Hiring of older employees and changes in early-retirement policy

Pekka Ilmakunnas
Helsinki School of Economics and HECER (pekka.ilmakunnas@hse.fi)
Seija Ilmakunnas
Government Institute for Economic Research (VATT) (seija.ilmakunnas@vatt.fi)

Abstract:

We analyse the determinants of hiring of older employees and examine how policy changes have affected the hiring behaviour of firms. We use linked employer-employee data from Finland in the period 1990-2004. This allows us to identify at the plant level employees in different age groups that have been hired during the last two years, and employees who have exited the plants. We form two measures of age-related hiring rates, relative share of old hires and old hires in relation to the stock of old employees. In descriptive analysis we examine trends in these rates and corresponding exit rates, as well as the plant-level segregation of age-related hiring. Over time the relative share of old hires has been lower than the stock of old employees, but their trends are rather similar, whereas the exit share of the old has varied much more. The hiring of older employees has become somewhat less segregated. Regression analysis shows that larger firms are more likely to hire older employees, but their hiring rates are lower. We have evaluated a reform in the eligibility of unemployment related early-exit channel i.e., increasing the lower age limit for this channel. This policy reform reduced the ease of downsizing the older work force, but at the same it also reduced the costs related to redundancies in this relevant age group. Our difference-in-differences results show some evidence for increased incentive to hire workers who were in an age group that was no longer eligible for the scheme in question. This age group also experienced a decline in the exit rate, especially in larger firms.

Key words: ageing, hiring, labour demand, pensions, employer-employee data

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1. Introduction

Along with the process of ageing of the population and the available labour supply firms are facing a new situation in formulating their recruitment policies. When the average age of the labour force is increasing, older workers are becoming a more and more important source of potential new work force. On the other hand, the empirical evidence indicates that older employees are less likely to change jobs than their younger counterparts, and they are also less likely to become re-employed once unemployed. These phenomena taken together imply that firms have to pay increasingly attention to their recruitment policies towards older workers. Furthermore, it is also increasingly important that the incentives implied by the tax-benefit schemes are such that they do not discourage the labour market transitions among the older work force.

There exists a relatively large number of studies on withdrawal from the labour market. The effects of various early-retirement channels and the incentives embedded in them have been the main focus in this research area. Compared to this, the amount of research devoted to hirings among older workers is much smaller. It is even more striking that the role of labour market institutions, like early-retirement schemes is very seldom tackled in these studies. This study aims to fill this gap by analyzing the hirings among older workers so that special attention is paid to the institutional arrangements that are likely to have an effect on hiring decisions.

This scarcity of hirings among older workers actually seems to be a rather universal phenomenon. The universality of it makes it interesting *per se*. But, the ageing of the work force makes it also increasingly policy-relevant. The flexible functioning of the labour market is becoming more dependent on the labour market transitions among older employees, when their share is growing.

From policy perspective it is important to understand the reasons for the reluctance of the firms to hire older employees. As an example one can compare two competing explanations. The reluctance may firstly arise because of high fixed hiring costs and their short payback period or, secondly, it may be related to harmful disincentives of the pension system. In the latter case there is likely to be a more direct link to reform the policy than in the former case.

We will first examine long-term changes in the hiring of older employees over a period of time from the beginning of 1990s to the 2000s in Finland. The purpose is to obtain a general picture of the trends that have happened. In the second stage we concentrate on a restrictive early-exit reform that took place in the late 1990s and use it as a natural experiment.

We proceed by first reviewing the earlier literature on employment opportunities of older workers in Section 2 and policy changes in Section 3. Section 4 then explains the data we use and Section 5 presents descriptive evidence on the development of hiring and exits of older workers. We present regression results on the determinants of hiring in Section 6 and an analysis of the policy change in Section 7. Section 8 concludes the paper.

2. Earlier research

The descriptive work has typically considered the age segregation of hiring compared e.g. to the age segregation of existing employees (e.g. Hutchens 1988; Hirsch et al. 2000 and Disney et al. 2006).[1] The underlying question is whether and to what extent the job opportunities of older workers are restricted compared to prime-age workers. The analysis may be carried out at occupational or sectoral level so that the location of the most severe entry barriers can also be detected. The results typically support the preconceptions that occupational segregation is substantially greater for older hires than for either young new hires or all older workers. This implies, among other things, that after major negative macroeconomic shock the displaced older workers have more limited options of re-entry available.

The most widely asked question in the literature follows from the empirical investigations: why the firms hire older workers so seldom even though their existing personnel may consist of older employees to a large extent. The natural following step is to analyse the reasons for the firms' reluctance to hire older employees. Here the theoretical explanations stem from two main ways of reasoning. The first puts the emphasis on training and the fixed costs related to it, while the second puts stress on the nature of optimal labour contracts, especially the so-called back-loaded compensation structures. The latter explanation is then closely connected to the optimal shapes of the wage profiles.

[1] A useful tool used in a couple of studies is the segregation curve introduced in this context by Hutchens (1988). It is also used in this paper and explained in Section 5.

The older employees are likely to have a fair amount of work experience and also firm-specific knowledge. Once they are e.g. displaced from their current job, firm-specific knowledge loses its value. It has been even argued that "managerial culture" they have inherited from their previous work place can actually be a burden from the point of view of the potential new employer (Heywood and Siebert 2009). Anyhow, potential new jobs require new firm-specific training and the fixed costs related to training need to be covered. Here comes the disadvantage of older employees compared to younger recruits: hiring the older employee makes the returns to specific training lower. These returns can be collected only for a relatively short period, because of the short remaining work career of the older employee. The negative relationship between the intensity of training and hiring opportunities of older employees is also verified in several empirical studies (e.g. Disney et al. 2009; Adams and Heywood 2007 and Hu 2003).

The very basic element of the hiring barrier is so-called productivity compensation deficit when workers age (Munnell and Sass 2008). While the wage profiles are typically raising or relatively flat even in older age groups, the productivity is likely to be falling at the same age groups. This is clearly forming a disincentive element related to the hiring opportunities for older employees. These phenomena have given motivation to the theories that aim at explaining the form of the wage profile which seems to contradict the changes in productivity by age. The origins of these theories are in delayed compensation schemes as formulated by Lazear (1979). Here an important motivation for rising wage profiles is the embedded incentive structure aiming at long tenures with good work performances. The rising wage profile gives the recruits the incentive to perform efficiently (even without heavy monitoring efforts) in order not to miss the opportunities for rising wages in the coming periods. It is also in their interests to stay with the firm long enough in order to be able to pick the fruits of good work performance.

Hutchens (1986) developed these ideas further by stating that the implied "delayed payment" contracts also introduce fixed costs (similar to hiring and training costs) into the employment relationships: the firm needs to pay an extra wage premium because in the case of delayed payment the employee faces the risk that the firm cheats (e.g. in the form of ending the employment relationship unilaterally). These kinds of fixed costs also make the firms

minimize hiring and favour long tenures and they also make young recruits more desirable than older ones.

While these recruitment strategies may be rational from the point of view of the firms, they make the hiring prospects for older employees less favourable. For instance, it is not profitable for the firm to offer the new old recruits the same wage the existing older employees within a firm have. On the other hand, offering a wage too different from the existing wage level may harm the work performance of the newcomers. This contradiction is likely to result in the firm choosing young recruits instead of old ones. Since the introduction of these ideas they have been tested in many studies (e.g. Hutchens 1986; Adams and Heywood 2007; Heywood et al. 2007; Daniel and Heywood 2005; Hirsch et al. 2000; Zwick 2008; and Pfeifer 2009). The empirical evidence quite consistently confirms the theoretical outcomes according to which firms with deferred compensation hire a smaller share of older workers.

The literature on back-loaded compensation often deals also with the different hiring behaviour of large and small firms. Long employment relationships are likely to be more important for large firms. This relates e.g. to the preconception that large firms typically invest more in firm-specific human capital introducing higher fixed training costs. Furthermore, the larger internal labour markets make it easier and also profitable to have long tenures. One may also assume that in larger firms the monitoring costs rise above the similar costs in smaller firms making the steeper wage-tenure profiles more likely. All in all, on theoretical grounds larger firms would be less likely to hire old employees than small firms. While some empirical evidence gives support to this reasoning (e.g. Hu 2003; Adams and Heywood 2007), there is also evidence pointing to the opposite direction Heywood et al. 2008).

There is also a bunch of studies that put more emphasis on institutional arrangements that may hamper the hiring opportunities of older employees. The relevant institutional arrangements include health and pension insurance systems and also employment protection and anti discrimination legislation (see e.g. Scott et al. 1995; Garen et al. 1996; Daniel and Siebert 2005; Adams 2004). While these policies may have well-founded welfare motivations, they may introduce as by-products negative implications for the hiring prospects

fof older employees. They may increase the costs of new potential recruits adding to the problem of wage-productivity gap among the older employees. The results of the relevant studies generally confirm the view that the policies in question can indeed have harmful effects on hiring prospects. On the other hand, the magnitude of these effects is naturally dependent on the actual implementation of the schemes. In the case of the pension schemes, for instance, the relevant question is to what extent also the employer-provided pension plan is back-loaded.

When the age structure of hiring has been analyzed there have been many ways to form the variable to be explained in econometric work. If the analysis is carried out at the firm or plant level one can either relate the number of old hires to (e.g. 51+ or 55+) to (i) the total number of people hired, or (ii) to older existing employees within the firm or to the total number of the personnel. Newly hired workers are typically defined as those hired during the last year or during the last few (often last 1-5) years. In addition to the firm-level analyses another approach has been to use individual-level data on new hires and explain the probability that a new hire is old (e.g. Scott et al. 1995; Adams and Heywood 2007).

The work on hiring of older employees has rarely used policy changes to obtain exogeneous variation in the costs (or incentives) of hiring older employees. One of the few exceptions is Adams (2004) who studied the effects of US age discrimination legislation using variation over time and across states in the legislation.

3. Approach of this paper

The motivation for this paper stems from the observed labour market phenomena related to older employees and the somewhat unbalanced nature of the existing analysis on the underlying causes of these phenomena.

Finland has witnessed a chain of restrictions in early retirement options during the last 15 years. The effects of these restrictions on exit rates from work to unemployment and early retirement and on exit routes from unemployment have been extensively studied at the individual level (Hakola and Uusitalo 2005; Kyyrä and Wilke 2007; Kyyrä and Ollikainen, 2008). The above studies have indicated that these reforms have postponed withdrawals from

the labour market and outflow rates from employment to unemployment and to early-retirement schemes have diminished remarkably during this period.

This development has been reflected in the rising employment rates among older employees. Finland has actually witnessed the largest increase in the employment of ageing workers since the late 1990s (Ilmakunnas and Takala 2005). At the same time the descriptive work has indicated that the inflow rates into employment have increased remarkably little. This is worrisome since it is likely that globalization is increasing both the destruction of existing jobs and the need to create new jobs. Flexible transitions between labour market states are then a prerequisite for well-functioning labour markets.

The purpose of this paper is to contribute to the labour demand side analysis of the employment among older employees. The aim is also to use a particular (and important) policy change as a natural experiment in the analysis of hiring behaviour of firms. We have chosen the reform where the lower age limit for so-called "unemployment pension pipeline" was raised. The former lower age limit of this early-retirement channel was 53 years, and in 1997 it was raised to 55 years. So far, there are no studies available on the effects of the reforms on hiring of older workers, although on theoretical grounds one can expect that these institutional changes might have an impact on the labour demand behaviour of firms.

Firstly, removal of early retirement options is likely to lengthen the expected working careers of the potential older recruits. Since there are fixed costs involved in hiring and training, the reforms increase the time over which the costs can be recouped. Secondly, firms have used the early exit options as an easy way to lay off employees in periods of declining demand. The restrictions have hit especially those exit routes where the firms have acted as a "gatekeeper", i.e. where the decisions on the use of the routes have mostly been made by the firm. These two mechanisms are likely to work in opposite directions.

Related to the system of early exit routes is experience rating, whereby firms above certain size thresholds directly cover a predetermined share of pension outlays between early retirement and start of old age pension of their employees. The motivation for this kind of financing structure is to discourage especially the larger firms from inefficiently overusing early retirement as a tool of labour adjustment. While experience rating may indeed reduce

exits to early retirement channels, it may at the same time make firms more cautious in hiring of older workers.

4. The data

We use data drawn from the Finnish Linked Employer–Employee Data (FLEED) 1990 - 2004, which include information on plants and firms and the employees who can be linked to their employer. The FLEED data set merges comprehensive administrative records of all labor force members in Finland as well as all employers/enterprises (including information also on their plants) subject to value added tax (VAT). The data on individuals cover the whole working age population and have information (code) of the employer plant and firm of the individuals at the end of the year. The codes allow linking of data on individuals to employers with near-perfect tractability over time.

Because of confidentiality, linked employer-employee data can be accessed only on site at the research laboratory of Statistics Finland (SF). To overcome the problems of using data at Statistics Finland, a sample of FLEED has been formed, with such information on firms and plants that guarantees that the employers cannot be identified. This data set has been obtained for use outside of SF. The sample data cover the years from 1990 to 2004. Every third individual in age group 16-69 years olds is randomly included in the sample in the year 1990. This sample includes ca. 1 million individuals. For these individuals, all information from the subsequent years 1991-2004 is included. Starting from 1991, in each year a third of all 16 years old persons are selected to the sample and these individuals are included in the sample in all subsequent years.

For each individual in each year, the data on the plant and firm that she is working in is included. In addition, data on these plants and firms are included for all the years. Hence, even if a plant appears only once as the employer of one worker in the sample it is included in all the years 1990-2004. The plant data thus cover all plants in the business sector that have at least one person in the data of individuals in at least one year. The company data include all companies that have at least one plant in the plant panel or at least one individual in the person panel. As a result, the plant and firm panels cover practically the whole populations of plants and firms for all the years, but the person panel is a sample. The data set differs from

FLEED in two respects. First, the number of variables has been slightly limited. Secondly, because of confidentiality, some of the data have been modified. Individual incomes are top-coded and only transformed variables for plants and firms are included. Basically these variables are in the form of classified variables (e.g. size group dummies), ratios (productivity), or rates of change (e.g. rate of employment change).

Our analysis on hiring is carried at the plant level, since plants are more relevant work units than firms. However, for each plant we can link information on the size class of the firm that it belongs to, which is relevant from the point of view of various costs involved with older employees. We concentrate on the private non-farm business sector.

The main variables of interest are the flows of employees to and from plants and firms. Since in many cases the number of hired employees is small, especially when we disaggregate hiring by age, we calculate two-year hiring rates. We define an employee in plant *i* in year *t* to be hired if she was working in the plant at the end of year *t*, but not at the end of year *t-2*. If the person does not have a plant code in year *t-2*, she has been hired from unemployment or out of the labour force. If plant and firm codes exist for both periods, she is a job-to-job switcher. We make two additional restrictions. First, if the person has changed plant codes, but was employed by the same firm in *t* and *t-2*, we do not classify her as being hired. This restriction takes into account worker flows between plants belonging to the same firm. Second, we also make the restriction that if the firm code changes, but the plant code not, there is no hiring. The plant codes are stable, but firm codes can change because the plant is sold to another firm, but also because of firm-level demographic events, like mergers, ownership changes or changes in the legal form. Since we cannot distinguish plant ownership changes from these other events, we concentrate on continuing plant-firm connections.

In a similar way, we define an employee to have exited plant *i* if she was working in plant *i* at the end of year *t-2*, but no longer at the end of year *t*. If the person has a plant and firm code in year *t*, she has exited to enter another firm. Here we make the same two restrictions as above, i.e. there is no exit if the plant code changes but firm code does not, or if the plant code does not change, but the firm code does. If the plant code is missing in year *t*, the person has exited to unemployment or out of labour force. These data on individuals are then aggregated to the plant level.

From the hiring and exit flows aggregated to the plant level we define various hiring rates. The hiring rate for age group j in plant i in year t is defined as h_{jit}/n_{it}, where h_{jit} is the number of hired employees between t-2 and t of age j in t and n_{it} the number of employees (in the sample data) at the end of t. The age is based on age in year t, so the hiring rate for 51 year olds, for example, counts those who were 49 years old in year t-2. In the case of a new plant (i.e., entry), the hiring rate is equal to one.[2] The relative hiring rate for age group j in plant i in year t is defined as h_{jit}/h_{it}, where the denominator is now total hiring in the firm. A third possible measure is age-specific hiring rate, which is defined as hiring in age group j in relation to the number of employees in the same age group: h_{jit}/n_{jit}. This can be understood as the ratio of hiring rate h_{jit}/n_{it} (e.g., old hires/number of all employees) and the share of the old in the stock of employees n_{jit}/n_{it} (e.g., old workers/number of employees).

The exit rate is defined in a similar way, but the denominator is now year t-2 employment: $e_{jit}/n_{i,t-2}$, where e_{jit} is number of exited persons of age j between t-2 and t. In case of plant disappearance this is equal to one. The relative and age-specific exit rates would follow analogously as e_{jit}/e_{it} and $e_{jit}/n_{j,i,t-2}$, respectively. Since we define the age on the basis of year t, the persons whose age is j in year t, was j-2 years old in year t-2, so the age in the denominator is lagged by two years. That is, if a person who is 51 years old in year t is classified as having exited plants i, she was last observed in the plant as 49 year old.

Since we calculate the hiring and exit rates from the sample data, the number of observations in smaller plants is relatively low and the variances of the hiring rates large. Therefore in the empirical analysis we weight the observations by the number of sample persons (i.e., n_{it}). As a robustness check, we leave the smallest firm size groups out in some analyses.

The explanatory variables include several indicator variables: dummy variables for size groups of the firms that the plants belong to (number of employees is -10, 10-49, 50-99, 100-299, 300-), dummies for plant age groups (7 groups based on the order of appearance in the registers), a dummy for foreign ownership (ultimate beneficial owner; dummy for 20% share), a dummy for exporting plants, and dummies for 24 two-digit industries. There are also several continuous variables: employment growth, productivity (sales per employee), average

[2] An alternative would be two divide hiring by the average of two year employment. In this case, entering plants would have hiring rate equal to two.

educational years of the employees (based on standard degree times), average tenure years of the employees, shares of age groups (-30, 31-50, 51-), ratio of earnings (annual earnings per months worked) of age 51- employees and earnings of age 16-50 employees, and the exit rate of employees in the same age group that is used as the dependent variable. The variables that describe the characteristics of the work force (average education, tenure, and the age shares), labour productivity, and employment growth have been calculated from the original FLEED data, i.e. the "total" data and not our sample data. To reduce endogeneity concerns, we lag exit rate by one period, and the work force structure variables, employment change, and productivity by two years. In this way the hiring rates cannot affect the work force structure, and the other variables do not perfectly coincide with the hiring flows which are defined by a comparison to year *t-2* situation.

5. Descriptive analysis

We first describe the development of hiring and exit of older employees over time. We concentrate here on the age group 51 years or over. Figure 1 shows the share of these employees among all employees (i.e., stock), among hired employees, and among exited employees. The hiring and exit shares are in effect relative hiring and exit rates. The values in the graph have been obtained by taking a size-weighted average of plant-level values. The graph shows an increasing trend in the share of the stock of older employees. This is the cohort effect. The large cohorts born in the late 1940s and early 1950s are shifting to the group of older employees. In the hiring share there is also an upward trend, but it is much weaker than in the stock. This shows that although the hiring of older employees to some extent follows the cohort, there are other factors that slow down hiring. These may include lower incentives to hire older employees, but also their lower tendency to switch jobs. The exit share of older employees has fluctuated much more than the other shares. Especially in the recession experienced in Finland in the early 1990s older employees have accounted for a disproportionate share of exits. Although we have not separated here the exits by destination, exits to unemployment and out of labour force (including retirement) are the dominant destinations in this age group. The Finnish unemployment pension system makes it attractive for firms to concentrate labour shedding to the older workers.

Figure 1. Share of older employees

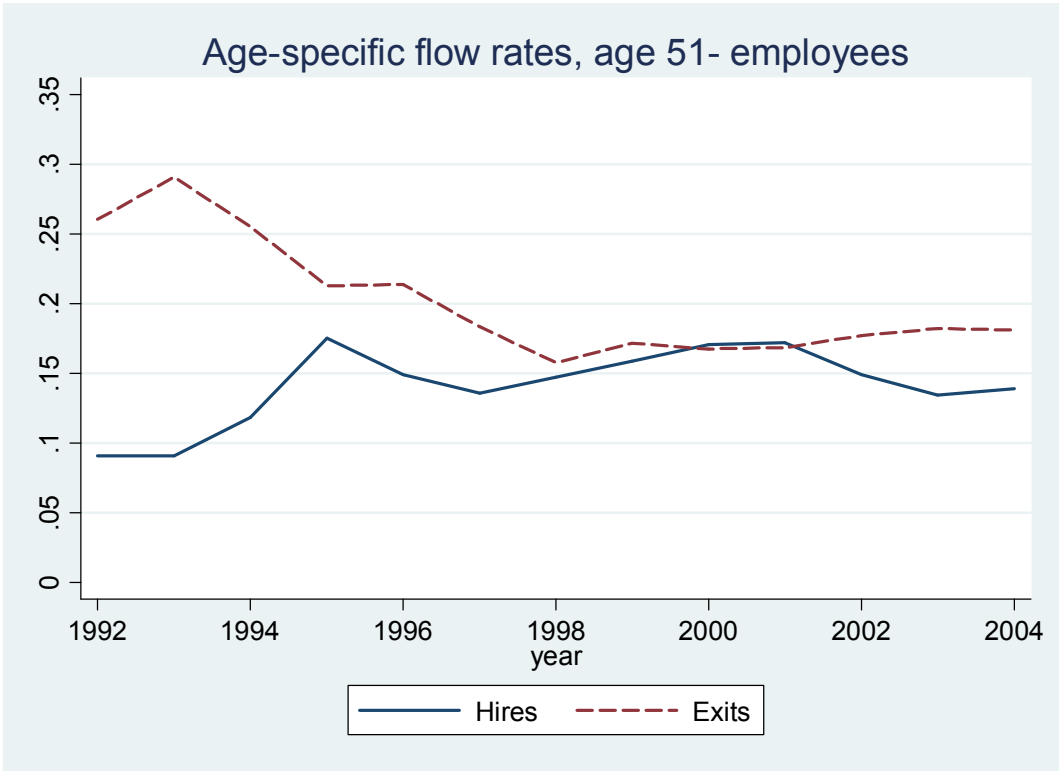

Figure 2. Hiring and exit rates of older employees

Figure 2 shows the age-specific hiring and exit rates of older employees, calculated by using the number of employees in the same age group in the denominator. These graphs show much more variation than the corresponding relative rates. The exit and hiring rates are now to some extent mirror images of each other. The recession meant higher exits and lower hiring of older employees in relation to their stock. Over time the age-specific exits have declined, but started to increase again in the 2000s. The hiring rate shows no clear trend. It has peaks in 1995 after the recession and in 2000-2001.

To gain further insights on the firms' hiring behaviour of older employees, we illustrate in Figure 3 the distribution of hiring across establishments with segregation curves. Establishments are first ranked according to the ratio of older employees (in stock, exits, or hires). Then the cumulative share of younger employees is plotted against the cumulative share of older employees. If the distribution of older and younger employees is the same in all plants, the curves would lie along the 45 degree line. The further the curves are from the line, the more segregated the age groups are. The curves are shown for two years, 1994 and 2004. The figures are drawn by weighting the observations by employment shares.

Two conclusions can be drawn from the graph. First, hiring of older employees is much more segregated than exits, which in turn are more segregated than the stock of older employees. In 1994 approximately 40 percent of (employment weighted) hiring of below 51 year old employees happened in workplaces that did not hire older employees. Second, over time the stock and exits of older employees have become somewhat more segregated, but hiring less segregated. As a result, the curves are now closer to each other. In 2004 approximately 30 percent of (employment weighted) hiring of younger employees happened in workplaces that did not hire older employees.

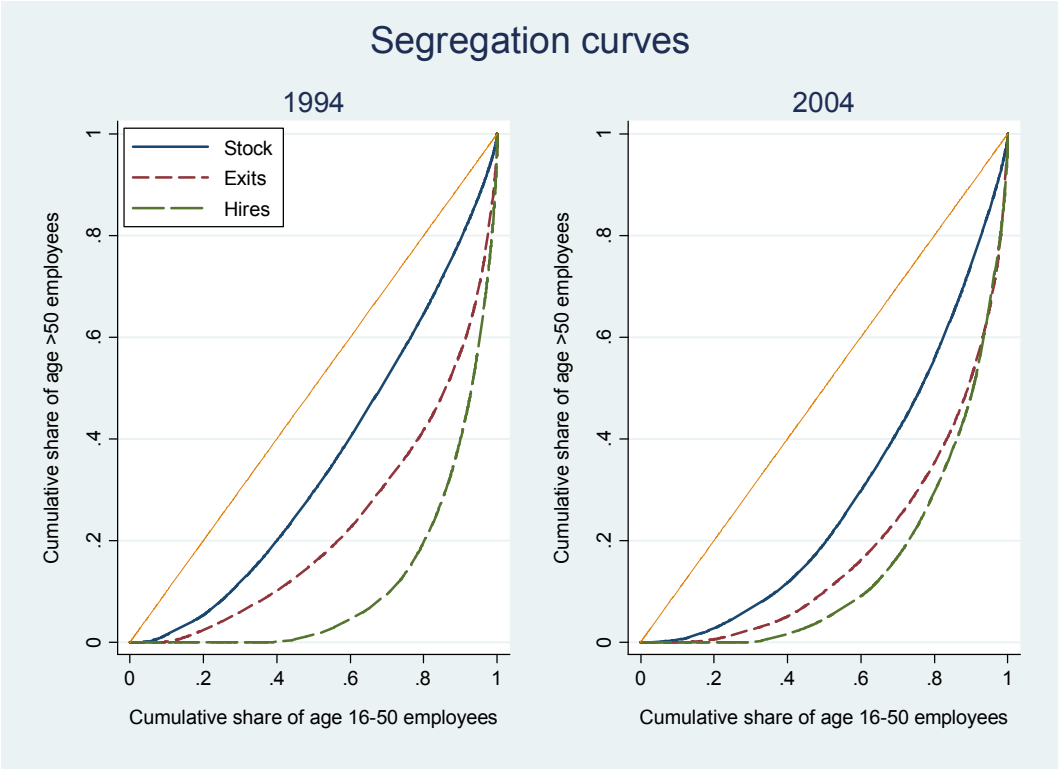

Figure 3. Age segregation curves

The area between the 45 degree line and a segregation curve is the Gini index for segregation. Normalizing the area of the triangle to unity, the index is between zero and one. Figure 4 shows the development of the Gini indexes of the stock, exits, and hiring of older employees over time. Until year 2000 the segregation of the stock and exits increased, but hiring segregation stayed relatively constant or even decreased. In the 2000s the development has to some extent reversed.

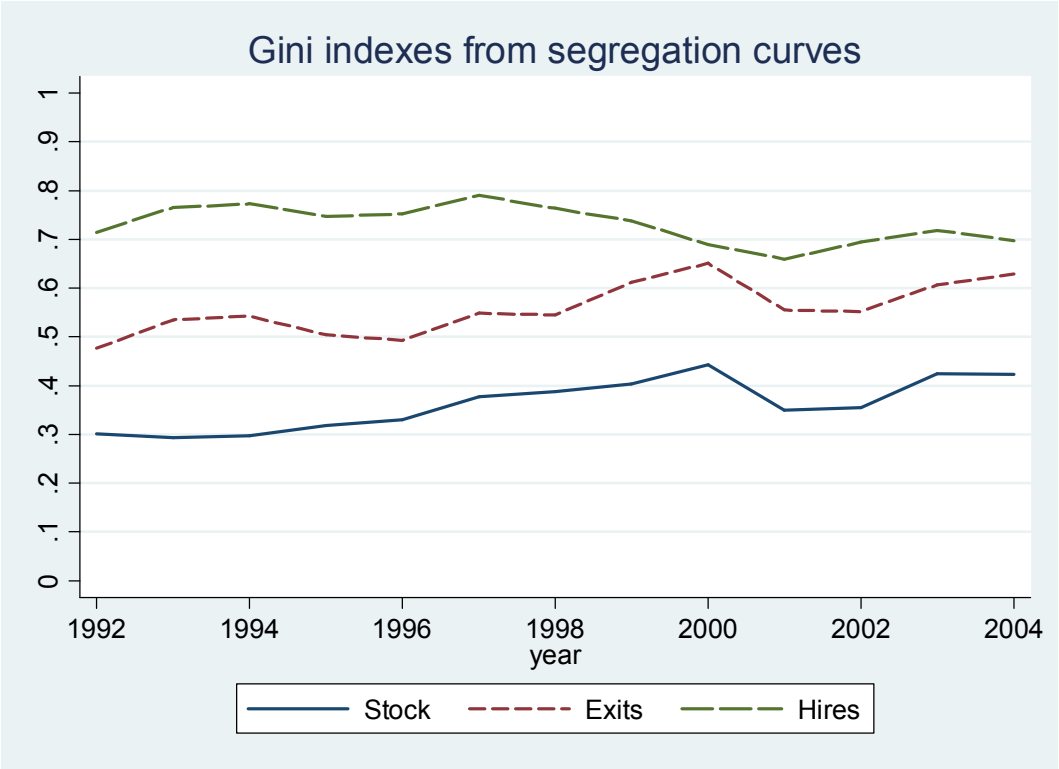

Figure 4. Time series of Gini indexes

6. Estimation results

We present first regressions where we examine whether the determinants of hiring of older employees have changed over time. Since there have been many policy changes in our data period, we show results for two cross-section analyses. The periods 1994 and 2004 are taken from the beginning and end of our data period.

We adopt the convention of earlier hiring studies of using the hiring share of older employees and the ratio of this share to the share of older employees as dependent variables. A challenge of this type of analysis is that the age shares of hiring are affected both by the firms' behaviour (demand) but also by the workers' behaviour (supply). Both can be affected by the policy reforms. In a reduced-form analysis we cannot differentiate these effects. In a cross sectional analysis the available supply (cohort) is fixed and the same for all firms.[3]

[3] In a panel analysis one could include as regressors variables that describe the age structure of the employed work force to account for shifts in supply.

We estimate models for the relative hiring rate and age-specific hiring rate. Since there are many observations, where the rates are zero, we further estimate models only for the positive hiring rates. In addition, we estimate probit models for having any hiring of older employees.

The zero observations are potentially problematic. They are corner solutions, as the hiring rates cannot be negative, so there is no censoring. In principle we could use Tobit models, but they have the disadvantage that the explanatory variables are assumed to have the same sign in the determination of non-zero observations and in the continuous part of the model. Selection models could account for different effects, but it is hard to justify exclusion restrictions, i.e. to find variables that would affect the choice of hiring older employees, but not the choice of how many of them to hire. Therefore we use a two-part model where the probit model and OLS for the continuous part are treated separately. In any case, when weighted estimation is used, the zero observations do not matter as much and often OLS for all observations gives more or less the same results as nonlinear models where the selection part and continuous is taken into account at the same time (see e.g. Ilmakunnas and Maliranta, 2005).[4]

The first two columns of Table 1 show the results for the relative and age-specific hiring rates of older workers in 1994. In both cases the largest firm size classes have the lowest hiring rates, but for the mid-sized firms the coefficients are not precisely estimated. In case of age-specific hiring rate the size effect may even be non-monotonic. We have included past exit rate in the same age group to examine whether there is age-related replacement hiring. The exit rate used is one that corresponds to the hiring rate that is the dependent variable. The coefficients of the exit rates are positive, but significant only in the equation for age-specific hiring rate. This shows that there is indeed some replacement of exited older employees by other old ones.

All the work force structure variables are significant in the relative hiring rate equation in column one, but only average tenure in column two. Plants that have a high share of older employees tend to have also a higher hiring share of the old. In case of age-specific hiring, the age share variables have negative signs, although they are not significant. Plants with a high

[4] There are also some observations with hiring rates equal to 1. However, the number of such observations is relatively small, especially with weighting by employment, so we do not treat them separately.

average level of education have a somewhat higher share of old hires, whereas plants with high average tenure hire relatively less old workers. Past growth does not seem to be related to the hiring rates (although it may, of course, be correlated with total hiring). High-productivity plants and plants belonging to the youngest plant groups (4 and 5) hire relatively more aged employees.

Columns three and four of the table repeat the same analysis, but using only plants with positive hiring rates. In this case the negative firm size effect becomes much stronger. There are some changes in the significance of the other variables, but their signs remain the same. Interestingly, foreign-owned plants tend to have lower share of old hires.

The last column of Table 1 shows the results for a probit model for having any old hirings. The explanatory variables are otherwise the same as in the other models, except that the variable for the past exit of the old is a dummy for having had any old exits. The main difference to the hiring rate models is that now the firm size dummies have positive coefficients that increase with firm size. That is, large firms are more likely to higher old employees, but their hiring rates are lower than in the smaller firms. The other notable differences to the other models are that plants that have grown in the past and foreign-owned plants are more likely to hire old employees. Exporting plants, however, are less likely to hire them.

The number of observations varies in the estimations. The relative hiring rate is not defined when a plant has no hiring and the age-specific hiring rate is not defined when a plant has no older employees, since the denominator of the rate is zero in these cases. However, the age-specific hiring rate can still be zero when the relative hiring rate does not exist (the plant has some older employees, but has not hired anyone), or vice versa (the plant has some hiring, but has no older employees). In the probit model the number of observations is largest, because it includes basically all cases (hiring of older employees is zero or positive).

	Relative hiring rate, OLS	Age-specific hiring rate, OLS	Relative hiring rate, OLS for positive obs.	Age-specific hiring rate, OLS for positive obs.	Probit for positive obs.
10-49 employees	-0.000	0.018*	-0.221***	-0.151***	0.357***
	(0.007)	(0.010)	(0.035)	(0.034)	(0.056)
50-99 employees	-0.005	-0.002	-0.343***	-0.349***	0.591***
	(0.009)	(0.012)	(0.038)	(0.039)	(0.088)
100-299 employees	-0.015*	-0.007	-0.430***	-0.423***	0.611***
	(0.008)	(0.012)	(0.036)	(0.038)	(0.097)
300- employees	-0.016*	-0.033***	-0.477***	-0.590***	0.906***
	(0.008)	(0.012)	(0.035)	(0.036)	(0.100)
Relative exit rate,	0.012		0.052*		
51- old employees (t-1)	(0.009)		(0.027)		
Age-specific exit rate,		0.167***		0.293***	
51- old employees (t-1)		(0.017)		(0.041)	
Exit of 51- old,					0.706***
dummy (t-1)					(0.068)
Share of 31-50 old (t-2)	0.066***	-0.044	0.239***	-0.034	-0.254
	(0.017)	(0.038)	(0.066)	(0.123)	(0.257)
Share of 51- old (t-2)	0.202***	-0.063	0.382***	-0.509***	0.617
	(0.045)	(0.040)	(0.146)	(0.135)	(0.390)
Average education (t-2)	0.004*	-0.001	0.003	-0.012	0.078**
	(0.002)	(0.003)	(0.006)	(0.008)	(0.034)
Average tenure (t-2)	-0.023*	-0.040***	0.003	-0.023	-0.413***
	(0.012)	(0.009)	(0.029)	(0.028)	(0.112)
Employment change (t-2)	0.001	-0.006	0.000	-0.038	0.194*
	(0.007)	(0.016)	(0.017)	(0.029)	(0.105)
Productivity (t-2)	0.007***	0.007***	0.007***	0.006***	0.018
	(0.002)	(0.001)	(0.001)	(0.001)	(0.019)
Foreign	-0.009	0.000	-0.031*	0.003	0.254*
	(0.007)	(0.011)	(0.019)	(0.025)	(0.136)
Exporter	-0.009	-0.011	-0.004	0.008	-0.236**
	(0.006)	(0.008)	(0.018)	(0.022)	(0.098)
Plant age group 2	-0.002	0.037	-0.013	0.136	-0.026
	(0.005)	(0.025)	(0.020)	(0.091)	(0.133)
Plant age group 3	-0.000	-0.005	0.008	0.002	-0.176
	(0.008)	(0.008)	(0.029)	(0.024)	(0.123)
Plant age group 4	0.009	0.026**	0.012	0.049*	-0.045
	(0.006)	(0.010)	(0.017)	(0.026)	(0.110)
Plant age group 5	0.038**	0.085**	0.035	0.184***	0.025
	(0.016)	(0.035)	(0.034)	(0.059)	(0.182)
Constant	-0.030	0.115**	0.484***	0.818***	-2.642***
	(0.043)	(0.055)	(0.154)	(0.144)	(0.505)
Industry dummies	Yes	Yes	Yes	Yes	Yes
N	6999	7443	1042	948	18691
R^2	0.044	0.128	0.329	0.544	
Pseudo R^2					0.126

Note: Robust standard errors in parentheses. * p<0.10, ** p<0.05, * p<0.01. Weighting by the number of employees is used in the estimations.

Table 1. Estimation results for 1994

	Relative hiring rate, OLS	Age-specific hiring rate, OLS	Relative hiring rate, OLS for positive obs.	Age-specific hiring rate, OLS for positive obs.	Probit for positive obs.
10-49 employees	-0.016*	0.014**	-0.216*	-0.164*	0.402*
	(0.006)	(0.007)	(0.019)	(0.015)	(0.034)
50-99 employees	-0.029*	0.004	-0.349*	-0.290*	0.593*
	(0.008)	(0.009)	(0.022)	(0.019)	(0.059)
100-299 employees	-0.038*	0.022**	-0.432*	-0.316*	0.779*
	(0.007)	(0.010)	(0.020)	(0.021)	(0.067)
300- employees	-0.045*	-0.006	-0.484*	-0.412*	0.959*
	(0.007)	(0.008)	(0.020)	(0.019)	(0.061)
Relative exit rate,	0.008		0.017		
51- old employees (t-1)	(0.008)		(0.020)		
Age-specific exit rate,		0.210*		0.296*	
51- old employees (t-1)		(0.017)		(0.028)	
Exit of 51- old,					0.605*
dummy (t-1)					(0.044)
Share of 31-50 old (t-2)	0.097*	-0.044*	0.255*	-0.093	0.076
	(0.011)	(0.025)	(0.032)	(0.058)	(0.143)
Share of 51- old (t-2)	0.330*	-0.032	0.476*	-0.345*	1.045*
	(0.021)	(0.029)	(0.046)	(0.074)	(0.188)
Average education (t-2)	-0.001	-0.004*	-0.005	0.003	0.007
	(0.002)	(0.003)	(0.004)	(0.006)	(0.024)
Average tenure (t-2)	-0.058*	-0.074*	-0.014	-0.058*	-0.626*
	(0.009)	(0.007)	(0.020)	(0.019)	(0.084)
Employment change (t-2)	0.005	0.035**	0.002	0.041	0.156*
	(0.008)	(0.015)	(0.017)	(0.027)	(0.060)
Productivity (t-2)	0.003	0.006	-0.006	-0.003	0.162*
	(0.003)	(0.004)	(0.007)	(0.011)	(0.058)
Foreign	0.005	0.002	0.029**	0.020	-0.142*
	(0.006)	(0.007)	(0.012)	(0.016)	(0.074)
Exporter	-0.005	-0.006	0.006	-0.004	0.002
	(0.005)	(0.006)	(0.011)	(0.016)	(0.067)
Plant age group 2	-0.016**	-0.012	0.007	0.004	-0.354*
	(0.007)	(0.008)	(0.020)	(0.024)	(0.135)
Plant age group 3	-0.009	-0.010	0.022	0.016	-0.241*
	(0.006)	(0.008)	(0.014)	(0.018)	(0.081)
Plant age group 4	-0.003	0.001	0.031**	0.045**	-0.246**
	(0.006)	(0.008)	(0.013)	(0.019)	(0.096)
Plant age group 5	-0.010*	-0.010	0.020	0.040**	-0.352*
	(0.006)	(0.008)	(0.012)	(0.019)	(0.078)
Plant age group 6	-0.002	0.042*	0.013	0.115*	-0.149
	(0.007)	(0.015)	(0.018)	(0.029)	(0.099)
Plant age group 7	0.009	0.027**	0.049*	0.066*	-0.120
	(0.008)	(0.013)	(0.016)	(0.023)	(0.090)
Constant	0.057	0.184*	0.426*	0.595*	-1.301*
	(0.035)	(0.038)	(0.080)	(0.095)	(0.340)
Industry dummies	Yes	Yes	Yes	Yes	Yes
N	13074	15201	2669	2600	30325
R^2	0.094	0.189	0.401	0.521	
Pseudo R^2					0.156

Note: Robust standard errors in parentheses. * p<0.10, ** p<0.05, * p<0.01. Weighting by the number of employees is used in the estimations.

Table 2. Estimation results for 2004

Table 2 presents same kind of estimation results for the year 2004. There seems to be considerable stability in the results, although the significance and in some cases even the signs may change, compared to 1994. The negative firm size effect in column one has become stronger, but in column two the size dummies now have positive coefficients in all but the largest size class (and even that is not significant). Productivity is now not related to the hiring rates, but it is positively related to the probability of having any old hires. There is weak evidence that high-growing plants have higher hiring rates of the old. The coefficient for the foreign-owned plants is now reversed, compared to 1994: foreign-owned plants are less likely to hire older employees, but when they do, they have a higher share of older hires.

In addition to the estimates in the tables, we estimated similar models where the relative earnings of 51- year old employees and 16-50 year old employees was included. Due to some missing data, the number of observations was smaller. The main result from these estimations was that the relative wage variable had a significant negative coefficient in the equation for the relative hiring rate of the older employees. The variable also had a significant negative coefficient in the probit equation for older hires. When only observations with positive hiring were used, the coefficient was negative, but no longer significant in the equation for the relative hiring rate. These results support the idea that back-loaded wages may restrict employment opportunities of older workers.

The time paths of the firm size coefficients are shown in Figure 5. They are based on separate annual cross section estimates.[5] The results obtained in tables 1 and 2 seem to hold more generally: the hiring rates are lowest in the largest firms, but this is a product of the higher propensity of the large firms to hire older employees and their lower rate of hiring when they hire any. The most noteworthy feature in the graph is that the share of older workers in hiring, i.e., the relative hiring rate, has declined over time compared to the reference group and this decline has been fastest in plants belonging to the largest firms. As a sensitivity check, we have estimated the models leaving out the smallest firm size groups. Our conclusions on the correlates of the hiring rates and the development of the size effects were not affected.

[5] The variables were otherwise the same as in Tables 1 and 2, but the foreign ownership and exporter variables were left out, because data on them is lacking in some of the years.

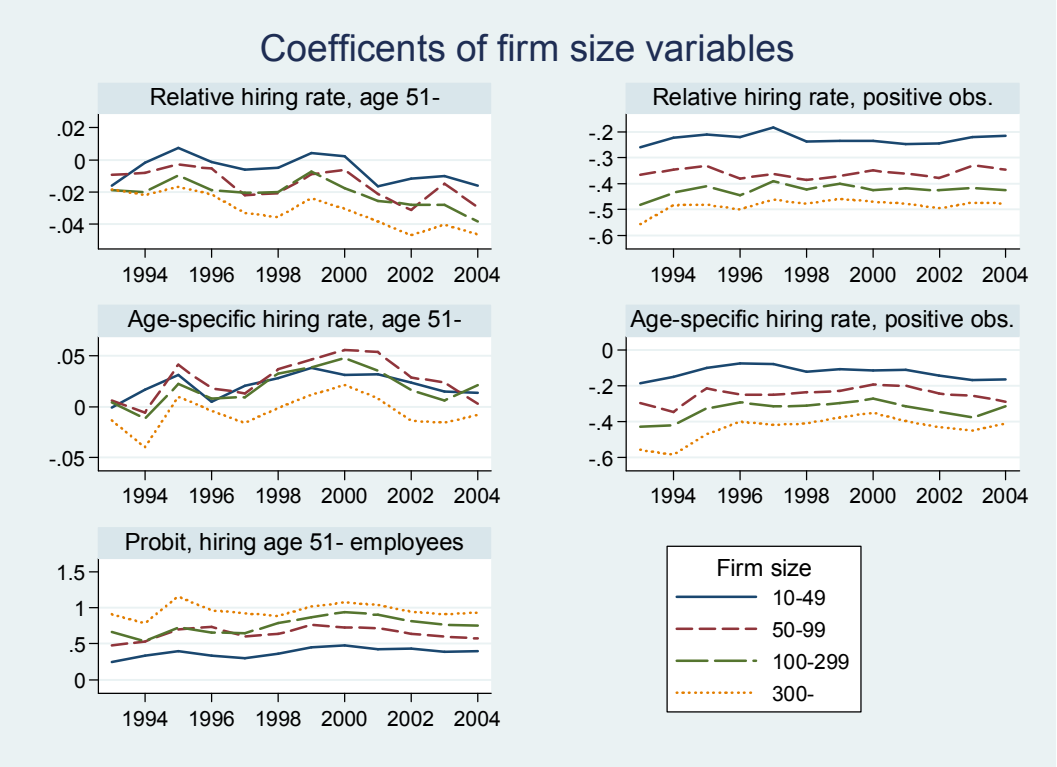

Figure 5. Development of firm size effects over time

7. Analysis of a policy change

As discussed above, there have been policy changes that may have affected the firms' incentives to hire older employees. In this section we have chosen to evaluate one of them. It is the reform related to unemployment pension and so-called "unemployment pension pipeline". Older employees becoming unemployed have some extra rights compared to their younger counterparts. In case of unemployment they are entitled an extended period of unemployment compensation and after that they are entitled to unemployment pension. This institutional arrangement is called 'unemployment pension pipeline'. From the economic point of view it means that the unemployed entitled to "pipeline" can maintain their social security benefits until the old-age pension – first in the form of unemployment benefit and then in the form of unemployment pension. The unemployment pension scheme also includes an experience rating element so that the larger firms are partly liable for the unemployment pension costs of the employees they make redundant. In this scheme firms with less than 50 employees are not liable for the costs of the unemployment pension. These liabilities then linearly increase according to the size of the firm and firms with more than 300 employees pay 50 % of the present value of the unemployment pension benefits.

	Age								
Birth cohort	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*
1939	52	53	54	55	56	57	58	59	60
1940	51	52	53	54	55	56	57	58	59
1941	50	51	52	53	54	55	56	57	58
1942	49	50	51	52	53	54	55	56	57
1943	48	49	50	51	52	53	54	55	56
1944	47	48	49	50	51	52	53	54	55

Grey area: eligible to unemployment pension pipeline.

Table 3. The eligibility to unemployment pension pipeline.

The reform we investigate increased the lower age limit for the pipeline from 53 years to 55 years in 1997 (Table 3).[6] The reform may have affected the firms' incentives in various ways. The unemployment pension pipeline has been a common way to downsize the work force. It has been argued that it has been in the mutual benefit of the firms and the employees. The benefit for the firms is that older employees often do not strongly resist the use of this particular arrangement. Also in public opinion, using this early withdrawal channel is viewed more favourable than standard lay-offs. In this sense the pipeline lowers the (partly psychic) adjustment costs of the employers. On the other hand, the larger firms pay part of the induced costs, so they may have higher monetary adjustment costs from using unemployment pension than from lay-offs. For the employees, the system offers an easy way to take an early exit with secure income for a long period and it is favoured especially in physically demanding occupations. The downside is that being in the pipeline leads to income reduction (compared to staying at work) and to a somewhat (but not much) lower old age pension.

When hiring new employees the firms have to weigh the benefits and costs. The costs include besides wage related costs, also the possible future costs involved if the firm needs to lay off the employees at some stage in the future. One could argue that after the increase in the age limit, hiring a worker in the affected age group 53-54 years is now riskier, because if a need for downsizing arises, the psychic costs of laying off these workers is now higher (as they can no longer enter the pipeline). On the other hand, they are less risky, since the monetary cost of

[6] Since the reform in 1997 this pipeline has been further shortened, but our data do not allow us to analyze its effects.

laying them off is lower (as the experience rating of the pipeline does not apply to them). As a result of these opposing effects, the total effect on hiring is a priori uncertain. The effects are likely to depend on firm size, however, since the monetary costs are lower for the smaller firms.

The research on the effects of the unemployment pension pipeline has so far concentrated on the unemployment risk of the older employees. It has been found that the risk increases significantly at the age where the pipeline starts, and the age where the risk increases changes with reforms of the system (Kyyrä and Wilke 2004). It is therefore interesting to study whether corresponding effects can be seen also in the hiring side. The earlier analyses have used individual-level data, so it is also of interest to see how the establishment-level exit rates are affected.[7] There is a difference to the earlier analyses, however, since we count all exits (withdrawals from the labour market to non-activity and exists to other jobs in addition to exits to unemployment).

We have estimated difference-in-differences models where we compare the hiring rate of the affected age group 53-54 to those not affected (51-52 and 55-56) before and after the reform. In addition, we also investigate whether there are firm size related effects. In this case we have a difference-in-difference-in-indifferences analysis where the additional dimension is firms above or below the size 300 employees (which is the size limit for the highest experience rating). We analyse separately the two hiring rates that have been discussed above, relative hiring rate (*RHR*) and age-specific hiring rate (*AHR*), and corresponding exit rates (*RER* and *AER*). Since we now have a time dimension in the analysis, the results may be affected by cohort sizes. That is, a larger cohort is likely to have more hirings just because of more labour supply rather than because of the incentives on demand. The period of analysis coincides with the time when the large post-war cohorts were in their 50s. The age-specific hiring rate takes this into account to some extent, because hiring is related to the stock of employees in the same age group.

Specifically, we estimate the following models:

[7] Hakola and Uusitalo (2005) is the only earlier study where hiring of older employees in Finland is examined. They studied the effects of changes in compulsory pension insurance fees.

$$RHR(53\text{-}54)_{it} - RHR(51\text{-}52)_{it} = \alpha + \beta PIPELINE_t + \gamma PIPELINE_t * FIRM300_{it} + X_{it}\phi + \varepsilon_{it}$$

$$RHR(53\text{-}54)_{it} - RHR(55\text{-}56)_{it} = \alpha + \beta PIPELINE_t + \gamma PIPELINE_t * FIRM300_{it} + X_{it}\phi + \varepsilon_{it}$$

$$AHR(53\text{-}54)_{it} - AHR(51\text{-}52)_{it} = \alpha + \beta PIPELINE_t + \gamma PIPELINE_t * FIRM300_{it} + X_{it}\phi + \varepsilon_{it}$$

$$AHR(53\text{-}54)_{it} - AHR(55\text{-}56)_{it} = \alpha + \beta PIPELINE_t + \gamma PIPELINE_t * FIRM300_{it} + X_{it}\phi + \varepsilon_{it}$$

where t = 1996 (pre reform year) and 1998 (post reform year), $i=1,...,K$ are the plants, *PIPELINE* is 1 in 1998 and 0 in 1986, *FIRM300* is a dummy for firms with 300 or more employees, and X includes controls. The controls include the same variables as in the cross-section models of Tables 1 and 2, except for the lagged exit rate. The structure of the exit rate models for *RER* and *AER* is similar to the hiring rate models.

Table 4 shows the results. We report only the coefficients of *PIPELINE* and its interaction with the firm size dummy. Analysis of the relative hiring rates shows that the relative hiring rate of the 53-54 year olds has increased compared to the adjacent age groups 51-52 and 55-56. This supports the view that the positive incentives from the removal of the pipeline option (and the liabilities related to it) for the 53-54 year olds have outweighed the negative incentives from not being able to use the pipeline. If the interaction of the pipeline dummy with large firm size dummy is included, the difference to the younger group 51-52 is no longer significant. The exit rate models show that exits of those affected by the reform have decreased compared to the younger age group 51-52. This is what could be expected based on the earlier studies. Most likely it is the reduced unemployment risk that has affected the exit rate. When the interaction with the firm size is included, it is the interaction term that drives the result of reduced exits. That is, especially the large firms have reduced exits of the 53-54 year olds. However, comparison to the older age group 55-56 shows that those affected by the reform have a higher exit risk which is not related to firm size. Since our exit measure includes exits to other jobs, this may be a result of the increased hiring of 53-54 year olds by other firms (i.e., job-to-job exits).

It is possible that the results are affected by cohort effects. The size of the 53-54 age cohort was higher in 1998 than in 1996. However, so was the size of the 51-52 age cohort, so that should at least partly take into account the cohort size. The estimates using the age-specific hiring rate are probably more neutral to cohort sizes, although they have the disadvantage that the number of observations drops quite a lot, as the rates cannot be defined for many smaller

establishments. Now there is no change in the hiring rate of the 53-54 year olds following the reform, irrespective whether it is compared to the younger or older group. In the exit side there is a reduced exit rate of those affected by the reform compared to the age group 51-52 years. Moreover, this is the case especially in establishments belonging to the large firms.

	Difference in relative hiring rates				Difference in relative exit rates			
	53-54 vs. 51-52	53-54 vs. 51-52	53-54 vs. 55-56	53-54 vs. 55-56	53-54 vs. 51-52	53-54 vs. 51-52	53-54 vs. 55-56	53-54 vs. 55-56
PIPELINE	0.004*	0.002	0.006*	0.005*	-0.009*	0.001	0.012*	0.011*
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.003)	(0.003)	(0.003)
PIPELINE* FIRM300		0.003		0.001		-0.018*		0.002
		(0.003)		(0.002)		(0.005)		(0.005)
N	30007	30007	30007	30007	28674	28674	28674	28674
R^2	0.004	0.004	0.004	0.004	0.015	0.016	0.010	0.010
	Difference in age-specific hiring rates				Difference in age-specific exit rates			
	53-54 vs. 51-52	53-54 vs. 51-52	53-54 vs. 55-56	53-54 vs. 55-56	53-54 vs. 51-52	53-54 vs. 51-52	53-54 vs. 55-56	53-54 vs. 55-56
PIPELINE	0.013	0.025	0.003	-0.006	-0.055*	-0.027	0.008	0.007
	(0.008)	(0.016)	(0.008)	(0.018)	(0.010)	(0.017)	(0.013)	(0.021)
PIPELINE* FIRM300		-0.017		0.012		-0.038*		0.001
		(0.018)		(0.020)		(0.021)		(0.026)
N	4514	4514	3305	3305	4697	4697	3666	3666
R^2	0.021	0.021	0.012	0.012	0.028	0.029	0.023	0.023

Note: Robust standard errors in parentheses. * $p<0.10$, ** $p<0.05$, * $p<0.01$. Weighting by the number of employees is used in estimations. Coefficients of the control variables not reported.

Table 4. Difference-in-differences analysis

8. Conclusions

We have investigated the behaviour of firms in hiring of older employees during time interval from 1992 to 2004. The hiring share of the employees who are 51 or older replicates the share of this age group in the employee stock. On the other hand, the exit share of older employees varies much more. It is therefore the exit side rather than the hiring side that determines the cyclical fluctuations in the number of older employees. The big trends are determined by the cohort sizes.

Our results also indicate that hiring of older employees is much more segregated than exits, which in turn are more segregated than the stock of older employees. During ten year time interval (from 1994 to 2004) the stock and exits of older employees have become somewhat more segregated, but hiring less segregated. In 2004 approximately 30 percent of (employment weighted) hiring of younger employees happened in workplaces that did not hire older employees.

We have found that there are differences between different sized firms in their hiring behaviour. Larger firms tend to have lower share of old hires and there has been a trend over time which increases the gap to the smallest firms. We have evaluated a particular policy change in the so-called unemployment pension pipeline. Our results show some evidence for increased incentive to hire workers who were in an age group that was no longer eligible for the scheme in question. This age group also experienced a decline in the exit rate, especially in larger firms. In relation to the size of the same age group in the firms, hiring and exits behave in a mirror-like fashion.

The policy conclusion from the analysis is that if the sustainability of the pension system and looming labour shortages require longer working lives, it is necessary to both reduce early exit from the labour force, but also to guarantee continuing employment opportunities for the ageing employees. Restrictions in the early exit routes may work both ways: they reduce exits and increase the incentives for hiring and keeping older employees. It is a particular challenge to affect the large firms which seem relatively less inclined to hire the old.

In further work we intend to analyse cohort effects in more detail, since the results on hiring may to some extent be contaminated by them. We also will extend the policy analysis to some other changes that have affected the hiring incentives. Finally, it is possible to analyse hiring also using individual-level data, modelling the probability of an individual to be an old hire (rather than a young hire).

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