees 100-499	0.191	(1.1)	0.015	(0.0)	-0.230	**(2.7)**	-0.366	(1.2)	0.000	(0.0)	0.009	(0.3)
Social security, Employees > 500	0.241	(1.2)	0.022	(0.0)	-0.127	(1.3)	0.176	(0.5)	0.000	(0.0)	0.014	(0.4)
Sample size	1485		938		3759		3184		5245		4123	
Coefficient Degrees of Freedom	26		26		26		26		26		26	
Root Mean Squared Error	0.9349		2.1252		1.0582		3.5350		0.3203		0.4271	
R^2	0.2754		0.0590		0.2461		0.0828		0.2420		0.0461	

All estimations are ordinary least squares using sample times firm employment weights. Metals and machinery is the reference industry (excluding IT industry).

Table 2. Estimates of Withdrawal into Unemployment Pension

Dependent Variable	Net Change of Employment age 55-59		Net Change of Employment age 60-64		Excess Worker Reallocation		Excess Worker Reallocation age 60-64	
Variable	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Average Predicted Effect of x Variables (xb)	-0.009	(1.2)	0.053	(0.5)	-0.003	(0.6)	-0.091	**(1.7)**
Average Unobserved Human Capital (α)	0.002	(0.8)	0.079	**(1.8)**	-0.007	**(3.4)**	0.014	(0.6)
Average Education Effect (uη)	-0.018	**(2.5)**	-0.253	**(2.5)**	0.001	(0.1)	-0.044	(0.8)
High Educated/Employees	0.014	**(2.2)**	0.389	**(4.2)**	0.007	(1.6)	0.061	(1.2)
Log(Capital/L)	0.000	(0.5)	0.002	(0.3)	0.000	(0.9)	-0.001	(0.3)
Borrowing ratio	0.001	(1.0)	0.000	(0.0)	0.000	(0.5)	-0.001	(0.1)
Market Share	0.000	(0.6)	0.000	(0.8)	0.000	(0.1)	0.000	(0.2)
Average employees < 7	0.003	(0.9)	-0.189	**(3.3)**	0.024	**(10.8)**	-0.011	(0.4)
Average employees 7-19	0.002	(0.4)	-0.150	**(2.5)**	-0.002	(0.7)	-0.046	(1.4)
Average employees 50-99	0.003	(1.0)	0.073	**(1.9)**	-0.001	(0.4)	-0.034	**(1.7)**
Average employees 100-499	0.004	**(2.1)**	0.104	**(3.5)**	-0.001	(0.8)	-0.024	(1.5)
Average employees > 500	0.004	**(2.0)**	0.097	**(3.4)**	-0.002	(1.3)	-0.041	**(2.8)**
Consumer goods	-0.002	(1.2)	-0.002	(0.1)	0.001	(1.3)	-0.006	(0.6)
Pulp and paper, chtyical	-0.001	(0.6)	-0.008	(0.5)	0.001	(0.9)	-0.001	(0.1)
Non-metallic mineral products	0.000	(0.1)	0.025	(1.0)	0.000	(0.1)	0.002	(0.1)
IT manufacturing and services	-0.003	(1.3)	-0.199	**(4.5)**	-0.004	**(2.1)**	-0.006	(0.3)
Energy and Water	0.000	(0.1)	0.029	(0.5)	0.000	(0.1)	0.001	(0.1)
Construction	-0.002	(0.9)	0.001	(0.0)	0.001	(0.8)	-0.009	(0.7)
Trade, Hotels, Restaurants	-0.003	**(2.0)**	-0.008	(0.4)	0.001	(1.1)	-0.001	(0.1)
Non-business services	-0.004	**(1.8)**	-0.007	(0.2)	0.002	(1.0)	-0.011	(0.6)
Social security	-0.028	**(2.3)**	-0.011	-(0.1)	-0.005	-(0.6)	0.016	(0.2)
Sample size	242		173		242		229	
Coefficient Degrees of Freedom	21		21		21		21	
Root Mean Squared Error	0.1193		2.5744		0.0822		0.8754	
R^2	0.1288		0.3068		0.5097		0.1250	

All estimations are ordinary least squares using sample times firm tyployment weights. Metals and machinery is the reference industry (excluding IT industry).

Table 3. Estimates of Withdrawal into Disability Pension

Dependent Variable	Job Creation		Job Creation age 55-59		Job Destruction		Job Destruction age 55-59		Excess Worker Reallocation		Excess Worker Reallocation	
Variable	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Average Predicted Effect of x Variables (xb)	-0.012	(0.7)	0.231	(1.0)	0.023	**(11.0)**	-0.176	**(4.5)**	0.001	(0.7)	-0.009	**(1.9)**
Average Unobserved Human Capital (α)	-0.015	(1.6)	-0.023	(0.2)	-0.002	**(2.1)**	0.011	(0.5)	-0.003	**(4.9)**	-0.003	(1.3)
Average Education Effect (uη)	0.013	(0.5)	-0.552	**(1.8)**	0.000	(0.1)	0.067	(1.6)	0.000	(0.3)	-0.006	(1.2)
High Educated/Employees	-0.036	**(2.5)**	-0.021	(0.1)	-0.007	**(4.1)**	-0.100	**(3.3)**	0.000	(0.5)	0.002	(0.4)
Log(Capital/L)	0.003	**(2.0)**	0.016	(0.9)	0.000	(0.6)	0.000	(0.1)	0.000	**(2.0)**	0.000	(0.7)
Borrowing ratio	-0.004	(1.1)	-0.070	(1.5)	-0.001	(1.4)	-0.005	(0.7)	0.000	**(1.8)**	0.002	**(2.5)**
Market Share	0.000	(0.2)	-0.010	(0.7)	0.000	**(2.5)**	0.000	(0.5)	0.000	(0.8)	0.000	(0.3)
Average employees < 7	0.033	**(3.4)**	-0.048	(0.4)	0.018	**(10.2)**	0.012	(0.3)	0.003	**(3.5)**	0.003	(0.7)
Average employees 7-19	0.005	(0.4)	-0.009	(0.1)	0.008	**(7.4)**	0.095	**(5.0)**	0.001	**(2.1)**	0.007	**(3.1)**
Average employees 50-99	-0.005	(0.5)	-0.031	(0.3)	-0.001	(1.1)	0.001	(0.0)	0.000	(0.2)	0.001	(0.3)
Average employees 100-499	0.002	(0.2)	0.026	(0.2)	-0.002	**(1.8)**	-0.026	(1.5)	0.000	(0.2)	0.000	(0.2)
Average employees > 500	-0.039	**(2.7)**	-0.345	**(2.2)**	-0.001	(1.3)	-0.027	(1.5)	0.000	(0.4)	0.000	(0.1)
Consumer goods	-0.003	(0.3)	-0.081	(0.7)	0.002	**(3.3)**	0.025	**(2.1)**	0.000	(0.0)	-0.001	(0.5)
Pulp and paper, chkyical	-0.002	(0.3)	-0.012	(0.2)	0.000	(0.9)	0.006	(0.6)	0.001	**(2.4)**	0.003	**(2.6)**
Non-metallic mineral products	-0.006	(0.6)	-0.081	(0.6)	0.001	(1.4)	0.011	(0.8)	0.000	(0.9)	0.001	(0.5)
IT manufacturing and services	0.007	(1.0)	0.227	**(2.6)**	0.001	(1.3)	-0.001	(0.1)	0.000	(0.7)	0.001	(0.4)
Energy and Water	0.006	(0.2)	0.261	(1.0)	0.003	**(2.6)**	-0.013	(0.6)	0.001	(1.2)	0.004	(1.5)
Construction	0.020	**(2.8)**	0.018	(0.2)	0.005	**(8.3)**	0.023	**(1.9)**	0.000	(1.0)	-0.001	(1.0)
Trade, Hotels, Restaurants	0.008	(1.3)	-0.005	(0.1)	0.001	**(2.4)**	0.001	(0.1)	0.000	(0.2)	-0.001	(0.8)
Non-business services	-0.002	(0.1)	-0.151	(1.2)	0.002	**(2.1)**	-0.001	(0.1)	0.001	**(2.6)**	0.000	(0.2)
Social security	0.046	(0.5)	-0.482	(0.5)	0.008	(0.8)	0.125	(0.7)	0.002	(0.4)	0.015	(0.6)
Social security, Employees < 7	0.025	(0.2)	3.546	**(2.5)**	0.057	**(2.7)**	0.538	(1.3)	-0.021	**(2.0)**	-0.022	(0.5)
Social security, Employees 7-19	0.074	(0.6)	0.379	(0.2)	-0.006	(0.5)	-0.176	(0.9)	-0.002	-(0.3)	-0.020	(0.8)
Social security, Employees 50-99	0.050	(0.4)	0.092	(0.1)	0.006	(0.4)	-0.184	(0.7)	0.001	(0.1)	-0.009	(0.3)
Social security, Employees 100-499	-0.203	(1.0)	-0.868	(0.4)	0.005	(0.5)	-0.035	(0.2)	0.001	(0.1)	-0.008	(0.3)
Social security, Employees > 500	0.868	**(3.3)**	9.903	**(2.9)**	-0.004	(0.3)	-0.207	(0.9)	-0.004	-(0.5)	-0.003	(0.1)
Sample size	184		138		3091		2912		3276		3051	
Coefficient Degrees of Freedom	26		26		26		26		26		26	
Root Mean Squared Error	0.2911		2.9109		0.1329		2.3693		0.0750		0.3016	
R^2	0.4009		0.3037		0.2943		0.0601		0.0320		0.0178	

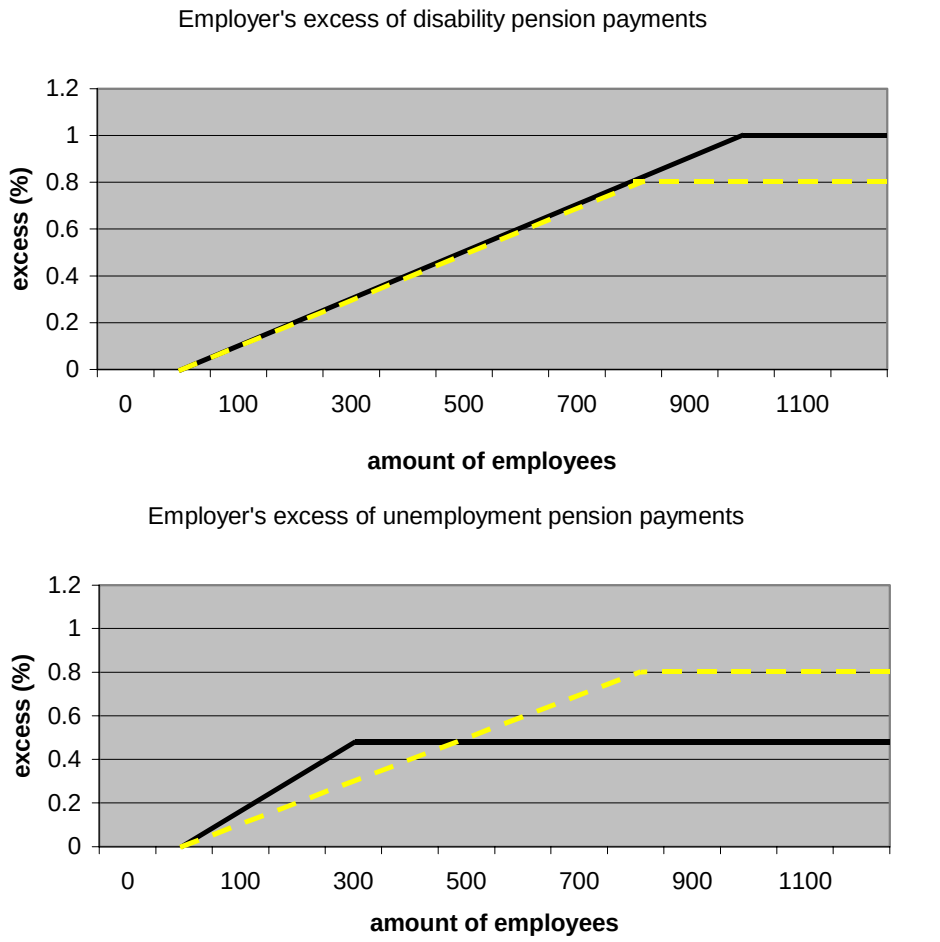
All estimations are ordinary least squares using sample times firm employmentweights. Metals and machinery is the reference industry (excluding IT industry).

Table 4. Total Factor Productivity, Valued Added and Net Profits Per Capita As a Function of Compensation Policies

Dependent Variable:	log(TFP) Level		Log of Valued Added/L/100		Log of Net Profits/L/100	
Variable	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Intercept	-0.527	**(4.6)**	-16.708	**(12.6)**	-13.143	**(4.4)**
Job Destruction, All Withdrawals	0.073	**(1.8)**	-0.708	**(5.5)**	-0.506	(1.2)
Job Destruction, All Withdrawals age 55-59	0.033	(0.2)	0.129	**(2.8)**	-0.143	(1.0)
Job Destruction, Unemployment Pension age 60-64	-0.823	(1.0)	0.089	(0.5)	-0.234	(0.5)
Job Destruction, Disability Pension	-0.050	(0.9)	-0.340	(0.4)	-1.403	(0.6)
Job Destruction, Disability Pension age 55-59	0.637	**(7.7)**	-0.121	**(1.8)**	-0.064	(0.3)
Average Predicted Effect of x Variables ($x\beta$)	0.958	**(22.0)**	0.672	**(7.2)**	0.220	(0.9)
Average Unobserved Human Capital (α)	0.831	**(7.7)**	1.035	**(20.7)**	0.947	**(7.7)**
Average Education Effect ($u\eta$)	0.075	(1.1)	1.007	**(8.1)**	1.028	**(3.7)**
High Educated/Employees	-0.085	**(4.7)**	0.100	(1.3)	0.673	**(3.7)**
Log(Capital/L)			0.107	**(14.7)**	0.184	**(10.1)**
Borrowing ratio	0.010	**(4.2)**	-0.054	**(2.6)**	-0.964	**(11.5)**
Market Share	-0.002	(0.1)	0.015	**(5.8)**	0.010	**(1.7)**
Average employees < 7	0.057	(1.5)	0.081	(1.5)	0.049	(0.4)
Average employees 7-19	0.027	(0.6)	-0.744	**(19.1)**	0.046	(0.4)
Average employees 50-99	-0.474	**(11.8)**	0.030	(0.6)	0.095	(0.7)
Average employees 100-499	-0.067	(0.9)	-0.402	**(8.6)**	-0.334	**(2.8)**
Average employees > 500	-18.531	**(50.4)**	0.015	(0.2)	0.014	(0.1)
Social security	0.794	(1.4)	-16.927	**(40.3)**	-10.506	**(9.1)**
Social security, Employees < 7	-0.368	(0.8)	-0.098	(0.1)	5.235	**(3.1)**
Social security, Employees 7-19	-0.448	(0.8)	11.682	**(25.7)**	0.043	(0.0)
Social security, Employees 50-99	7.580	**(15.4)**	-0.579	(0.9)	-1.582	(0.9)
Social security, Employees 100-499	-0.174	(0.2)	6.833	**(11.9)**	5.837	**(3.9)**
Social security, Employees > 500	-0.410	**(4.9)**	-1.189	(0.9)	4.421	(1.4)
Sample size	4952		5220		3373	
Coefficient Degrees of Freedom	55		56		31	
Root Mean Squared Error	0.5109		0.5975		1.2805	
R^2	0.6631		0.7054		0.2192	

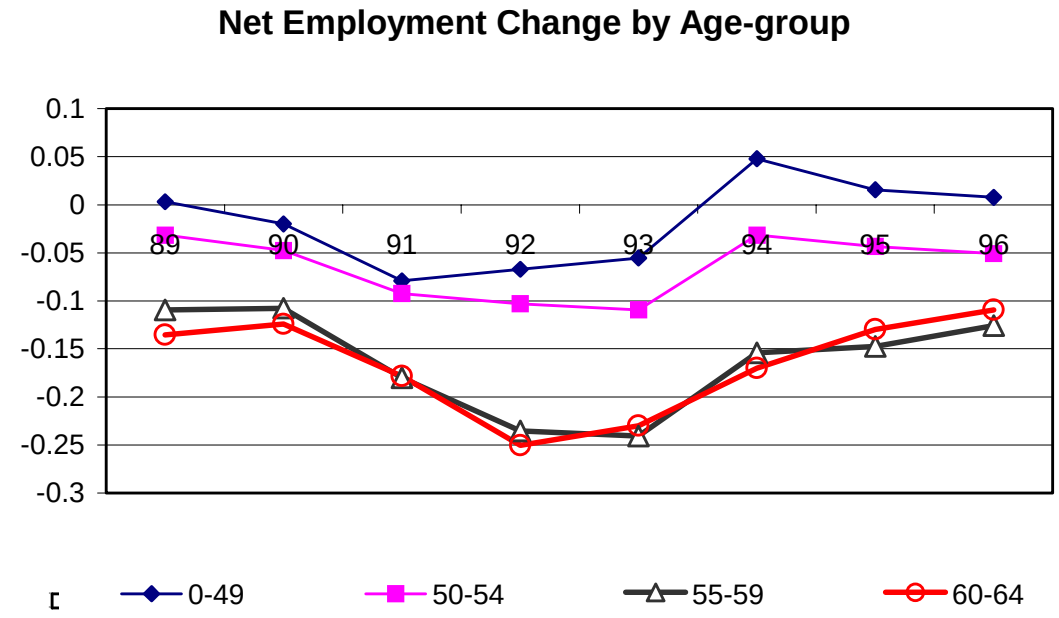
The dummies in TFP and Value Added estimations include 35 industry dummies and in profitability estimations are the same as in earlier figures. Metals and machinery is the reference industry (excluding IT industry). Estimations use general least squares.

Figure: employers excess of early retirement payments



black line: old system dashed line: system after 2000

Figure 1 a-b: Net employment changes in Finland 1989-1996



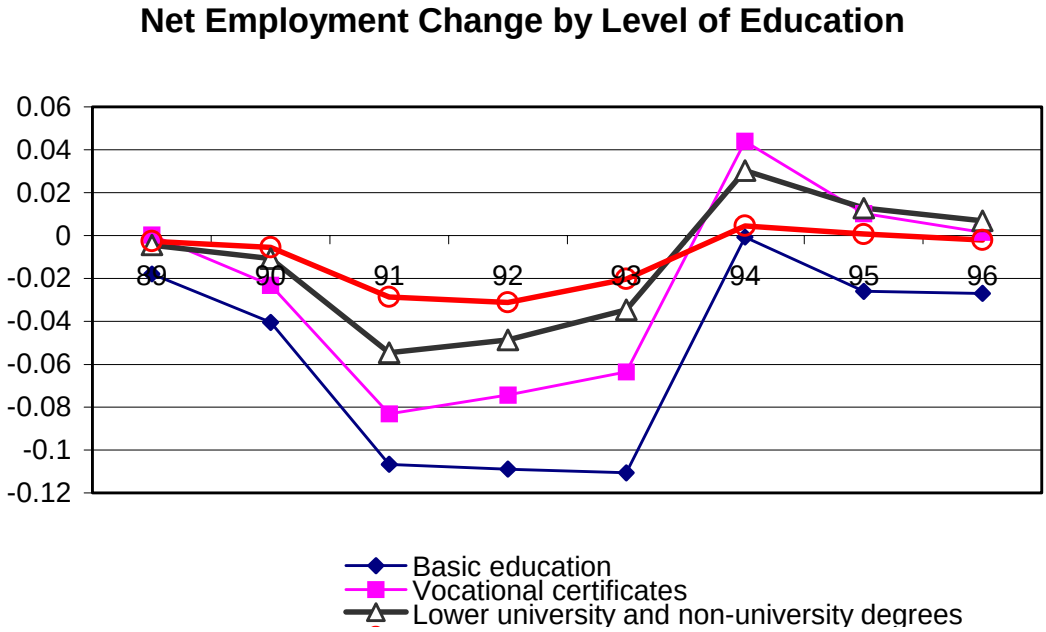


Figure 2 a-h: Job creation and destruction rates by age and industry

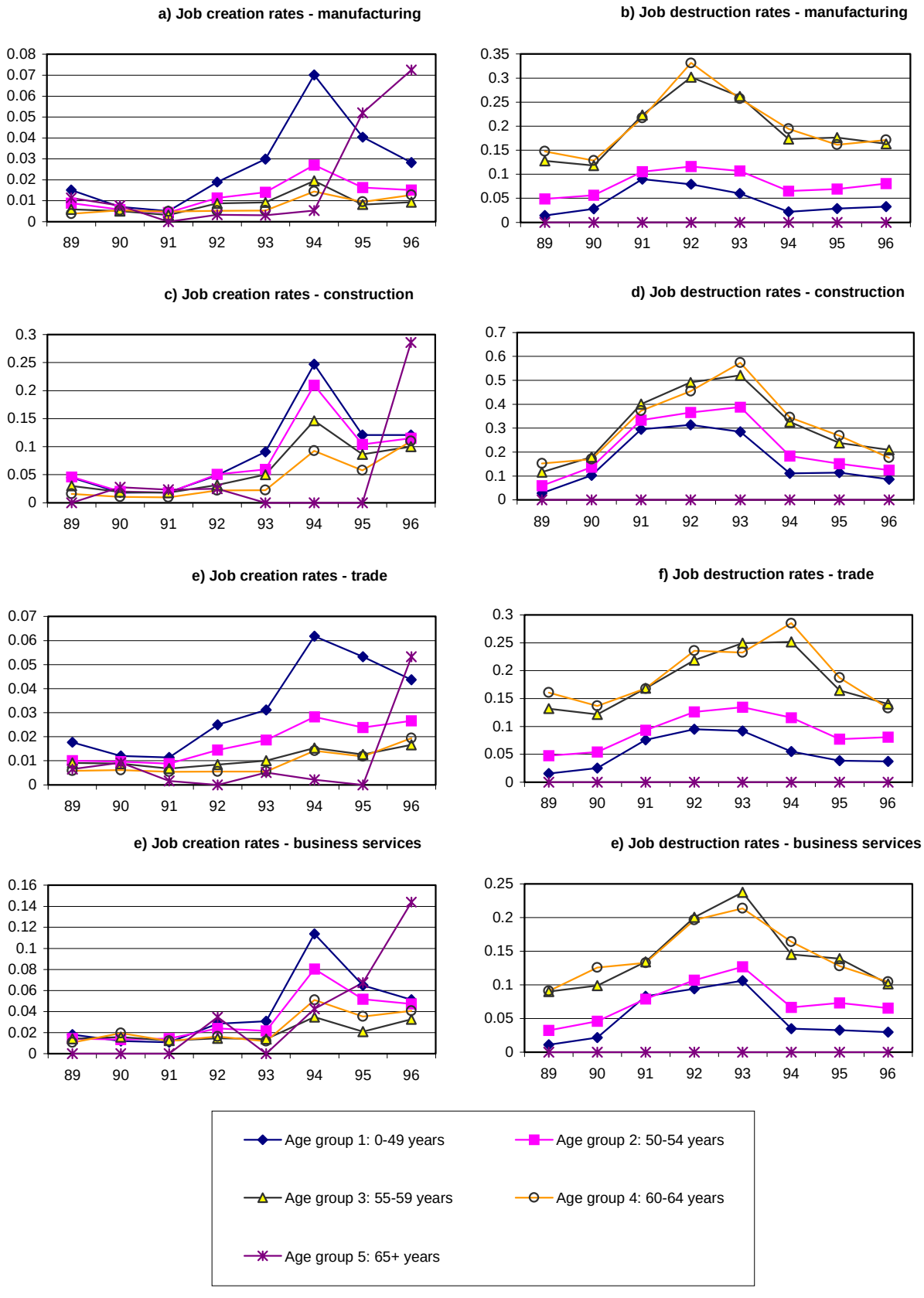


Figure 3 a-h: Job creation and destruction by age and industry; disability pensioners

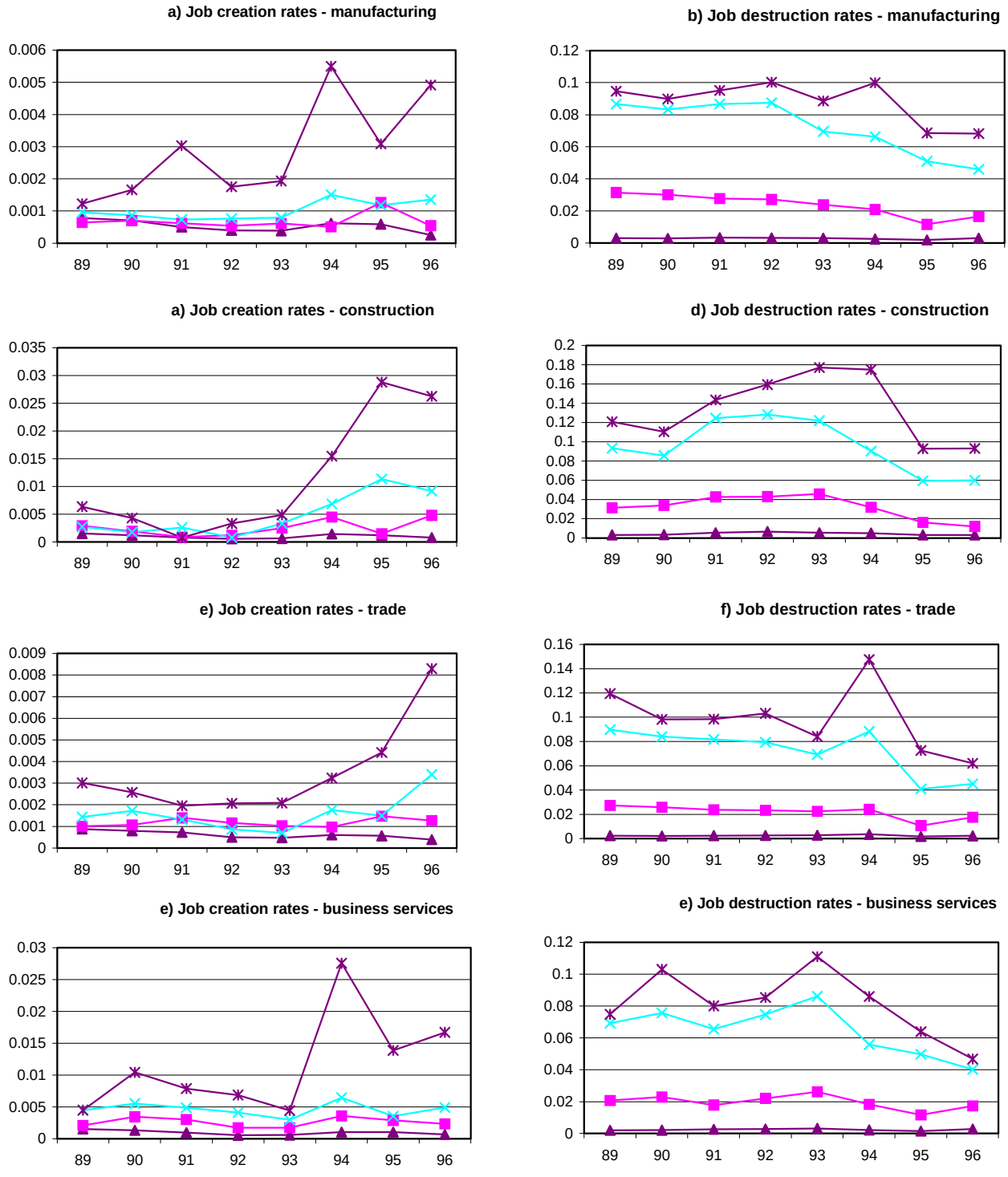


Figure 4 a-d: Job creation and destruction in age group 60-64 by industry; unemployment pensioners

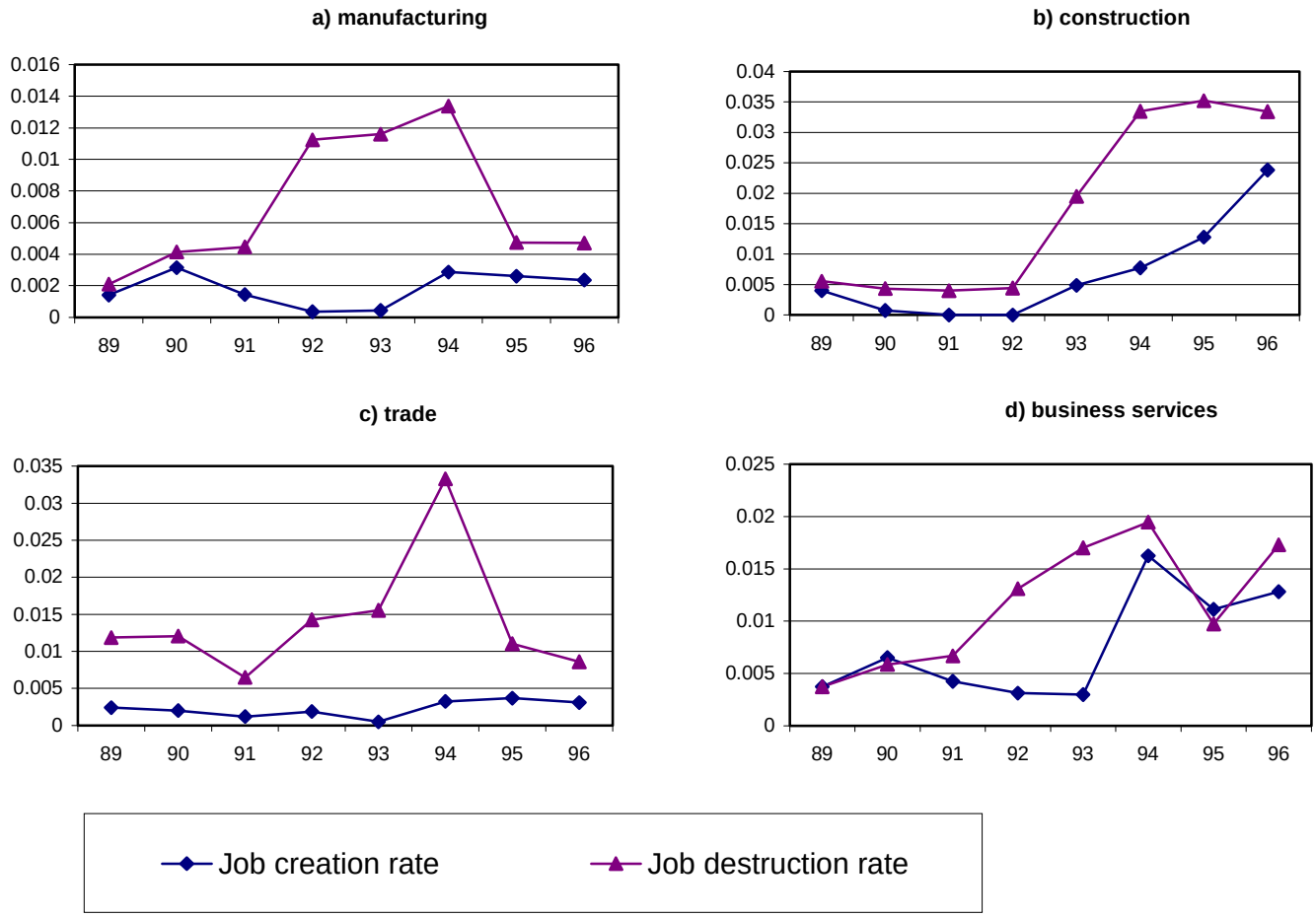
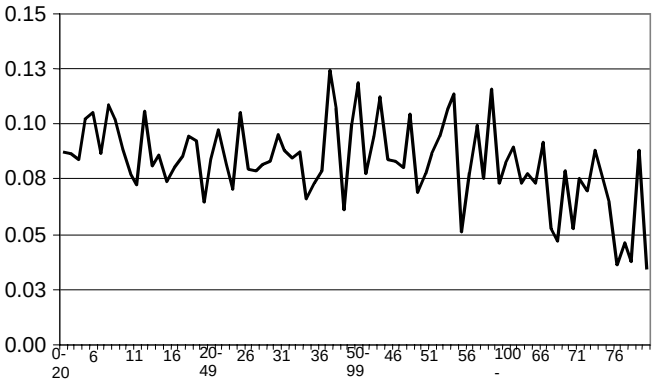
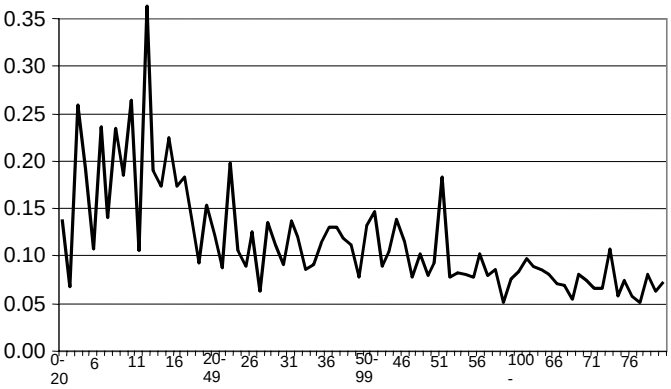


Figure 5 a-d: Job destruction of 55-59 old by firm numbers in four firm size groups

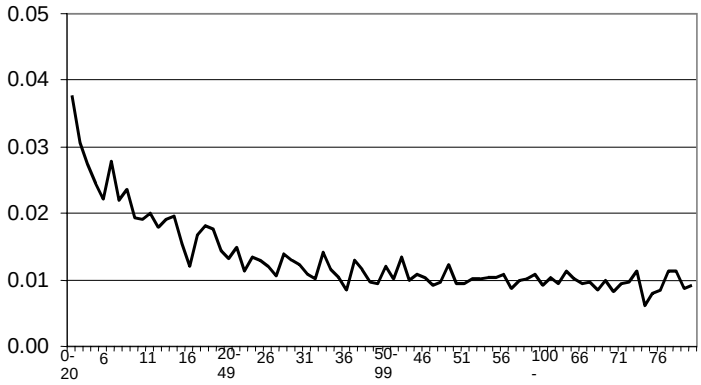
Job Destruction 55-59



Job Destruction



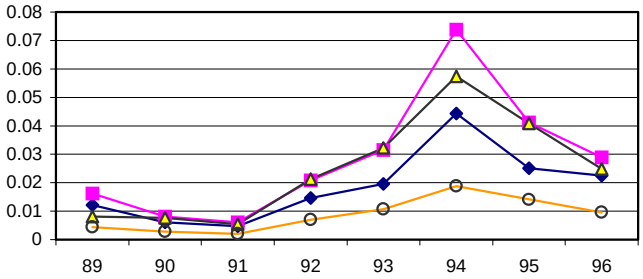
Job Destruction, Disability 55-59



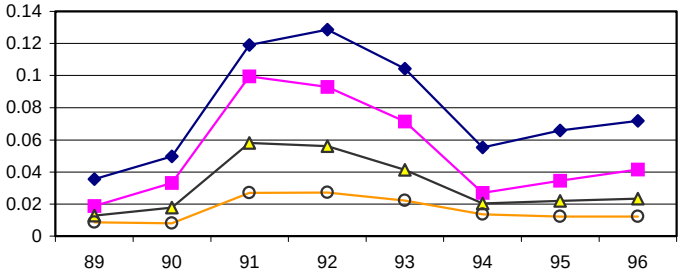
Job Destruction, Disability

Figure A1 a-h: Job creation and destruction by education and industry

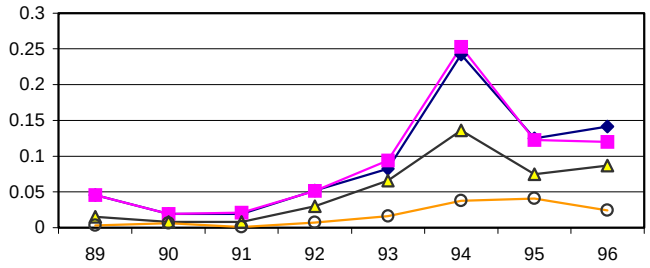
a) Job creation rates - manufacturing



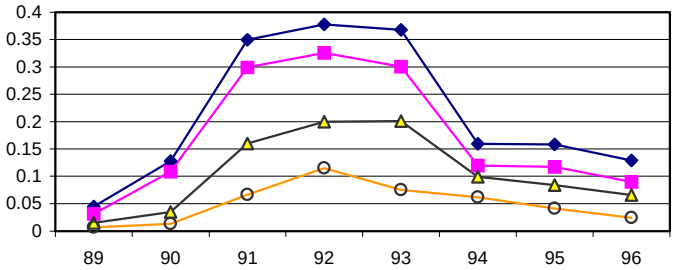
b) Job destruction rates - manufacturing



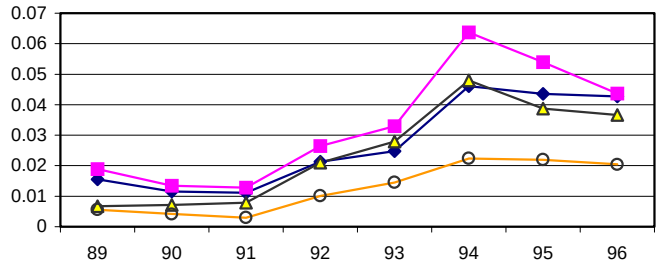
c) Job creation rates - construction



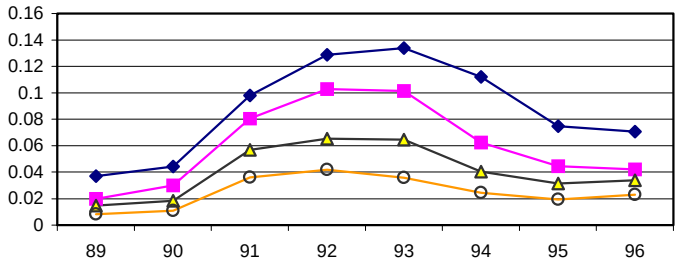
d) Job destruction rates - construction



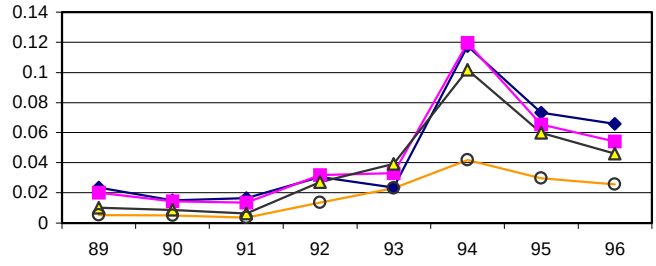
e) Job creation rates - trade



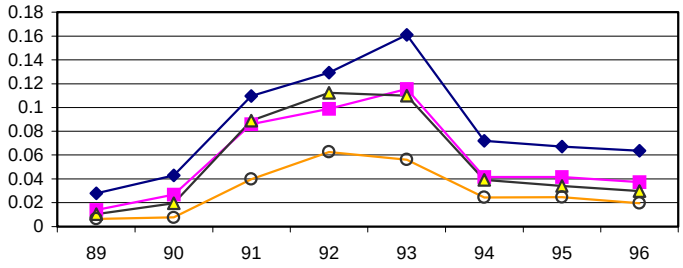
f) Job destruction rates - trade



e) Job creation rates - business services



e) Job destruction rates - business services



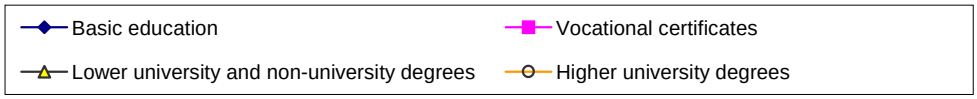
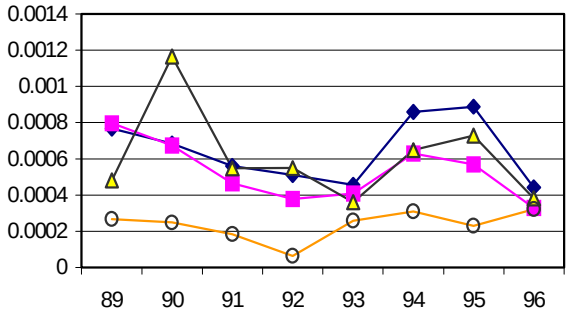
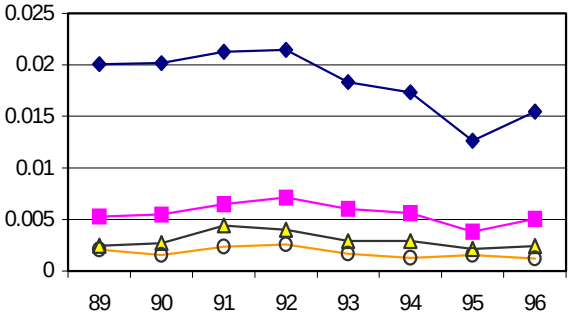


Figure A2 a-h: Job creation and destruction by education and industry; disability pensioners

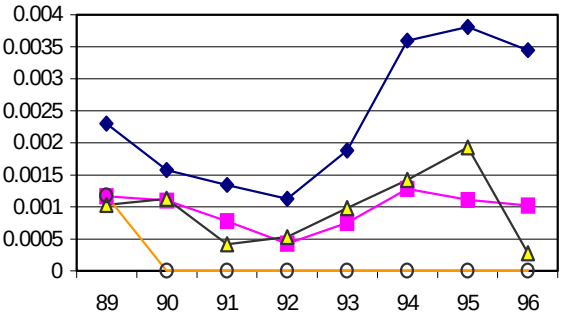
a) Job creation rates - manufacturing



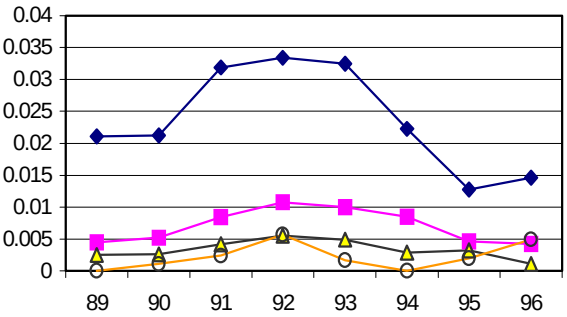
b) Job destruction rates - manufacturing



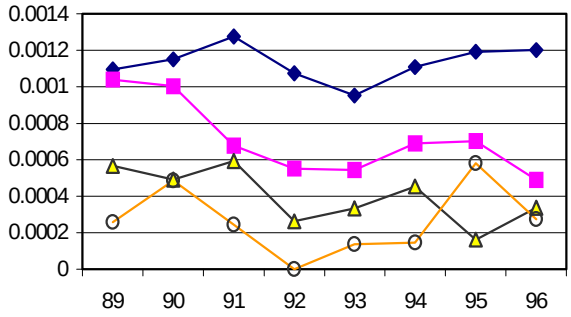
c) Job creation rates - construction



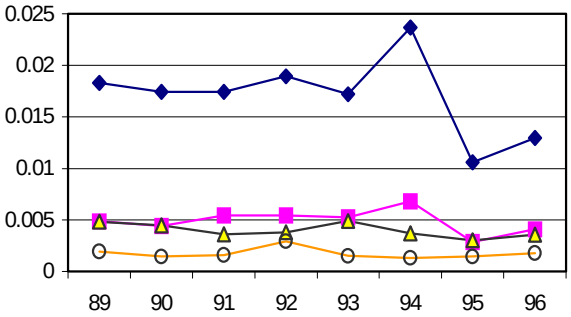
d) Job destruction rates - construction



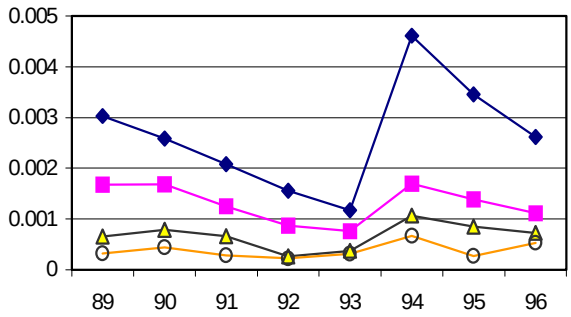
e) Job creation rates - trade



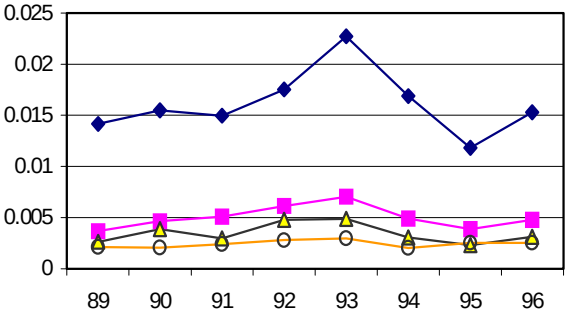
f) Job destruction rates - trade



e) Job creation rates - business services



e) Job destruction rates - business services



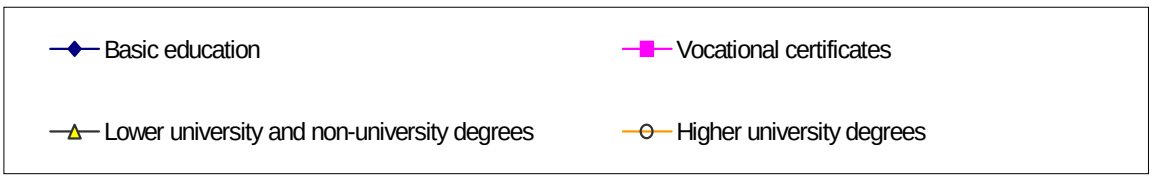


Figure A3: a-h: Job creation and destruction by education and industry; unemployment pensioners

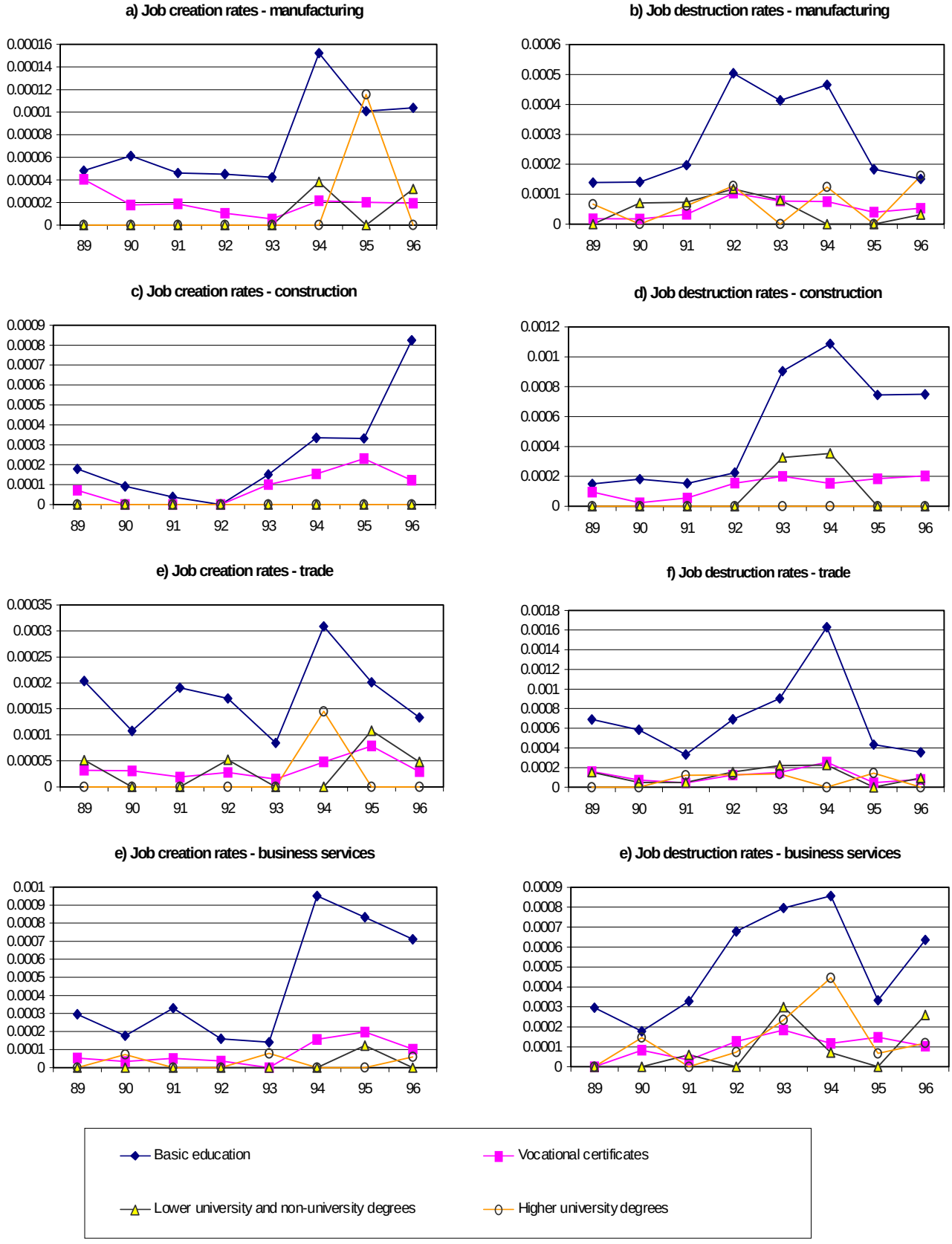


Figure A4 a-d: Job destruction; establishment deaths and continuing establishments