VATT-KESKUSTELUALOITTEITA
VATT DISCUSSION PAPERS

396

REDUCTION IN THE LONG-TERM UNEMPLOYMENT OF THE ELDERLY: A SUCCESS STORY FROM FINLAND REVISED

Tomi Kyyrä
Ralf A. Wilke*

Valtion taloudellinen tutkimuskeskus
Government Institute for Economic Research
Helsinki 2006

*ZEW Mannheim, P.O. Box 10 34 43, 68034 Mannheim, Germany; Email: wilke@zew.de.

This is a revised version of VATT Discussion Papers No. 346, and a shorter version of the paper is forthcoming in *Journal of the European Economic Association*. Compared with the earlier version, the layoff risk is modelled and analysed in more detail, unemployment duration analysis is extended to cover a longer time period, and anticipation of two different reforms of the UI system are discussed and carefully accounted for in the econometric analysis.

This work has benefited from the comments received at the seminar at Mannheim University, the Semiparametrics in Rio Conference, the ESEM Conference in Madrid, the EALE Conference in Lisbon, the Finnish Society for Economic Research Annual Meeting in Mariehamn, and the seminar at IFAU in Uppsala. Financial support from the German Research Foundation (DFG) through the project "Microeconometric modelling of unemployment durations under consideration of the macroeconomic situation" is gratefully acknowledged. We thank Xuan Zhang and Ossi Korkeamäki for their research assistance and Bernd Fitzenberger, José M. Arranz Muñoz, Seija Ilmakunnas, Antti Romppanen, Juha Rantala, Tuulia Hakola, Virve Ollikainen, (Co-editor) Orazio Attanasio, and anonymous referees for their suggestions and comments.

ISBN 951-561-637-9 (nid.)
ISBN 951-561-638-7 (PDF)

ISSN 0788-5016 (nid.)
ISSN 1795-3359 (PDF)

Valtion taloudellinen tutkimuskeskus
Government Institute for Economic Research
Arkadiankatu 7, 00101 Helsinki, Finland
Email: etunimi.sukunimi @vatt.fi

Oy Nord Print Ab
Helsinki, July 2006

Kyyrä, Tomi, and Wilke, A., Ralf: Reduction in the Long-Term Unemployment of the Elderly: A Success Story from Finland Revised. Helsinki, VATT, Valtion taloudellinen tutkimuskeskus, Government Institute for Economic Research, 2006 (C, ISSN 0788-5016 (nid.), 1795-3359 (PDF), No 396). ISBN 951-561-637-9 (nid.), 951-561-638-7 (PDF).

ABSTRACT: In several European countries the elderly unemployed are allowed to collect unemployment benefits up to a certain age limit, after which they can retire via some early retirement scheme. In Finland the eligibility age of persons benefiting from this kind of scheme was raised from 53 to 55 in 1997. We consider layoff risks, unemployment durations, and the exit states before and after the reform. In the duration analysis a flexible treatment design is adopted by allowing for quantile treatment effects. Since the reform the group aged 53-54 has had a lower risk of unemployment, shorter unemployment durations, and higher exit rates to employment, and it is almost indistinguishable from the group aged 50-52. We estimate that the amount of unemployment benefits saved due to the reform is close to 100 million euros for each age cohort turning 53.

Keywords: Unemployment insurance reform, quantile treatment effect, duration analysis, Finnish register data.

TIIVISTELMÄ: Useissa Euroopan maissa ikääntyneet työttömät voivat nostaa työttömyyskorvauksia kunnes pääsevät varhaiseläkkeelle. Suomessa ikääntyneet työttömät voivat nostaa työttömyyspäivärahaa 60 ikävuoteen asti, jolloin heillä on oikeus siirtyä työttömyyseläkkeelle. Vuonna 1997 laajennetun päivärahaoikeuden alaikäraja nostettiin 53:sta 55:een. Tutkimuksessa analysoidaan, miten ikärajan nosto vaikutti työttömyysriskiin, työttömyyden kestoon ja työttömyyden poistumisreitteihin. Työttömyyden kestoa analysoitaessa sallitaan ikärajan muutoksen vaikutuksen vaihdella työttömyyden keston jakauman eri kohdissa. Ikärajan noston jälkeen 53–54-vuotiaiden työttömyysriski pieneni, työttömyysjaksot lyhenivät ja työttömyys päättyi useammin työllistymiseen. Uudistuksen jälkeen 53–54-vuotiaat, joiden asemaan muutos suoraan vaikutti, eivät enää juurikaan poikenneet työttömyyskokemustensa suhteen 50–52-vuotiaista. Ikärajan noston arvioidaan johtaneen yksityisellä sektorilla noin 100 miljoonan euron säästöihin työttömyyspäivärahoissa jokaista ikäkohorttia kohden.

Asiasanat: Työttömyysturvauudistus, vaikuttavuusanalyysi, duraatiomallit, rekisteriaineisto.

Contents

1 Introduction

In many OECD countries the population is aging rapidly while people are living longer and workers leaving the labour force at ages below the official retirement age (see Gruber and Wise, 1998, and OECD, 2002). The financial pressure caused by these trends has led many governments to change their policies with respect to early retirement. Unemployment-related benefits effectively provide a particular pathway to early withdrawal from the labour market in many European countries, including Finland, Belgium, France, Germany, the Netherlands, Portugal, Spain, and United Kingdom (Duval, 2003). In these countries the entitlement periods of unemployment benefits are extended for older workers and/or particular early retirement schemes are available for redundant workers who are old enough. Several authors have reported a higher risk of unemployment for older employees (see Lindeboom, 1998, or Heyma, 2004, for the Netherlands; Fitzenberger and Wilke, 2004, for Germany; and Rantala, 2002, for Finland). Hunt (1995) and Lalive and Zweimüller (2004) find that increases in the entitlement period of unemployment benefits for the elderly unemployed led to declines in transition rates to employment in Germany and Austria respectively. The aim of our paper is to show that a large share of this kind of unemployment is attributable to the combination of extended unemployment benefit periods and early retirement schemes that have been made available for the elderly unemployed. This is done by a microeconometric evaluation of a reform of the unemployment insurance system in Finland. We believe that the lessons of the Finnish reform carry over to other European countries with high unemployment rates and a large share of long-term unemployed among the elderly.

In Finland unemployment benefits, i.e. the basic unemployment allowance or earnings-related unemployment insurance benefits, can be received for a maximum of two years, but there is an exception for the older unemployed. Workers aged 55 (53 before 1997) or more at the time of job loss are allowed to collect unemployment benefits up to the age of 60, when they become eligible for the unemployment pension benefit. At the age of 65 the unemployment pension is transformed into the normal old-age pension. This route out of the labour market is widely known as the "unemployment tunnel". The unemployment tunnel (UT) scheme contributes to aggregate unemployment in two ways. First, the employers tend to target dismissals at the elderly workers, as a reasonable income level is fully secured for them. Rantala (2002) provides evidence that unemployment risk at least doubles at the eligibility age of the UT scheme. Secondly, without a risk of future cuts in the benefit level, the elderly unemployed may be more passive in job search and more choosy in accepting job offers, leading to longer unemployment spells. Not surprisingly, the older cohorts account for a large fraction of the aggregate unemployment rate. In 2000 one-third of the unemployed (including those on the unemployment pension) and two-thirds of the long-term unemployed were aged 56 and over (Koskela and Uusitalo, 2003).

In practice, the UT scheme facilitates the withdrawal of aging workers from the labour market several years before the official retirement age of 65. This is in clear contrast with the government's goal to induce people to retire later. The effective retirement age in Finland is currently around 60, five years below the official retirement age. The Finnish pension system is built in such a way that the pensions of the retired are paid in large part by the current employees. As the Finnish population will age more rapidly than most of the other European populations over the next few decades,[1] the financing of future pensions has been a subject of increasing concern. As a result of financial pressure, several policy measures have been taken to discourage early retirement. These measures included an increase in the age threshold for the UT scheme: the eligibility age for the extended benefit entitlement period, followed by the unemployment pension at the age of 60, was increased from 53 to 55 in 1997. Consequently, the entitlement period of unemployment benefits for the age group 53-54 was effectively reduced to the maximum of two years, while the other age groups remained unaffected by the reform. In this paper we examine the effects of this reform on the incidence and duration of unemployment among elderly workers.

We employ high-quality panel data drawn from the records of the Finnish Employment Statistics database. This database includes information from several administrative registers, and it effectively covers the entire Finnish population. In the first stage we quantify the change in the inflow to unemployment resulting from the increase in the age threshold of the UT scheme. This effect turns out to be very strong. In the second stage we examine the effect of the UT reform on the distribution of unemployment durations. Following Doksum (1974), we define the treatment effect as a horizontal distance between the marginal distributions of unemployment durations for the treatment group (i.e. 53-54 years old before the reform) and the comparison group (i.e. 53-54 years old after the reform). In other words, we consider the effect of the reform across different quantiles of the unemployment duration distribution. In the duration analysis we apply a stratified version of the competing risks Cox proportional hazard (PH) model and the quantile regression method to a sample of people between the ages of 50 and 57 becoming unemployed between 1995 and 1998. Unlike in the difference-in-differences approach with dummy variables added to the proportional hazard model as in Hunt (1995) and Carling et al. (2001), we do not require the treatment effect to be proportional with respect to the transition rate to employment. In the (censored) quantile regression model, nonproportionality of the reform effect is easily accounted for by allowing the coefficient of the treatment dummy — and those of all other covariates — to vary across the quantiles. We are not aware of any other difference-in-differences quantile regression analysis of unemployment duration data. The re-employment probability roughly doubled for the age group affected by the UT reform.

[1] The old-age dependency ratio, i.e. the ratio of the population aged 65 and over to the population aged 20-64, is estimated to rise from the current level of 25% to over 40% by 2025, when Finland is expected to have the second highest dependency ratio among the OECD countries (OECD, 2004, pp. 18-20).

After the reform, differences in the length of unemployment spells between the age groups 53-54 and 50-52 almost vanished. In the final stage of the analysis we quantify the amount of unemployment benefits saved owing to the increase in the UT age threshold and find it to be around 100 million euros for each age cohort turning 53.

The rest of the paper proceeds as follows. In the next section we describe the Finnish unemployment compensation system and early retirement schemes, with an emphasis on the UT scheme. Section 3 gives details of the data and reports some sample statistics. Section 4 discusses the econometric methods and presents the results. The final section concludes.

2 The Institutional Framework

We shall discuss the features of the Finnish social security system during the second half of the 1990s, i.e. around the time of our empirical analysis. It should be stressed that the Finnish system has been the subject to continuous changes over the years. A more complete description of the regulations and current reforms affecting early retirement is provided by OECD (2004).

2.1 The unemployment compensation system

The Finnish compensation system distinguishes between the basic unemployment allowance, earnings-related unemployment insurance (UI) benefit, and labour market support. The earnings-related UI benefit is received by workers who have been working and contributing insurance payments to an unemployment fund for at least 10 months during the two years prior to unemployment.[2] Those who fulfil the employment criteria of having worked at least 10 months but do not belong to any unemployment fund are eligible only for the basic allowance (which amounts to 115 euro per week in 2003). The replacement rate for the earnings-related UI benefit declines with the level of former earnings, the gross and net replacement rates for a worker with median earnings being 55 and 64 percent respectively (Koskela and Uusitalo, 2003). The basic allowance and UI benefit can be received for a maximum of two years, i.e. 500 working days, but an exception is made for the elderly (see below). Workers who do not meet the employment criteria or whose entitlement period has been exhausted can claim labour market support, which is viewed as a minimum income for the long-term unemployed and those entering the labour market. The maximum benefit level for labour market support equals the basic unemployment allowance, but it is means-tested against household income.

2.2 Early retirement schemes and the unemployment tunnel

Disability and unemployment pensions are the major pathways of early withdrawal from the labour market.[3] The disability pension is payable to people between the ages of 16 and 65 who are unable to support themselves by regular work due to deteriorated health. Although receipt of disability pension is conditional on a medical assessment, almost one-fifth of all people aged 55 to 64 were on a disability pension in 2001 (Rantala and Romppanen, 2004). Compared with most other OECD countries, the incidence of disability among older people seems to be particularly high in Finland (OECD, 2004, p. 58). The disability pension provides a benefit level close to normal old-age pension benefits, which may partly explain its popularity. The unemployment pension is payable to a

[2] The unemployment funds are closely related to labour unions. The fund membership is voluntary, and workers can join the fund without joining the union.

[3] Other early retirement schemes include early old-age pension, individual early retirement, part-time pension, and farmers' pensions. These schemes are of less importance and are not discussed here. See OECD (2004) for a more complete description of the Finnish pension system.

person aged between 60 and 64 who has been unemployed and has collected unemployment benefits for at least two years. The compensation level of the unemployment pension is close to other early retirement schemes and usually exceeds the level of UI benefit.[4] At the age of 65 unemployment and disability pensions are transformed into normal old-age pensions.

Moreover, the unemployed who turn 57 (55 before 1997) during their initial two-year period of unemployment benefit entitlement are allowed to collect unemployment benefits up until the age of 60. Thus an unemployed person aged 55 or over (53 or over before 1997) at the beginning of the unemployment spell has an option to collect unemployment benefits up to the entry into the unemployment pension scheme, which will be subsequently followed by a normal old-age pension. This combination of the extended unemployment benefit entitlement period and the unemployment pension has become known as the "unemployment tunnel" (UT).[5]

There have been two reforms in the UT scheme that are relevant for our analysis. The first one ("1996 reform") cut benefit levels for various early retirement schemes, including unemployment pensions. The reduced benefit levels apply to workers who start collecting early pension benefits in 1996 or later. This law was enacted by the parliament in September 1995. There was, however, a peculiar protection clause in the law: all workers born before 1943 who were unemployed on January 1st 1996 remain covered by the old rules in case of early retirement (regardless of the day the early retirement event takes places in the future). As we shall see, the anticipation of the law change caused an excess inflow to unemployment at the end of 1995 among elderly workers who benefited from the protection clause. Although this reform is not of our interest, we need to take it into account in our research design.

Another reform ("1997 reform") raised the age threshold for the extended benefit period from 55 to 57. This reform was passed as a law by the parliament in September 1996, and it came into effect on January 1st 1997. However, according to a protection clause, the former threshold was applied to workers born before 1944 who were unemployed on January 1st 1997 if they either resigned from their job or were made redundant before June 1996. As a consequence of this reform, workers aged 53 or 54 at the beginning of their unemployment spells who resigned or were made redundant in June 1996 or later lost their eligibility for the UT scheme. The UT scheme was perceived as a loophole, given that some companies had exploited the existing system during reorganising proceedings and it had turned into a somewhat generally acceptable pathway to early withdrawal from

[4] The compensation levels of UI benefits and unemployment pensions are determined by previous earnings over the periods of different lengths. The UI benefits tend to be higher for workers with a steeply increasing earnings profile before job loss. Rantala (2003) finds that transitions from unemployment to the unemployment pension were followed by an average increase of 16 percent in the gross compensation level in 1996 and 1997.

[5] Over the period 2009-2014 the unemployment pension scheme will be gradually abolished and replaced with additional unemployment benefit days for the elderly until the age of 65. Moreover, the age threshold for the extended period of unemployment benefits was raised by two additional years in 2005.

the labour market. The increase in the age threshold for the UT scheme was expected to reduce and postpone the dismissals of older employees, and thereby lead to a reduction in the unemployment expenditures.

2.3 Incentives

Large numbers of older workers have been found to withdraw from the labour market several years before the normal retirement age. This finding is related to the elements of the Finnish social security system that induce firms to focus workforce reductions on older workers on the one hand, and discourage the elderly unemployed from returning to work on the other hand. Consider the supply side first. As those who are eligible for the UT scheme cannot lose their unemployment benefits, they may be less active in searching for employment opportunities and claim higher wages. There are also doubts that the employment authorities may not forward job offers that arrive at the public employment offices to the oldest applicants. Accepting a low wage job can reduce future old-age pension benefits, which may increase the wage claims of the older unemployed. It may also be difficult to find wage offers close to the previous wage level, as post-unemployment wages are generally clearly below the average wage level (see Holm et al., 1999). Overall, financial incentives to return to employment are rather poor for the elderly unemployed.

For the employer, keeping elderly workers can be a risky business. Employers are liable for a large fraction of early retirement expenditures via partially experience-rated employer contributions. Experience-rating is not applied to firms with fewer than 50 employees, but larger firms have to pay a given proportion of the early pension benefit stream received by their former employees. This cost share is determined as a linear function of firm size. In the case of the unemployment pension, firms with over 300 employees pay a maximum amount of one-half of the overall cost, whereas medium-sized firms with 51-300 employees pay a lower share. A different scale is applied to the disability pension, in which case the former employer pays 0 (firms with fewer than 50 employees) to 100 (firms with more 1000 employees) percent of the early pension expenditures. In practice, the cost share of the disability pension exceeds that of the unemployment pension for firms with more than 500 employees.[6] The opposite is true for firms with 51 to 500 employees, while it does not make any difference for smaller firms.

It is worth emphasizing that costs incurred by the employer can cumulate over several years until the former employee reaches the age of 65 and transfers to an old-age pension. Once again, there is a difference between the two schemes: unemployment pension costs cannot be realised until the former employee turns 60 but disability pension costs may emerge much earlier. For example, a worker laid off at age 55 must remain unemployed for five years before he or she can enter the unemployment pension. Since the employer is not liable for unemployment benefits received by its former employees, the UT scheme may be a financially attractive option to get rid of elderly employees with a high disability risk

[6] The experience-ratings of the two early pension schemes were harmonized in 2000.

also for medium-sized firms which have to pay a higher share of unemployment pension expenditures than disability pension expenditures.

It is evident that early retirement can become costly for the former employer, especially in the case of a large firm. Discrepancies in experience-rating and timing of early retirement costs between disability and unemployment pensions may encourage economically distressed firms to lay off older workers. In doing so, the firm avoids the risk of incurring disability pension costs later, i.e. the risk that is rather high in the light of official statistics. Moreover, the fear of future early retirement cost may induce firms to discriminate against older job applicants in recruitment.[7]

[7]Age-dependent social security contributions further raise the costs of older workers compared with prime-age workers. In 2003, the contribution paid by the employer on top of the wage received by the worker varied from 19.3 to 38.4 percent, being an increasing function of firm size and the worker's age (OECD, 2004, p. 82).

3 Data and Descriptive Statistics

We have daily information on the employment status of the entire Finnish population over a number of years. This sort of comprehensive data is available for economic research mainly in the Nordic countries, where collection and maintenance of large-scale administrative registers, with unique identification information, has a long tradition. With the high-quality register data, researches can draw sizeable samples from the population of interest and get rid of response bias and most measurement error issues, which are common problems in survey-based data.

3.1 The Employment Statistics database

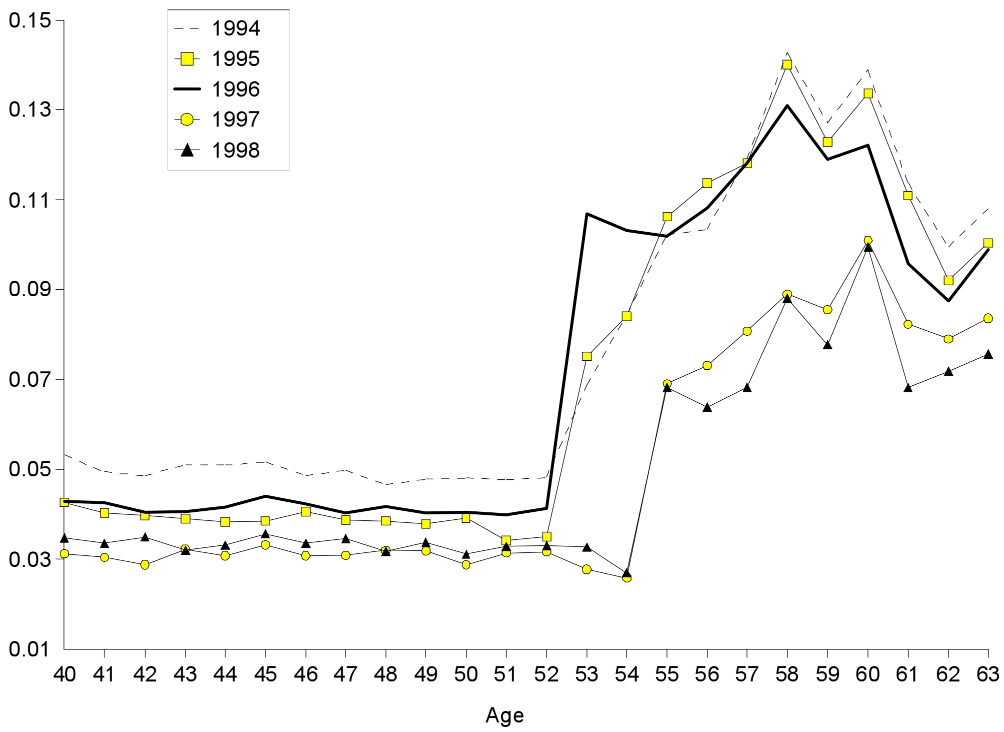
Our data were drawn from the records of the Employment Statistics (ES) database of Statistics Finland. Since 1987 the ES database has been updated regularly by merging information from over 20 administrative registers through the use of unique personality identity numbers. The ES database effectively covers all people with permanent residence in Finland, and its information content is extensive. Along with standard socio-demographic background variables, the database includes detailed information on annual income (from the tax authorities), job spells (from the pension institutes), unemployment spells and participation in labour market programmes (from the employment offices). With this source of data one can basically follow the entire Finnish population over time and across different labour market states. For research purposes the records of the ES database are currently available for the period 1988-2000.

3.2 The incidence of unemployment

The UT scheme is of less importance in the public sector, where employers have weaker financial incentives for age discrimination and workers with a long employment history gain from a high level of job security. In the following analysis we therefore consider private sector workers only. Our analysis focuses on the second-half of the 1990s which was a time of stable economic growth and high unemployment. The Finnish economy was hit by a severe depression in the early 1990s. The GNP contracted three years in a row (1991-1993), and at the worst, in 1991 the GNP decreased by over 7 percent. According to the Labour Force Survey the unemployment rate increased from 3.2 to 16.6 percent between 1990 and 1994, even though masses of people were removed from the unemployment register and directed to labour market programmes. The depression was followed by a period of strong and stable economic growth. The average growth rate of GNP was above 4 percent between 1994 and 2000. The unemployment rate declined approximately by one percentage point each year over this period, reaching 9.8 percent in 2000.

Figure 1 displays the risk of becoming unemployed by age and year in the private sector. The unemployment risk corresponds to a proportion of workers who were continuously employed over the past year but who became unemployed or participated in a

Figure 1: Annual unemployment risk by age and year in the private sector. Source: the authors' calculations from the ES database.



labour market programme during the current year.[8] This group of workers is eligible for unemployment benefits in the case of job loss, and hence exposed to the UT scheme. These workers are also very likely to be members of unemployment funds, and thereby eligible for earnings-related UI benefits.

Before the 1997 reform those who were 53 or older at the beginning of their unemployment period were eligible for the extended period of unemployment benefits, owing to the UT scheme. In 1994, 1995, and 1996 the likelihood of unemployment jumped at the age of 53, increasing thereafter smoothly up to the age of 58. In each year the unemployment risk starts to decline at around the age of 60, suggesting that the oldest workers can leave the labour market through other early retirement schemes. At the beginning of 1997 the

[8]More specifically, the risk of unemployment in year t for k years old workers is computed as

$$1-\prod_{m=1}^{12}\left[1-p_{t,m}(k)\right],$$

where $p_{t,m}(k)$ is the monthly layoff rate among workers aged k at the end of month m in year t, which is defined as the ratio of workers unemployed (and those participating in labour market programmes) at the end of month m who were employed from the beginning of year $t-1$ to the end of month $m-1$ in year t to otherwise equal workers but who were still employed at the end of month m. Data on the entire population of private sector employees were used for calculations.

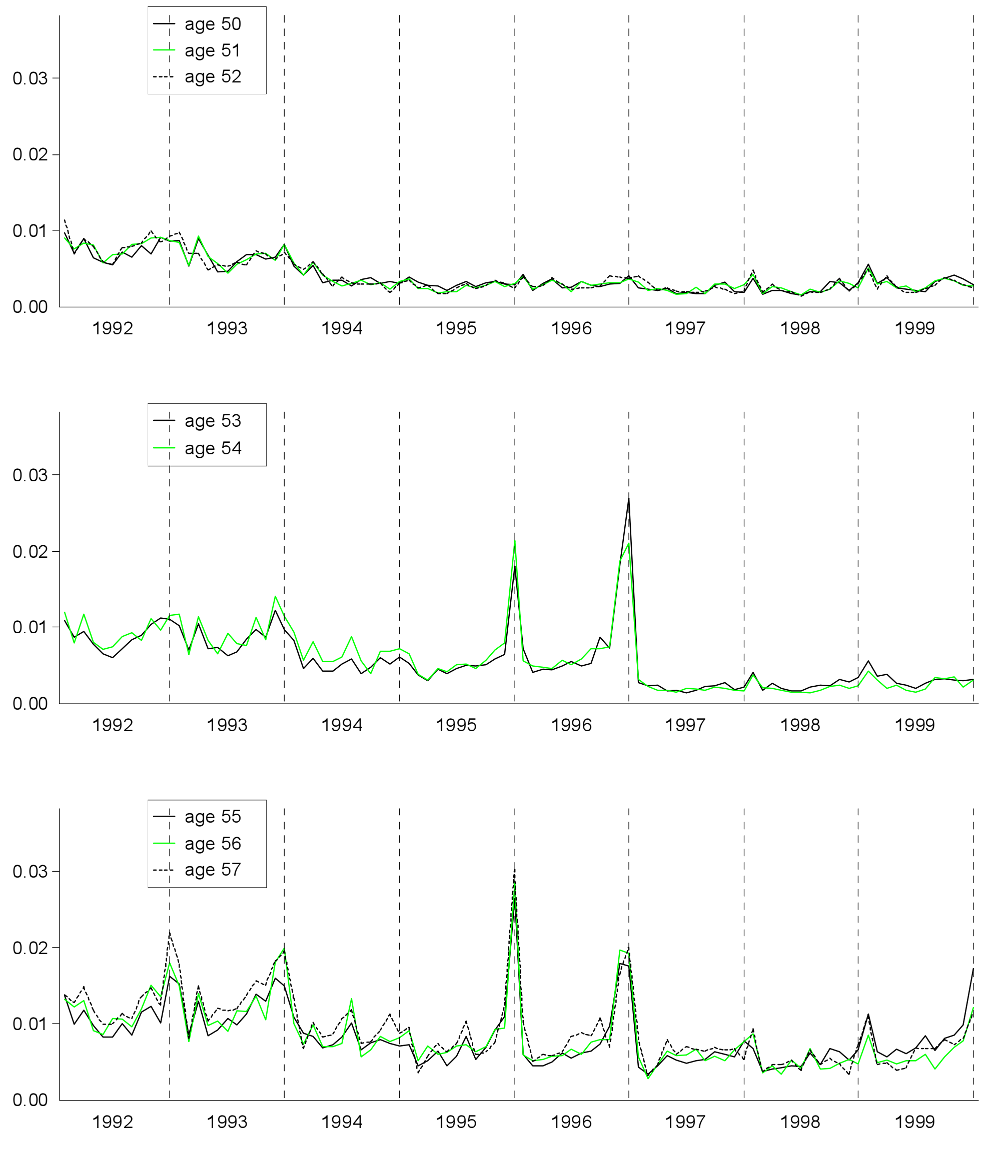
age threshold for the UT scheme was raised by two years (for those who resigned from their job or were made redundant after May 1996). As a result, the unemployment risk as a function of age shifted forward by two years in 1997 and 1998 compared with the earlier years. In particular, the risk of unemployment in the age group 53-54 dropped to a level roughly identical to that of younger groups. This clearly indicates that the sharp level shift in the unemployment risk after a given age cannot be a coincidence but is driven by the UT scheme. Moreover, the inflow to unemployment among workers aged 53 and 54 is much higher in 1996 than in 1994 and 1995. This suggests that some employees who were eligible for the UT scheme in 1996 but lost their eligibility temporarily as a result of the increase in the age threshold in 1997 entered unemployment in 1996 in anticipation of the law change.

A third noteworthy pattern in Figure 1 is a clear decrease in the incidence of unemployment among workers aged 55 and over after the 1997 reform. This is partly illusory, however, as the annual unemployment risks of older groups in 1995 and 1996 are inflated by the anticipation effects of the two distinct UT reforms. The presence of anticipation effects can be seen from Figure 2. The inflow to unemployment increases sharply among workers aged 53 or over (i.e. those born before 1943 who were covered by the protection clause of the 1996 reform) at the end of 1995, while there is no evidence of peaks for younger groups. An even larger increase in the unemployment risk occurs at the end of the next year for workers aged 53 and 54 who were affected by the 1997 increase in the age threshold for the UT scheme. This is consistent with the anticipation hypothesis of the 1997 reform. Surprisingly, the unemployment inflow also increases, though less strongly, among older workers who remain unaffected by the 1997 reform. There is no obvious explanation for this phenomenon. This "shadow effect" may arise from uncertainty about the forthcoming reform if firms and employees were aware that the age threshold will increase but did not know by how much. This may be the case here, as the exploitation of the prior age threshold required that the dismissal or resignation took place several months before the law was enacted by the parliament in September 1996. When interpreting the results one should note that the majority of the elderly workers who entered unemployment in the late 1996 were likely to be covered by the protection clause of the 1997 reform because of 6 months' notice for workers with long job tenure.

Compared with 1998, the inflow rate in 1997 is lower for younger groups but higher for older groups (see Figure 1). In 1998 the lower age limit for part-time pensions was reduced from 58 to 56. Workers on part-time pension remain employed but work less than five days per week or do a reduced number of hours per day. If employers view part-time pensions as an alternative way of adjusting working hours in the case of older employees, this reform may partly explain the decline in the unemployment risk among the older groups in 1998.

Older workers who are eligible for the UT scheme are clearly much more likely to become unemployed than their younger co-workers. It is hard to explain this phenomenon

Figure 2: Monthly unemployment risk by age in the private sector. Vertical lines correspond to Decembers. Source: the authors' calculations from the ES database.



with a simple supply or demand side story alone. In most cases, unemployment causes, along with a social stigma, a notable cut in both gross and net income. Therefore, a claim that elderly workers are flowing into long-term unemployment of their own free will does not sound very convincing. Moreover, it seems economically irrational for employers to lay off disproportionate numbers of workers who have just passed the age limit of the UT scheme. Such workers yield a liability to the firm for the unemployment pension expenditure. The firm could easily avoid this liability by laying off employees that are a few years younger. In the case of a large firm (with more than 500 employees), which aims to minimise the risk of disability pension expenditures, targeting dismissals at the elderly group of workers may have some economic reasoning. This is so because large firms must pay a higher cost share of disability pensions than of unemployment pensions. But this does not explain why layoffs tend to fall on the elderly employees in firms of all sizes (see Rantala, 2002, and Section 4.1 below).

One possibility is that the dismissals of older people, whose income levels are secured through the UT scheme or some other early retirement scheme, have an implicit approval from the general public and, to some extent, from the older people themselves. For example, some elderly people may agree to accept a lower income level in favour of much more leisure time. This view is formalised in a study by Hakola and Uusitalo (2001). Building on the work of Arnott et al. (1998) and Hutchens (1999), they lay out an optimal contract model of early retirement for Finland. In their model the dismissals of elderly employees are determined via an optimization problem where both the employer and employee are involved. An optimal contract specifies wages, firing rules, and severance payments so as to maximise the sum of expected utilities of the employer and employee. Within this framework a partially experience-rated unemployment pension system subsidizes effectively the dismissals of the elderly employees. This encourages firms to target dismissals at their older employees, which subsequently increases early retirement. In other words, if a firm cares about the welfare of its employees, it organises workforce reductions so that losses to the employees are minimised, which means that those who are eligible for the UT scheme are displaced in the first place. Hakola and Uusitalo also show that a number of predictions of their theoretical model are in accordance with empirical regularities observed in the Finnish micro data.

3.3 The sample of the elderly unemployed

In the subsequent analysis of unemployment durations we focus on workers between the ages of 50 and 57 who lost their private-sector job and became unemployed between 1995 and 1998, having been continuously employed for at least one calendar year prior to the year of job loss. These workers were eligible for unemployment benefits, and those old enough were also eligible for the UT scheme. We restrict the sample to the majority receiving UI benefits by excluding individuals whose unemployment benefits do not exceed 14 euro per day (17% of observations). We allocate workers to groups on the basis of their age at the beginning of the unemployment spell and the time they entered unemployment. Workers in the oldest group of 55-57 years old were eligible for the UT scheme in all years, whereas the youngest workers aged 50-52 had no access to the UT scheme at any time. The eligibility status of the age group 53-54 changed during the period as a result of the 1997 reform. For each worker in the data we observe the length of the unemployment spell (in days), exit destination, and a set of control variables. All unemployment spells that continue beyond the end of 2000 are recorded as censored.

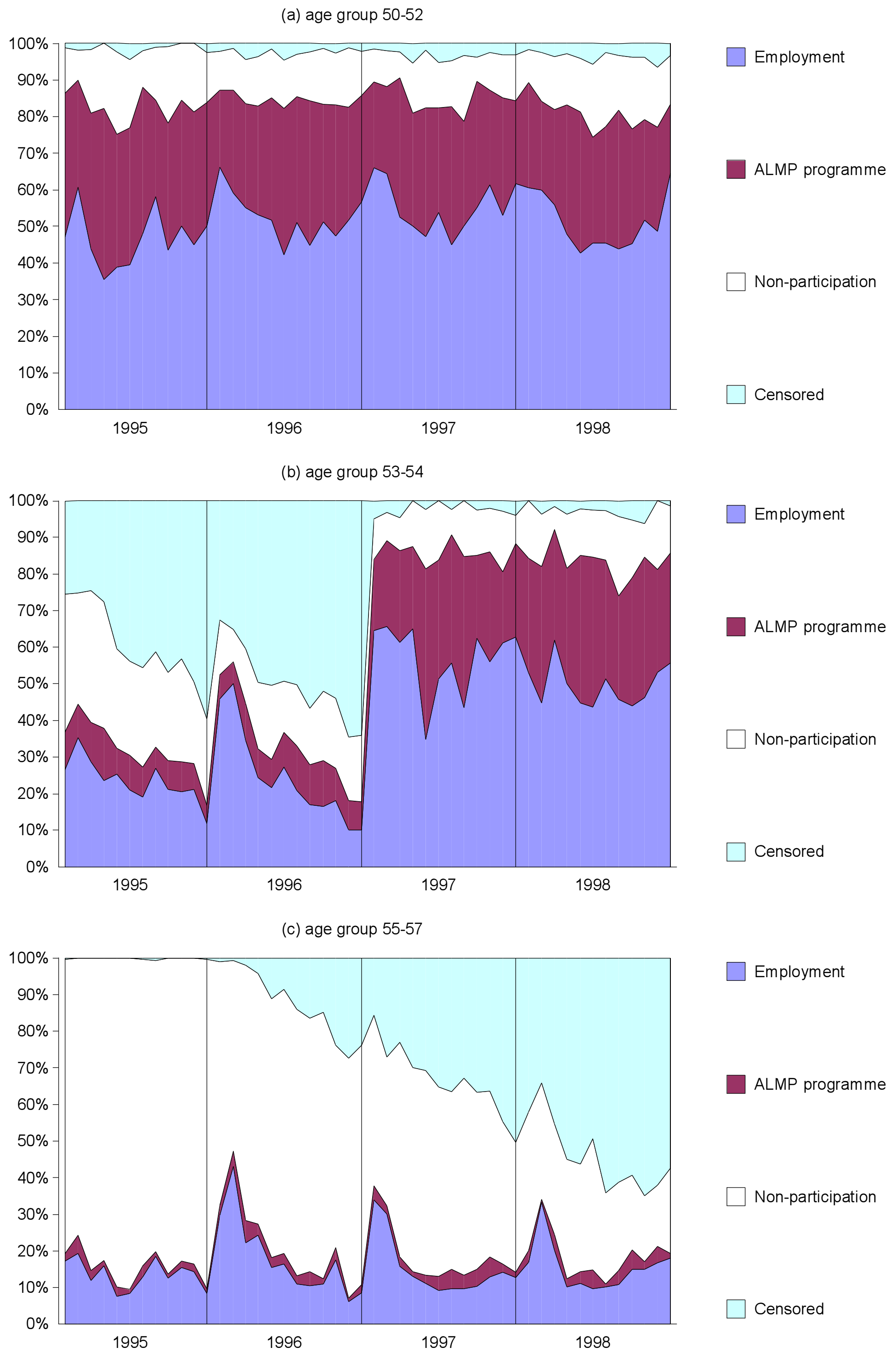
Figure 3 shows the distribution of post-unemployment destination states by age group and the month of unemployment entry. The unemployed in the youngest group typically exit to employment or labour market programmes. For this group the distribution of different exit events has remained stable over time. Workers between the ages of 55 and 57 rarely find a new job, and they do not participate in labour market programmes. For this group, when the destination state is observed, it is most likely to be retirement (i.e. non-participation). A high degree of censoring for the spells that started in 1997 or 1998 further implies that many retirements occur after the end of the observation period. The distribution of destination states for the age group 53-54 closely resembles that for the age group 50-52 in the 1997 and 1998 inflows. However, roughly one-half of the unemployment spells of workers aged 53-54 that started in 1995 or 1996 had not terminated by the end of 2000. This indicates very long periods of unemployment for this group prior to the increase in the age threshold of the UT scheme.

Among the two older groups, the degree of censoring is particularly high and the share of exits to employment low for the spells that started at the end of 1995 and 1996 while the opposite is true for the spells that started in the early 1996 and early 1997. There is no similar variation over time for the age group 50-52. This further highlights the selection issues arising from anticipation of the two distinct UT reforms: the elderly employees who expected to start a long spell of unemployment in the early 1996 or 1997 (i.e. those who believed to benefit from extended UI benefits and/or unemployment pension) tend to advance their unemployment entry in order to benefit from the prior rules. To identify the effects of eligibility for the UT scheme in the absence of anticipation and selection issues, we exclude the following groups from the duration analysis:

- *All individuals who entered unemployment in the last quarter of 1995.* Anticipation of the 1996 reform led to the excess inflow to unemployment at the end of 1995 among workers aged 53 and over owing to the protection clause of the law (see Figure 2). These workers are nonrandomly selected with respect to their re-employment prospects, as implied by the increase in the share of censored spells and the decline in the share of spells ending in employment particularly in December 1995 in Figure 3. Individuals aged 50-52 who became unemployed in the same period are excluded to keep the seasonal composition of the 1995 inflow identical for all age groups.

- *All individuals who entered unemployment between June 1996 and December 1996.*

Figure 3: Post-unemployment destination by age and the month of unemployment entry, percent. Vertical lines correspond to Decembers.



The eligibility status is not clear for workers aged 53 or 54 who became unemployed during this time interval as it depends on the day of resignation or dismissal which is not known. Most of these workers are likely to be eligible for the UT scheme due to the period of notice but we cannot be sure. In addition there is an obvious selection problem at the end of 1996 due to the anticipation of the 1997 reform (see Figures 2 and 3), which we avoid by focusing on individuals entering unemployment before June. It should be noted that the first half of 1996 for the two older groups may still be subject to another selection issue due to the anticipation of the earlier reform. The high share of exits to employment among the spells that started in the early 1996 imply that some of those who expected to retire via the UT scheme and who would have become unemployed in the first half of 1996 in the absence of the 1996 reform did so already in 1995 in order to benefit from the old rules. For this reason the 1996 inflow samples of the age groups 53-54 and 55-57 remain problematic, which we should keep in mind.

- *Individuals born in 1942 or 1943 who entered unemployment in 1997-1998 at age 53 or 54.* In 1996 the 1942 and 1943 birth cohorts were 53 years old, and thereby eligible for the UT scheme, but they lost their eligibility briefly on January 1st 1997 as a result of the increase in the age threshold. Those who expected to experience a long spell of unemployment starting in 1997 or 1998 had an incentive to enter unemployment already in 1996. This claim is supported by the excess inflow to unemployment among workers aged 53-54 at the end of 1996 (see Figure 2). As a consequence, individuals born in 1942 or 1943 who became unemployed after the 1997 reform are likely to be a selected group in terms of skills and motivation. By excluding these workers, we effectively restrict the age group 53-54 entering unemployment in 1997-1998 to those who were born between 1944 and 1945. These workers were not eligible for the UT scheme in 1996, and hence were not affected by the 1997 reform.

These excluded groups were chosen on the basis of the timing of the law changes, the details of the protection clauses, and our first impression of the timing of anticipation effects. It is not clear at which time employers and employees actually became aware of the forthcoming law changes. For example, the observed increases in the unemployment risk at the end of 1996 for the older groups show that anticipatory decisions were made well before the law change was enacted by the parliament. In Section 4.1 we assess the validity of the included groups in more detail.

Sample means by age group and sampling period are shown in Table 1. For some variables the means for the groups excluded from the analysis are reported in square brackets. No distinction is made between 1997 and 1998 since these inflow years are highly similar and will be pooled together in the duration analysis. From the table we see that the average duration of unemployment spells starting in 1995 is close to one year for the youngest group, and much longer for the two older groups. The average unemployment duration is generally shorter for the later inflow samples and, as expected, a sharp decline occurs in the period 1997-1998 for the age group 53-54. When we look only at the completed spells, i.e. those eventually ending in employment, differences between the groups almost vanish. This may indicate that a large fraction of those eligible for the UT scheme in the two older groups was not searching for a new job but was instead passively waiting for access to retirement.

The excluded spells of the two older groups are longer on average than the spells included in the 1995 and 1996 inflow samples. This is consistent with the likely effects of anticipation behaviour, though the business cycle may play a role as well. Among workers aged 53-54 entering unemployment in 1997 or 1998, the excluded individuals (i.e. those born in 1942 or 1943) have marginally shorter spells than those included in the analysis. Also this finding is in line with the expected selectivity effects.

There are no notable differences in the average levels of UI benefits received by different age groups. Almost one-half of workers aged 50-52 were employed by small firms with 50 employees or less and a quarter by large firms with more than 500 employees before unemployment. These shares do not exhibit variation over time, and the differences between the included and excluded groups are minor. A much higher share of the oldest group entered unemployment from large firms. The size distribution of the past employer for the age group 53-54 is very close to that for the older group in 1995 and 1996, but almost identical to the size distribution for the younger group in 1997-1998. Evidently, individuals old enough for the UT scheme tend to become unemployed from larger firms than their younger counterparts. Compared with the included workers, a higher share of the excluded workers in the two older groups entering unemployment in 1995 or 1996 were employed by large firms. This suggests that large employers were responsible for much of the excess inflow to unemployment at the end of 1995 and 1996.

Table 1: Sample means by age and sampling period

	50-52 years old			53-54 years old			55-57 years old		
Continuous variables:	1995	1996	1997 –98	1995	1996	1997 –98	1995	1996	1997 –98
Duration, in days	357	284	275	1219	938	289	983	819	799
excluded obs.	[312]	[327]		[1351]	[1121]	[284]	[1045]	[1056]	
Duration, completed spells	187	149	147	207	139	152	152	139	151
excluded obs.	[202]	[192]		[286]	[228]	[143]	[189]	[183]	
UI benefit, euro/day	32.2	32.0	32.5	30.8	32.2	32.3	28.1	27.8	31.0
Dummy variables:									
Married	.690	.703	.685	.727	.714	.679	.728	.706	.746
Female	.474	.392	.437	.550	.453	.466	.537	.470	.461
Dependent child	.217	.197	.208	.103	.096	.109	.056	.051	.063
Swedish-speaking	.062	.051	.042	.045	.045	.062	.054	.052	.046
Occupation:									
Commercial work	.185	.134	.158	.160	.152	.181	.185	.153	.156
Technical	.085	.082	.080	.074	.066	.068	.066	.052	.082
Teacher, lawyer, humanist	.022	.021	.021	.021	.015	.032	.018	.021	.022
Health care	.018	.015	.019	.014	.017	.019	.011	.010	.013
Clerical work	.194	.149	.155	.260	.159	.158	.185	.163	.176
Forest work, farming, fishing	.025	.074	.016	.010	.046	.022	.016	.033	.012
Transportation	.052	.059	.063	.056	.058	.060	.076	.055	.075
Industrial work	.318	.383	.390	.312	.400	.370	.354	.420	.379
Service work	.093	.076	.092	.090	.076	.084	.086	.088	.080
Not classified	.008	.006	.006	.004	.012	.006	.002	.004	.006
Education:									
Lower secondary	.255	.309	.336	.245	.258	.305	.234	.217	.252
Upper secondary	.133	.112	.125	.131	.098	.141	.083	.079	.118
Undergraduate or higher	.089	.065	.062	.052	.055	.054	.040	.038	.053
Spell started in winter time	.410	.619	.575	.313	.555	.576	.321	.513	.502
Firm size:									
1–50 employees	.437	.475	.467	.297	.390	.472	.266	.382	.290
excluded obs.	[.401]	[.394]		[.136]	[.183]	[.522]	[.139]	[.200]	
51–500 employees	.295	.251	.273	.316	.296	.277	.310	.296	.275
excluded obs.	[.310]	[.277]		[.256]	[.259]	[.251]	[.265]	[.291]	
Over 500 employees	.268	.274	.260	.387	.314	.251	.424	.322	.436
excluded obs.	[.288]	[.329]		[.609]	[.558]	[.228]	[.595]	[.509]	
Unemployed in early 1990s	.379	.569	.549	.288	.517	.520	.280	.464	.387
Past recall in early 1990s	.076	.185	.171	.062	.159	.151	.040	.116	.076
Tenure 4 years or more	.463	.436	.437	.496	.450	.456	.591	.502	.570
Number of observations	975	864	3081	1078	605	689	1655	705	4166
excluded obs.	[364]	[1165]		[943]	[2071]	[487]	[1320]	[2426]	

Notes: 1995 covers spells started between January and September. 1996 covers spells started between January and May. 1997-1998 cover all spells for 50-52 and 55-57 years old but the spells of those born in 1942 or 1943 are excluded for 53-54 years old. The numbers in the square brackets are means for the excluded observations. Winter time refers to the period between October and March. Firm size refers to the past employer. Tenure refers to job tenure with the last employer.

4 Econometric Analysis

The descriptive analysis above gives some clues as to how the UT reform in 1997 affected the unemployment experiences of older age groups. Keeping these lessons in mind, we lay out the following strategy for the econometric analysis:

1. We examine how the likelihood of becoming unemployed as a function of age changed in response to the 1997 reform. We also test the exclusion of certain inflow months from the duration data as a solution to the selection issues resulting from anticipation behaviour.

2. In the unemployment duration analysis we evaluate the extent to which exit behaviour to employment of the group affected by the 1997 reform, i.e. those aged 53-54 at the time of job loss, changed after the reform. Additionally, we try to identify whether the behaviour of this group differs significantly from the behaviour of the younger group aged 50-52 after the reform.

3. Having shown that the UT reform in 1997 led to a decline both in the incidence and expected duration of unemployment for workers aged 53-54, we compute a change in the expected amount of unemployment benefits received until old-age retirement for the private sector employee who is about to turn 53.

4.1 Flow from employment to unemployment

It has become evident that the unemployment inflow of the elderly employed changed sharply in response to the increase in the age threshold for the UT scheme in 1997. From Figures 1 and 2 it is difficult to distinguish the "pure" effects of the 1997 reform from changes in the business cycle and the anticipation effects of the two distinct reforms. Therefore, we elaborate this issue further by modelling the likelihood of becoming unemployed over various periods. By identifying the timing of the anticipation effects, we also validate our choices of treatment, comparison, and control groups for the duration analysis.

Since the entire private sector is covered by the ES database, we have observations on the employees of a large number of plants (and firms). We model the probability that a worker aged s who is working in plant k becomes unemployed during the period under consideration as

$$p_{ks}(x) = \frac{\exp\left(\gamma_k + \alpha_s + x'\beta\right)}{1 + \exp\left(\gamma_k + \alpha_s + x'\beta\right)}, \tag{1}$$

where γ_k is the fixed plant effect, α_s is the age effect, and x is a vector of individual-specific control variables.[9] We include all workers between the ages of 50 and 63 who were

[9] Age is measured at the end of the year under consideration. The control variables x include education, firm tenure, its square, gender, marital status and its interaction with gender, a dummy for a dependent child in the family and its interaction with gender, a dummy for those who speak Swedish as their native language, a dummy for recipients of capital income, a dummy for those with taxable wealth, and a dummy for debts. Information on income, wealth, and debts refers to the previous year.

employed over the past year in the analysis. Workers aged 50 serve as a reference category, and hence $\alpha_{50} \equiv 0$ is imposed as a normalisation. We estimate separate logit models for different periods. Under the assumption that changes in macroeconomic conditions affect all age groups similarly, significant differences in the age pattern of the unemployment risk between two periods are attributed to factors other than the business cycle, such as the anticipation and permanent effects of the UT reforms.

For each period we estimate two models: one for employees of small firms with less than 50 employees and another for employees of larger firms.[10] Small firms should have weaker, if any, incentives for age discrimination because the experience-rating of early retirement schemes is applied only to larger firms.[11] We apply the conditional maximum likelihood method (i.e. the fixed effects logit model) to estimate $\alpha_{51}, \alpha_{52}, ..., \alpha_{63}$ and β for the employees of large firms. Since the fixed plant effects drop out of the conditional likelihood function, no assumptions about how the unobserved plant effects are related to age and control variables are needed. A particular feature of the approach is that observations on the employees of a given plant do not contribute to the conditional likelihood function if either none or all of the plant's employees became unemployed during the period. This is the case for most small plants which cannot have many employees between the ages of 50 and 63. As a result, the fixed effects method is a less appealing choice for modelling the unemployment risk in small firms (unless one is willing to throw away over 90 percent of observations). In the case of the employees of small firms we therefore replace the fixed plant effects with a set of industry and regional dummies and apply the standard logit model (but adjust the covariance matrix for within-plant correlation). We represent our results for the age effects in terms of odds ratios. The odds of becoming unemployed is defined as $p_{ks}(x)/\left[1 - p_{ks}(x)\right]$. The odds ratio for age group $s \in [51, 63]$ is given by e^{α_s}, and it gives the proportional effect on the odds of becoming unemployed compared with the reference worker aged 50.[12]

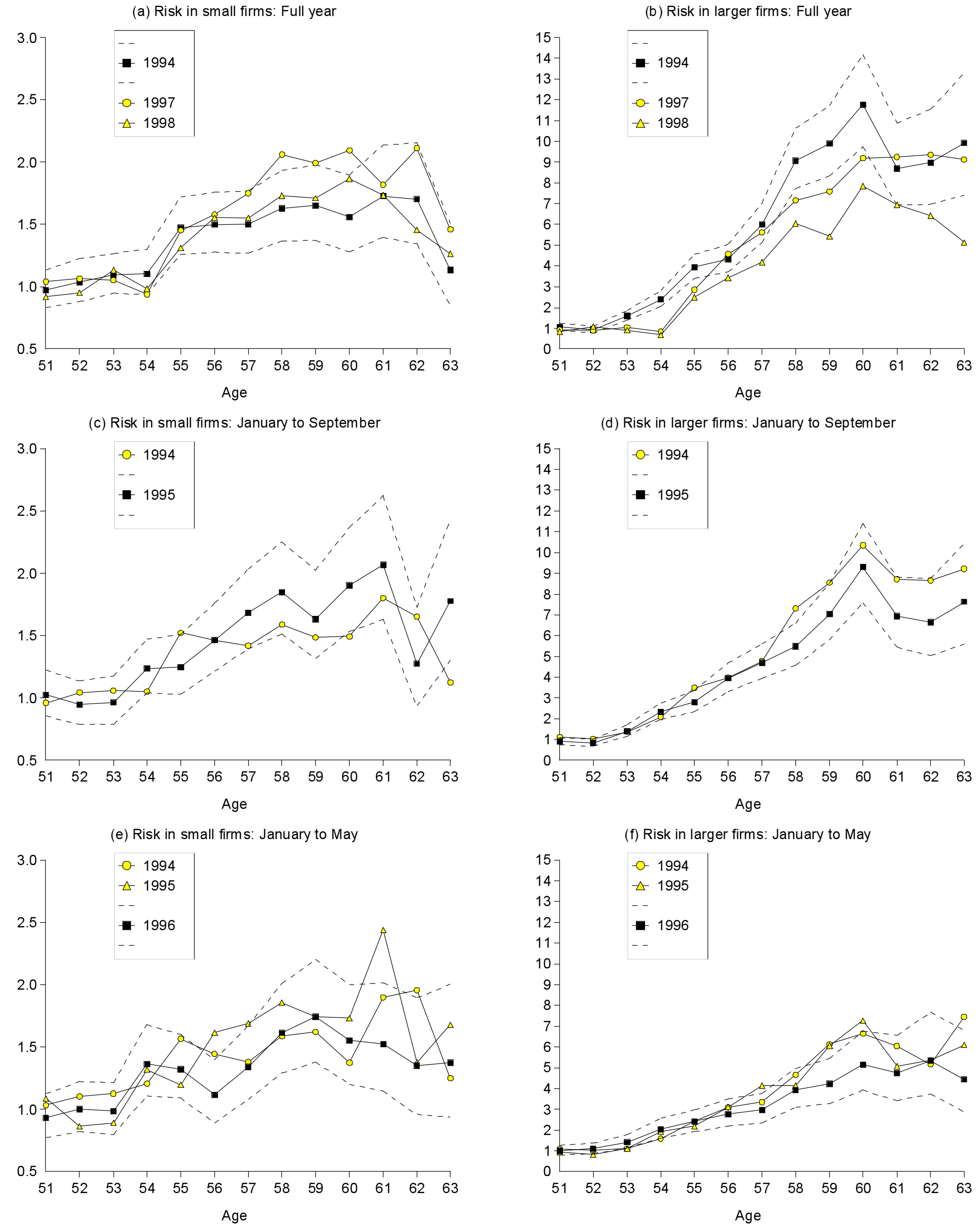
The odds ratios for workers between the ages of 51 and 63 in three different years are shown in Figures 4a and 4b. We have chosen 1994 as a reference period for the pre-reform time since it is supposed to be free of all anticipation issues. We have also added the 95% confidence band for this year. Among the employees of large firms the odds of becoming unemployed starts to increase smoothly at the age of 53 in 1994. This increase occurs more

[10] It may be confusing that we split the data by firm size but allocate workers to plants in the estimations. The distinction between plants and firms is relevant only for large firms with multiple plants. However, if we replace the fixed plant effects with the fixed firm effects, few very large firms will lead to numerical problems in the estimation step.

[11] In addition, a large employer has a wider range of possibilities in targeting dismissals at workers of particular ages than a small firm with only a few employees.

[12] For example, $e^{\alpha_{55}} = 1.7$ would imply that the odds of becoming unemployed is 70 percent higher for a 55-year-old worker than for a 50-year-old worker who is identical in terms of characteristics x and who is working in the same plant (or in the same industry and region in the case of workers employed by a small firm). Note that the effect of age on the odds of becoming unemployed does not depend on the other explanatory variables and the unknown plant-specific effects (which cannot be estimated consistently without further assumptions).

Figure 4: Odds ratios of becoming unemployed from logit models compared with a reference worker aged 50



sharply two years later in the post-reform periods. Since the reform in 1997 workers aged 53 and 54 have not been at a higher risk of unemployment than the reference workers aged 50. Overall the older employees of large firms have a substantially higher risk of becoming unemployed than their younger co-workers. As expected, the risk of unemployment does not depend so much on age in small firms, though it is significantly higher for the elderly employees also in this case. Among the employees of small firms the higher risk applies only to workers aged 55 and over in all years, and hence no significant differences are observed for those aged 53 or 54 in 1994.

Small declines in the odds ratio for 54-years-old workers in 1997 in Figures 4a and 4b are consistent with the hypothesis that the entry to unemployment for some workers who lost their eligibility for the UT scheme was advanced in anticipation of the 1997 reform. However, these declines are not statistically significant at the 5% level and similar declines occur also in 1998 (workers who turned 54 in 1998 were not eligible for the UT scheme in 1997). Compared with 1994, the odds ratios for workers aged 55 and over who are working in large firms are roughly at the same level in 1997 (with a few exceptions) and lower in 1998. The age pattern for the employees of small firms looks rather similar across all years. So there are no notable changes in the relative risk of unemployment among the older groups not directly affected by the reform in 1997 (i.e. those aged 55 or more), and hence the overall inflow of the elderly employees to unemployment also decreased. The additional declines in the unemployment risk for those aged 55 and over in 1998 remain a puzzle, but reasons like the increased use of part-time pension or social pressure may play a role here.

In the duration analysis we aim to solve the selection problems arising from the anticipation of the UT reforms by excluding certain inflow months of 1995 and 1996 from the data. To test the validity of this solution we compare the age patterns of the unemployment risk over the selected subperiods of 1995 and 1996 with the corresponding subperiods of 1994 which are not subject to any selection issues. Figures 4c and 4d show the age patterns of the unemployment risk over the first three quarters of 1994 and 1995. The 1994 curve lies within the 95% confidence band for the 1995 curve with a few exceptions. Marginally significant differences occur at the ages of 55 and 58. These differences, however, cannot be attributed to the anticipation of the 1996 reform which should lead to a *higher* risk of unemployment for workers aged 53 and over in 1995 than in 1994. We therefore conclude that the anticipation of the 1996 reform caused the excess inflow to unemployment among workers covered by the protection clause only in the last quarter of 1995 (see also Figure 2), and thereby workers aged 53-54 who entered unemployment in 1995 by the end of September serves as an anticipation-free group for the duration analysis.

In Section 3.2 we found a sharp increase in the unemployment risk at the end of 1995 among the groups covered by the protection clause of the 1996 reform. If a large fraction of workers who entered unemployment at that time would have become unemployed in

1996 in the absence of the reform, we should see a decline in the unemployment risk in the early 1996 which would then imply a selection problem for our 1996 inflow sample. Indeed, some differences appear in Figures 4e and 4f, which show the age profiles of the odds of becoming unemployed in 1994, 1995, and 1996 by the end of May, along with the 95% confidence band for the 1996 curve. The odds ratio for workers older than 55 is occasionally significantly lower in 1996 than in 1994 and 1995. But there are no statistically significant differences at the ages of 53 and 54. Therefore, on the basis of unemployment risk, workers aged 53-54 who entered unemployment in 1996 by the end of May seem to be another valid group for the duration analysis. This conclusion should be treated with caution, however, as it is in contrast with evidence in Figure 3 where the distribution of exit states implies a possibility of a selection problem for this group.

4.2 Unemployment duration analysis

In this section we aim to quantify the effects of the UT reform on the length of unemployment spells until re-employment among the group affected by the reform. We define two treatment groups whose behaviour is expected to be affected by eligibility for the UT scheme: workers aged 53-54 who entered unemployment in 1995 (by September) and those who entered in 1996 (by May), where the former group is covered by the prior rules for the calculation of the unemployment pension benefit. Since there are no "untreated" workers aged 53-54 entering unemployment during the same periods, we do not observe a natural comparison group that would be of the same age and ineligible for the UT scheme. Therefore, workers aged 53-54 who became unemployed in 1997-1998 (those born in 1942 or 1943 excluded for the reasons provided in Section 3.3) are used as the comparison group. We choose the pooled period of 1997 and 1998 as the post-reform period since the annual inflow samples proved to be highly similar.

Following Doksum (1974), we define the treatment effect as the horizontal difference between the marginal distributions of unemployment durations for the treatment and comparison group. Let $G(t|x)$ and $F(t|x)$ be the distribution functions conditional on observable characteristics x for the treatment group and comparison group respectively. The conditional quantile treatment effect is then given by

$$\delta(\tau|x) = G^{-1}(\tau|x) - F^{-1}(\tau|x) \tag{2}$$

for the quantile $\tau \in [0, 1]$, with $G^{-1} = \inf\{t|G(t|x) \geq \tau\}$ and F^{-1} analogously. In other words, $\delta(\tau|x)$ equals the difference in the durations by which the fraction τ of the treatment group and the comparison group with characteristics x have left unemployment for employment. For example, $\delta(.5|x)$ gives the difference in the median durations between the groups.

Because our treatment and comparison groups are sampled at different points in time, the treatment effect is potentially sensitive to variation in the macroeconomic environment. For this reason we define the age groups 50-52 and 55-57 as the control groups that will be used for comparison purposes and to identify calendar time effects in the difference-in-differences setting. The younger group is expected to be very similar to the comparison group, and the older group similar to the treatment group. The shape of the duration distributions is allowed to vary freely across age groups and sampling periods, as we wish to keep our treatment design flexible. We specify two econometric models for the estimation of the duration distributions. In addition to the classical Cox proportional hazard model we apply a recently emerging method based on quantile regressions (e.g. Koenker and Geling, 2001, Koenker and Bilias, 2001, and Koenker and Xiao, 2002).

4.2.1 The Cox proportional hazard model

We estimate a competing risks proportional hazard model where we distinguish between independent exits from unemployment to employment and other states. We consider the following stratified data version of the hazard rate of leaving unemployment to destination j:

$$\lambda_j^k(t|x) = \lambda_{0j}^k(t)\exp(x'\beta_j), \tag{3}$$

where k refers to a given age group (50-52, 53-54, or 55-57) in a given sampling period (1995, 1996, or 1997-1998). We use Cox's (1972) partial likelihood method to estimate β_j, where we do not have to specify the baseline hazards λ_0. However, in the second stage the integrated baseline hazards are estimated nonparametrically using the product limit estimator given in Kalbfleisch and Prentice (1980).[13]

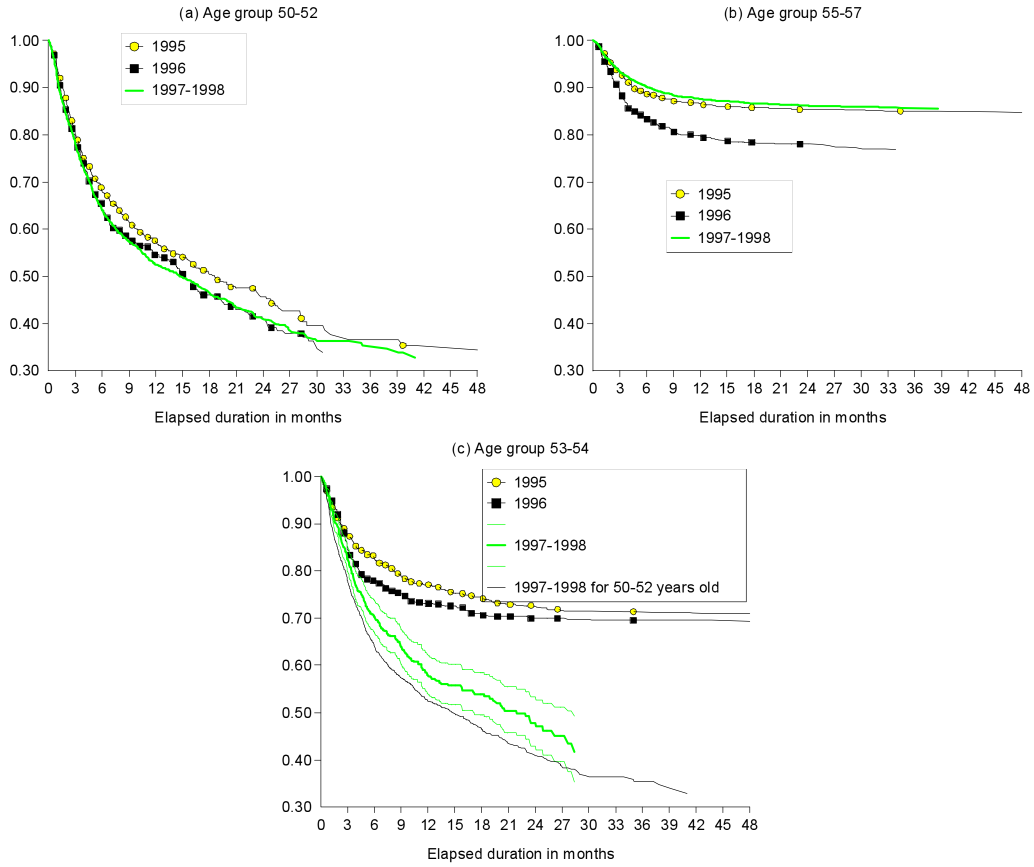
It is worth emphasizing that we leave the destination-specific baseline hazard flexible over sampling periods and over age groups. This implies a flexible treatment design where the treatment effect is captured by the baseline hazards, which are nonparametric and specific to each group. Stated differently, the shape of the hazard functions is allowed to vary freely across the treatment, comparison, and control groups, and thereby no restrictions on the variation of the treatment effect over the quantiles of the duration distribution is imposed. By contrast, the effects of control variables x are modelled in a parametric way, i.e. the familiar proportional effect on the underlying baseline hazard is assumed.

The Cox survivor function estimates for exits to employment by age group and sampling period, evaluated at the sample means of the regressors, are depicted in Figure 5.[14] The estimated coefficients are presented in Table 4 in the Appendix. The survivor functions of all age groups are lower in 1996 than in 1995. In the case of the two older groups this decline may reflect a possible selection process associated with the 1996 reform or the reduction in the expected level of future unemployment pension benefits caused by that reform. These explanations do not, however, apply to the age group 50-52, so the change in the economic environment is likely to play a role as well. The survivor function of workers aged 50-52 is roughly identical in 1996 and the post-reform period 1997-1998.

[13] For this purpose we apply the SAS procedure PHREG.

[14] Ranking of the Kaplan-Meier survivor functions between the groups is similar to the Cox survivor functions, and hence we report only the latter ones.

Figure 5: Cox survivor function estimates for exits to employment, evaluated at the sample means



By contrast, the survivor function of the oldest group in 1997-1998 is above its 1996 level, being roughly identical to the 1995 level. This difference may be related to the observed decrease in the relative risk of unemployment of the older workers in 1998. Since a smaller fraction of the population aged 55 and over lost their jobs in the post-reform period than before, those who did so are likely to be a more selected group in terms of skills and motivation.

The results indicate a strong effect due to the 1997 reform. While the survival curve of workers aged 53-54 approaches the value of .40 in the post-reform period, it never goes below .69 in 1995 and 1996. By contrast, in the case of the other age groups, the survival curve in 1997-1998 is either roughly equal to (workers aged 50-52) or above (workers aged 55-57) its level in 1996. Thus the change in macroeconomic conditions cannot explain the huge downward shift in the survivor function among workers aged 53-54 in the post-reform period but it is mainly attributed to the UT reform. There is also evidence that the effect of the reform increases over the quantiles of the (conditional) duration distribution since the horizontal distance between the predicted survivor functions of workers aged

53-54 in the pre- and post-reform periods also does. In Figure 5c we have added the 95% confidence band for the age group 53-54 in 1997-1998 and the survivor function estimate of the younger control group. The post-reform survival curve of the age group 50-52 lies strictly below the confidence band for that of workers aged 53-54 (except for the last few observations). That is, workers aged 53-54 exit to employment at a lower rate also after the 1997 reform, and thereby the sharp difference in the survivor functions between these groups in 1995 and 1996 is not entirely attributable to the age group 53-54's eligibility for the UT scheme. This result turned out to be sensitive to the exclusion of workers born in 1942 or 1943 from the age group 53-54 in 1997-1998. If these birth cohorts were included, the survival curve of the youngest group would almost everywhere lie inside the confidence band for the survivor function of workers aged 53-54 in the post-reform period. This highlights the importance of anticipation behaviour for the estimation results.

It should be noted that the degree of censoring within the groups eligible for the UT scheme is very high. The survivor functions of these groups decrease over the first 24 months but remain above the level of .69 up to the end of the observation period. This implies a possibility that a notable fraction of the unemployed who are eligible for the UT scheme are not even looking for a new job but are passively waiting for early retirement. If so, the transition rate to employment for such workers is zero. This issue can be seen as a special case of unobserved heterogeneity where the (true) re-employment hazard includes a multiplicative unobserved component with the distribution function that has a mass point at the value of zero. As a consequence, the survivor function for exits to employment will not converge to zero even when the duration time approaches infinity (i.e. the duration distribution is defective). Since the Cox PH model does not allow for unobserved heterogeneity our estimation results may be subject to some bias in this case.

There is, however, evidence that unobserved heterogeneity may be a less serious problem when flexible baseline hazards are used. It is likely to be more of a problem in parametric models that assume a particular parametric form for the baseline hazard. A number of studies have found that incorporating unobserved heterogeneity into semiparametric duration models has only a minor effect on the results (e.g. Meyer 1990; and Han and Hausman 1990). We also included some variables describing the working history of the unemployed, which to some extent capture the specific labour market behaviour of the unemployed and should therefore reduce the magnitude of unobserved heterogeneity (Lüdemann et al. 2006). In order to check the robustness of our results, we turn to quantile regression which also allows for a more flexible specification for the effects of the regressors (see e.g. Portnoy, 2003).

4.2.2 Quantile regressions

Consider the following relationship of the log duration on some regressor vector x and an error term u with distribution function F_u:

$$\log(T) = \beta' x + (x'\gamma)u. \tag{4}$$

This class of models belongs to the linear scale-location models which imply the following conditional quantile function of the log durations for quantile τ:

$$Q_{\log(T)}(\tau|x) = x'\beta + x'\gamma F_u^{-1}(\tau) = x'\beta(\tau), \tag{5}$$

with $\beta(\tau) = \beta + \gamma F_u^{-1}(\tau)$, see Koenker and Geling (2001). The coefficients therefore depend on the quantile τ. The model reduces to the accelerated failure time model, if one imposes $x'\gamma = 1$. If, in addition, the error term u follows an extreme value distribution, we obtain the Weibull proportional hazard model. In both cases the coefficients β do not depend on the quantile of the distribution of $\log(T)$, which is rather restrictive. The same restriction is imposed by the Cox PH model for a different transformation of the duration variable (i.e. $\log(T)$ replaced with the integrated baseline hazard). A common feature of these traditional duration models is that the covariates x affect only the location of the distribution of the transformed duration variable, without affecting its shape. Using the quantile regression models, we can allow the covariates x to affect both the location and shape of the duration distribution. The linear scale-location model above is a special case where all components of $\beta(\tau)$ depend on τ in the same way. We do not impose such a restriction but allow for a more general form of heterogeneity below.

For the estimation of the conditional quantile treatment effect, we use the same difference-in-differences approach that has enjoyed widespread popularity in the linear model setting. Hunt (1995) and Carling et al. (2001) exploit this methodology in the context of the proportional hazard models when analysing unemployment compensation reforms in Germany and Sweden respectively. We include dummies for 1996 and 1997-1998 inflows, group dummies for workers aged 53-54 and 55-57, and interaction terms for the age groups 53-54 and 55-57 in 1996 and 1997-1998 respectively, along with other covariates x as the explanatory variables for the quantile regression model for log durations. The reference group is workers aged 50-52 who entered unemployment in 1995. The business cycle effect, measured by the coefficient of the year dummy, is identified from the change in the exit behaviour of the reference group from 1995 to 1996 or from 1995 to 1997-1998. We only use the younger control group to identify the business cycle effects because our results from the logit and Cox PH models suggest that the composition of the age group 55-57 may have changed over time also for other reasons than the business cycle.

Assuming that the effect of the business cycle is the same for all age groups, the coefficient of the interaction term for the age group 53-54 in 1997-1998 (say $\beta_{5354,97-98}$) identifies the treatment effect in terms of log durations; that is, the change in the distribution of log durations due to the 1997 reform. Given the log transformation of durations, the conditional treatment effect for quantile τ can be computed by

$$\hat{\delta}(\tau|x) = \exp[\hat{\beta}_0(\tau) + \hat{\beta}_{5354}(\tau) + x'\hat{\beta}] - \exp[\hat{\beta}_0(\tau) + \hat{\beta}_{5354}(\tau) + \hat{\beta}_{5354,97-98}(\tau) + x'\hat{\beta}], \quad (6)$$

where $\hat{\beta}_0$ is the estimated intercept, $\hat{\beta}_{5354}$ is the estimated coefficient for the age group 53-54, and x is the vector of control variables with corresponding coefficients $\hat{\beta}$. The first term on the right-hand side corresponds to $G^{-1}(\tau|x)$, the predicted quantile for the treatment group of workers aged 53-54 in 1995 under the pre-reform regime. The second term is an estimate of $F^{-1}(\tau|x)$, the predicted quantile for the comparison group, which is now the age group 53-54 in 1995 under the post-reform regime.[15] In the application we will compute $\hat{\delta}(\tau|x)$ at the sample means of the covariates x.

For the estimations we use durations T, which are non-censored if the exit of an individual to employment is observed; otherwise they are considered as censored (exit to other states or spell in progress at the end of observation period).[16] We use the algorithm of Fitzenberger (1997), which is implemented in the most recent version of TSP 4.5. Due to a certain amount of censoring at the end of the observation period we cannot expect reliable results for the upper quantiles. In general, it may happen that the quantile treatment effect is not identifiable for some quantiles because they are not observed in real world data. This is the case in clinical studies if the treated individuals survive the observation period, but many of the untreated do not. This may occur in unemployment duration analysis if a large fraction of the unemployed in the treatment group do not exit to employment because they retire or drop out of the labour market. Therefore, some upper quantiles of the distribution may become unobservable. In general, the treatment effect is only identifiable for $\tau \in [0, \overline{\tau}]$ with $\overline{\tau} = \min\{G_{n_1}(\overline{T}), F_{n_0}(\overline{T})\}$ and $\overline{T}$ is the end of the observation period.

Figure 6 displays the estimated coefficients along with the 95% bootstrapping confidence bands for the age group 53-54 and the interaction term for various quantiles. The estimated coefficients for other variables are shown in Figures 7, 8, and 9 in the Appendix. From Figure 6 it becomes apparent that the effect of the reform varies over the quantiles of the conditional distribution of unemployment durations (see the coefficient of the interaction term). We also observe that the sum of the two coefficients is not significantly different from zero, so that the age group 53-54 does not possess different exit behaviour from unemployment to employment after the reform in 1997-1998 compared with the control group of workers aged 50-52. At a glance, this is not in line with the previous findings that the Cox survival curves for these groups differ after the reform. This illustrates that a more flexible estimation method may yield different results. However, as noted by Portnoy

[15] We could also add the coefficient of the interaction term for the age group 53-54 in 1996 to both quantities, in which case the treatment group would be those aged 53-54 who are eligible for the UT scheme under the 1996 rules of the unemployment pension benefits. Since the coefficient of this interaction term may be biased due to the likely selection issues in the 1996 inflow, we do not include it and hence our treatment group is covered by the prior rules.

[16] In fact, we are estimating the quantiles of a defective distribution with censored data.

Figure 6: Quantile regression coefficients for the age group 53-54

Table 2: Quantile treatment effects in months

Quantile τ	$G^{-1}(\tau\|\overline{x})$	$F^{-1}(\tau\|\overline{x})$	$\delta(\tau\|\overline{x})$
.20	9.1	4.5	4.6
.25	16.2	6.0	10.2
.30	16.2	6.0	10.2
.35	35.7	9.0	26.8
.40	45.2	9.9	35.3
.45	62.2	11.1	51.1

Notes: Predicted quantiles are evaluated at the sample means of the regressors x. We do not report quantiles exceeding 67.5 months, which is the average length of the observation period for workers aged 53-54 who became unemployed in 1995.

(2003), the estimates of censored quantile regression are less efficient than the Cox PH model if the latter is correctly specified. For this reason differences in the results obtained with the two methods could also be well explained by efficiency reasoning.

The estimated quantile treatment effects are given in Table 2. As already mentioned, the systematic censoring at the end of the data does not allow us to consistently estimate the model for the upper quantiles. When we evaluate the predicted quantile functions at the sample means of the other regressors, we do not obtain reliable predictions for the treatment group (i.e. G^{-1}) for quantiles $\tau > .45$. The conditional quantile treatment effect is not reported if the predicted conditional quantile exceeds the average length of the observation period for the treatment group. We find a strong positive treatment effect for all observed quantiles. The treatment effect increases over the lower end of the distribution which might be due to a large share of the unemployed in the treatment group who never leave for employment because of the unemployment pension option.

To summarize, our main result that the UT reform in 1997 led to the substantial increase in the transition rate out of unemployment to employment among the group affected is clearly robust across different empirical specifications. However, it may be interesting to give a structural interpretation for the observation that the survivor functions of the groups who are eligible for the UT scheme do not converge to zero.[17] One way to proceed in this direction is to model simultaneously the likelihood that the worker is still searching for a new job and the timing of exit to employment conditional on being searching. These sort of duration models are known as the mover-stayer and split population models in economics (see e.g. Abbring, 2002; and Addison and Portugal, 2003). With these models one may be able to obtain an estimate of the fraction of the elderly unemployed who are effectively withdrawn from the labour force and to study how this decision varies with background characteristics. For these reasons the specification and estimation of mover-stayer models is an interesting extension of our approach but it is left for future research.

4.3 Change in unemployment benefits

In the light of our empirical findings, both the incidence and expected duration of unemployment depend on age and the age threshold for the UT scheme. In this section we pursue a partial analysis for quantifying the reduction in unemployment benefits in the private sector attributable to the increase in the age threshold of the UT scheme. We assume that the 1997 reform only affected the incidence of unemployment at ages 53 and 54, and the expected duration of unemployment spells that begins at these ages, having no effects beyond age 54. Under these assumptions we estimate the change in the expected amount of unemployment benefits received by a 53-year-old employee until he or she transfers to the normal old-age pension as

$$\Delta UB = (p + \Delta p)\,[E(b) + \Delta E(b)] - pE(b) = \Delta p E(b) + p\Delta E(b) + \Delta p \Delta E(b), \qquad (7)$$

where p and $E(b)$ are the probability of becoming unemployed between the ages of 53 and 54 and the expected amount of unemployment benefits collected over a spell of unemployment that begins at age 53 or 54 under the pre-reform regime respectively; and $p+\Delta p$ and $E(b) + \Delta E(b)$ are the corresponding post-reform values. That is, Δp and $\Delta E(b)$ capture the effects of the UT reform. We apply the conventional difference-in-differences (DiD) estimator to estimate Δp and $\Delta E(b)$ using workers aged 50-52 as the control group to eliminate the business cycle effect. As the pre-reform period we use 1995 (the last quarter excluded) and as the post-reform period 1997-1998. Details and results are reported in Table 3.

While both the change in the incidence of unemployment and the change in the average receipt of unemployment benefits are important, the latter contributes more to ΔUB.[18]

[17] We are grateful to a referee for pointing this out.

[18] $\Delta E(b)$ is driven by the change in the expected duration of unemployment since there are no notable

Table 3: Expected change in unemployment benefits

	Probability of job loss, p			Expected benefits, $E(b)$		
	50-52	53-54	DiD	50-52	53-54	DiD
1995	.0730	.1159		9,740	37,018	
1997-1998	.0601	.0545		8,619	8,353	
Change	–.0129	–.0614	–.0485	–1,121	–28,665	–27,544

Per capita change in expected unemployment benefits, euro	
Effect of a change in incidence, $\Delta pE(b)$	–1,796
Effect of a change in expected benefits, $p\Delta E(b)$	–3,192
Cross effect, $\Delta p\Delta E(b)$	1,336
Total change, ΔUB	–3,652

Notes: The last quarter is excluded from the 1995 period. Workers born in 1942 or 1943 are excluded from the age group 53-54 in 1997-1998. p approximates the likelihood of becoming unemployed in the 24-month period, and it is computed as $1-(1-q)^{24}$ where q is the average monthly risk of unemployment over the period under consideration (January to September 1995 or January 1997 to December 1998). $E(b)$ is the mean amount of unemployment benefits collected over the unemployment spells. In the case of the unemployment spells that have not terminated by the end of observation period, we assume that the spells continue until the age of 60, i.e. that these workers will eventually end up with the unemployment pension. DiD is the difference-in-differences estimate.

In order to obtain the expected population change, we multiply the expected per capita change ΔUB by the number of 53-year-old employees in the private sector.[19] In the absence of spillover effects and under constant macro-environment this gives the estimated decline in the unemployment benefits received by this age cohort before the normal old-age pension. We find that the 1997 reform led to a reduction of 60 million euros in expected unemployment benefits for the cohort aged 53 in 1997. The estimated decline is 90 million euros for 1999 and even slightly higher for the next few years because the cohort size of individuals aged 53 increases due to a baby boom after the Second World War. Roughly speaking, the reduction in unemployment benefits was close to 100 million euros per age cohort around the turn of the millennium.

A few remarks about our partial analysis are in order. First, the decline in the inflow to unemployment and the increase in the re-employment rates among workers aged 53-54 may have occurred at the expense of younger workers. If this is the case, an increase in the receipt of unemployment benefits by younger workers may have at least partly offset the decline among the age cohort directly affected by the reform. Second, we do not account for the reduction in unemployment pension expenditures, nor the likely increases in other early retirement expenditures. Lindeboom (1998), for example, provides empirical evidence that, when the alternative exit routes act as substitutes, changes in the regulations of one exit route tend to affect the exit rates of the others. This suggests that the change in the UT scheme probably had an indirect effect on the inflow to other early retirement

differences in the level of average UI benefits between the periods (see Table 1).

[19] In the ES database the number of private-sector employees aged 53 who were continuously employed over the past year at the beginning of 1997 and 1999 are 16,698 and 25,108 respectively.

schemes. For these reasons our partial evaluation may tell only part of the story. A general equilibrium assessment of this question is left for future research.

5 Conclusion

In Finland disproportionate numbers of dismissals fall on the group of older workers who are eligible for the unemployment tunnel scheme. It seems that (large) employers actively exploit the UT scheme to get rid of their elderly employees. This kind of a culture of early labour market withdrawal is in sharp contrast with the original idea of the experience-rating of early retirement schemes, which was to encourage employers to invest in working conditions and preventive measures to reduce the disability and layoff risks of their older employees. We analysed the effects of the two-year increase in the eligibility age of the UT scheme on the incidence and duration of unemployment among elderly workers. We found a large decrease in the inflow to unemployment and a large increase in the transition rate out of unemployment to employment owing to the UT reform. The high risk of unemployment and the low escape rates from unemployment in the treatment group before the reform were mainly due to the UT scheme and not because of difficult labour market conditions for elderly workers. We also found evidence of notable anticipation behaviour prior to the UT reforms in 1997 and 1996. This suggests that social security reforms should be implemented without delay after the political decisions have been made.

While ignoring possible general equilibrium effects, we computed the expected reduction in the amount of unemployment benefits paid in the private sector due to the reform and found that it was in the range of 100 million euros per age cohort. For these reasons, the UT reform in 1997 may be viewed as a success story. On the other hand, the poor employment prospects of elderly workers can be attributed to the Finnish social security system that encourages employers for age discrimination and older unemployed to withdraw from the labour market. Therefore, a more cynical observer might see the 1997 reform as a partial correction of the self-inflicted catastrophe rather than a success story. The lessons of the Finnish reform may be useful to other OECD countries with similar schemes for the elderly which have not yet enacted all required changes of the social security and unemployment insurance systems in order to challenge the ageing of their societies. Our results show that early retirement via long-term unemployment can be effectively reduced by abolishing the extended unemployment benefit periods of the elderly used to bridge the time until the normal old-age pension.

References

[1] Abbring, J. H. (2002), "Stayers versus defecting movers: A note on the identification of defective duration models", *Economics Letters*, 74, 327-331.

[2] Addison, J. T., and P. Portugal (2003), "Unemployment duration: competing and defective risks", *The Journal of Human Resources*, 38, 156-191.

[3] Arnott, R. J., Hosios, A. J., and J. E. Stiglitz (1998), "Implicit contracts, labour mobility and unemployment", *The American Economic Review,* 78(5), 1046-1066.

[4] Carling, K., Holmlund, B., and A. Vejsiu (2001), "Do benefit cuts boost job finding? Swedish evidence from the 1990s", *The Economic Journal,* 111, 766-790.

[5] Cox, D. R. (1972), "Regression models and life tables (with discussion)", *Journal of the Royal Statistical Society,* B, 34, 187-220.

[6] Doksum, K. (1974), "Empirical probability plots and statistical inference for nonlinear models in the two-sample case", *Annals of Statistics*, 2, 267-277.

[7] Duval, R. (2003), "The retirement effects of old-age pension and early retirement schemes in OECD countries", *OECD Economics Department Working Paper 370*, OECD, Paris

[8] Fitzenberger, B. (1997), "A guide to censored quantile regressions", in *Handbook of Statistics: Robust Inference*, eds. G.S. Maddala, and C. R. Rao, Vol. 15, North-Holland, Amsterdam, 235-287.

[9] Fitzenberger, B., and R. A. Wilke (2004), "Unemployment durations in West-Germany before and after the reform of the unemployment compensation system during the 1980s" , ZEW-Discussion Paper, No. 04-24.

[10] Gruber, J., and D. Wise (1998), "Social security and retirement: An international comparison", *The American Economic Review*, 88(2), 158-163.

[11] Hakola, T., and R. Uusitalo (2001), "Let's make a deal – the impact of social security provisions and firm liabilities on early retirement", VATT Discussion Papers 260, Helsinki.

[12] Han, A., and J. A. Hausman (1990), "Flexible parametric estimation of duration and competing risk models", *Journal of Applied Econometrics,* 5, 1-28.

[13] Heyma, A. (2004), "A structural dynamic analysis of retirement behavior in the Netherlands", *Journal of Applied Econometrics*, 19(6), 739-759.

[14] Holm, P., Kyyrä, T., and J. Rantala (1999): "Household economic incentives, the unemployment trap and the probability of finding a job", *International Tax and Public Finance,* 6, 361-378.

[15] Hunt, J. (1995), "The effect of unemployment compensation on unemployment duration in Germany", *Journal of Labour Economics*, 31(1), 88-120.

[16] Hutchens, R. (1999), "Social security benefits and employer behaviour: Evaluating social security early retirement benefits as a form of unemployment insurance", *International Economic Review,* 40(3), 659-678.

[17] Kalbfleisch, J. D., and R. L. Prentice (1980), *The Statistical Analysis of Failure Time Data*, New York: Wiley.

[18] Koenker, R., and Y. Bilias (2001), "Quantile regression for duration data: a reappraisal of the Pennsylvania reemployment bonus experiments", *Empirical Economics*, 26, 199-220.

[19] Koenker, R., and O. Geling (2001), "Reappraising medfly longetivity: a quantile regression survival analysis", *Journal of the American Statistical Association*, 96(454), 458-468.

[20] Koenker, R., and Z. Xiao (2002), "Inference on the quantile regression process", *Econometrica,* 70(4), 1583-1612.

[21] Koskela, E., and R. Uusitalo (2003), "The un-intended convergence: How the Finnish unemployment reached the European level", The Labour Institute for Economic Research, Discussion Papers No. 188, Helsinki.

[22] Lindeboom, M. (1998), "Microeconometric analysis of the retirement decision: the Netherlands", *OECD Economics Department Working Paper 207*, OECD, Paris.

[23] Lalive, R., and J. Zweimüller (2004), "Benefit entitlement and unemployment duration: The role of policy endogeneity", *Journal of Public Economics*, 88, 2587-2616.

[24] Lüdemann, E., Wilke, R. A., and X. Zhang (2006), "Censored quantile regressions and the length of unemployment periods in West Germany", forthcoming in *Empirical Economics*.

[25] Meyer, B. D. (1990), "Unemployment insurance and unemployment spells", *Econometrica,* 58, 757-782.

[26] OECD (2002), "Increasing employment: the role of later retirement", Chapter V, *OECD Economic Outlook*, No. 72, December, Paris

[27] OECD (2004), "Ageing and employment policies: Finland", Paris.

[28] Portnoy, S. (2003), "Censored Regression Quantiles", *Journal of the American Statistical Association*, 98(464), 1001-1012.

[29] Rantala, J. (2002), "Unemployment among the elderly and unemployment pension" (in Finnish), Central Pension Security Institute, Reports 2002:28, Helsinki.

[30] Rantala, J. (2003), "Income changes associated with retirement" in Subsistence of pensioners in the 1990s (in Finnish), eds. R. Hagfors, K. Hellsten, S. Ilmakunnas, and H. Uusitalo, Central Pension Security Institute, Research Publications, 2003:1, Helsinki.

[31] Rantala, J., and A. Romppanen (2004), "Labour force participation of the elderly" (in Finnish), Central Pension Security Institute, Reports, 2004:35, Helsinki.

Table 4: Cox proportional hazard model estimates for exits to employment

	Parameter estimate	Standard error	P-value
Married	.2857	.0434	.0000
Female	−.2125	.0620	.0006
Female × married	−.2666	.0706	.0002
Dependent child	.1462	.0410	.0004
Swedish speaking	.0688	.0696	.3226
Occupation:			
Technical	.2873	.0695	.0000
Teacher, lawyer, humanist	.1297	.1182	.2725
Health care	.6609	.1144	.0000
Clerical work	.0001	.0632	.9983
Forest work, farming, fishing	.9315	.0886	.0000
Transportation	.2876	.0743	.0001
Industrial work	.4003	.0516	.0000
Service work	.0776	.0717	.2793
Not classified	−.1801	.2403	.4536
Spell started in winter time	.2939	.0313	.0000
log Firm size	−.0284	.0085	.0008
log Firm size × aged 53-54	−.0523	.0171	.0022
log Firm size × aged 55-57	−.2005	.0156	.0000
Unemployed in early 1990s	.3564	.0360	.0000
Past recall in early 1990s	.7153	.0404	.0000
Tenure 4 years or more	−.1884	.0319	.0000
log UI benefit	−.2652	.0510	.0000

Notes: The regression parameters are estimated with the Cox partial likelihood method, the ties dealt with the Breslow approximation. The baseline hazard is allowed to vary freely across age groups (50-52, 53-54, and 55-57) and sampling periods (1995, 1996, and 1997-1998). The number of observations is 13,818. The reference occupation is commercial work.

Figure 7: Quantile regression coefficients

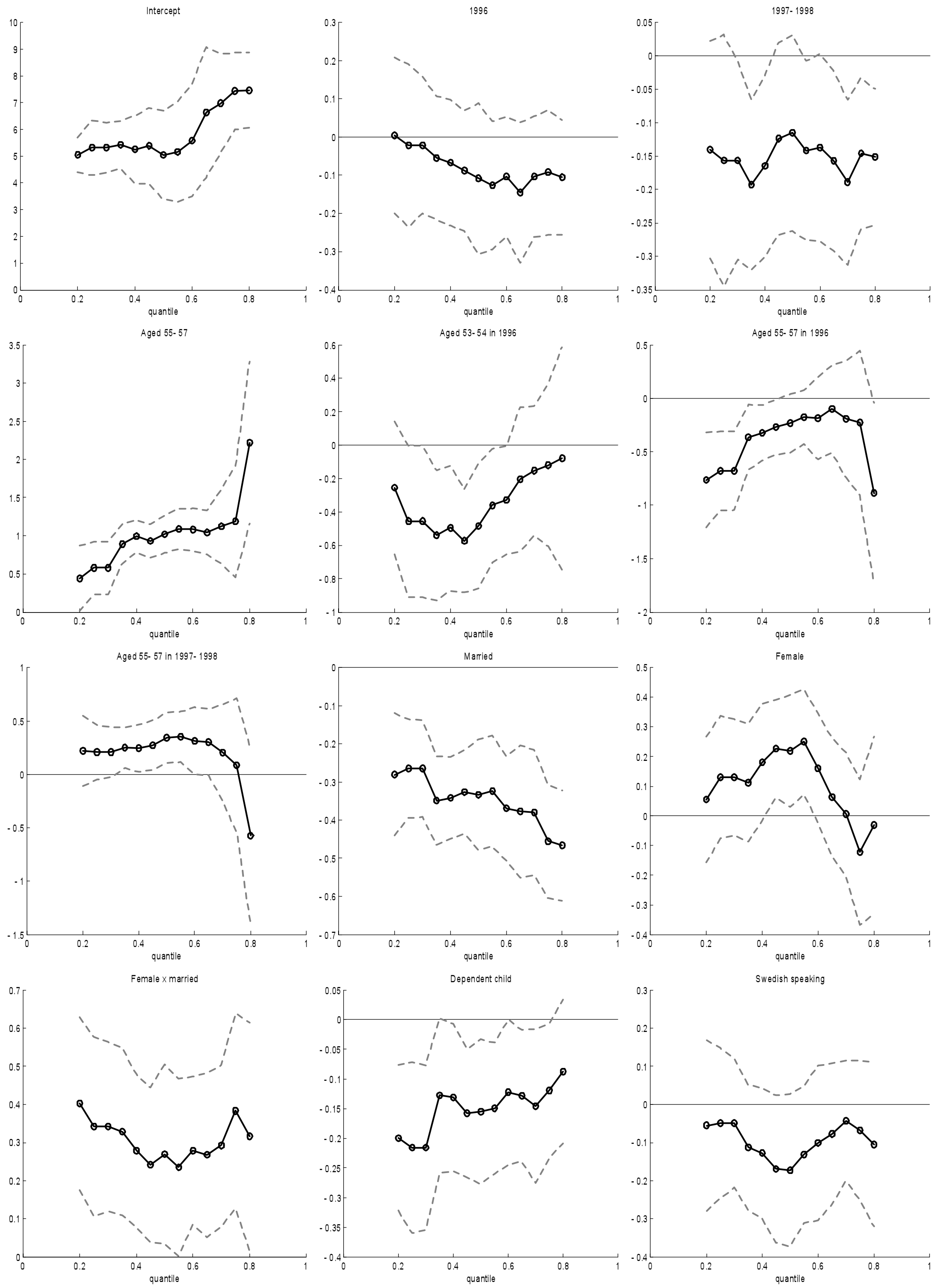


Figure 8: Quantile regression coefficients, continued

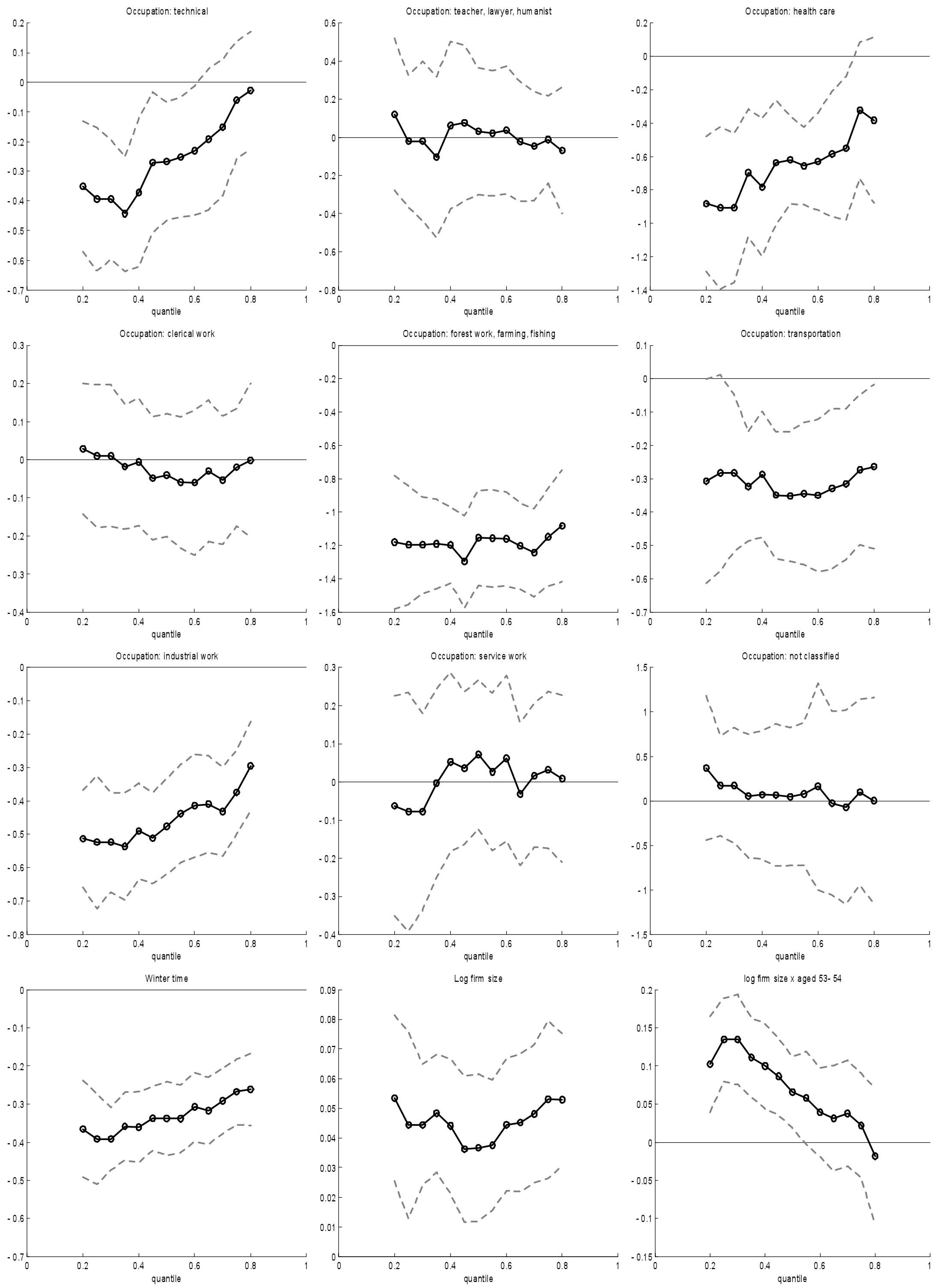
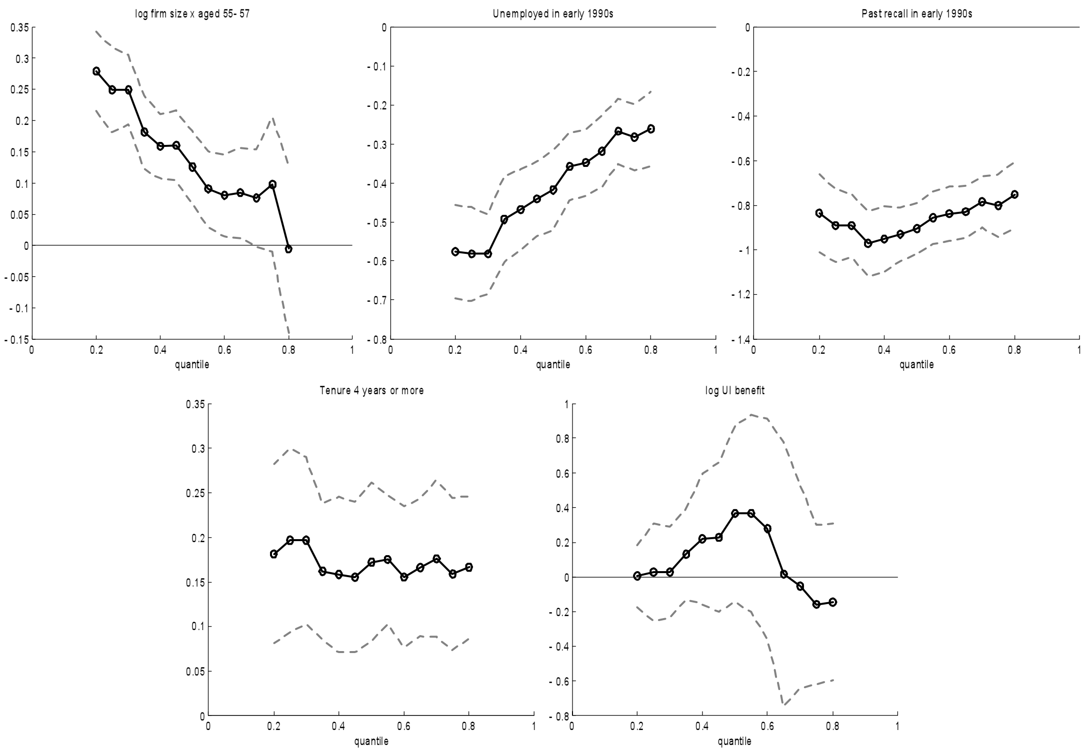


Figure 9: Quantile regression coefficients, continued



VATT-KESKUSTELUALOITTEITA / DISCUSSION PAPERS ISSN 0788-5016 - SARJASSA ILMESTYNEITÄ

340. Räty Tarmo: Palvelusetelit sosiaalipalveluissa 2004. Helsinki 2004.

341. Honkatukia Juha – Antikainen Riikka: Väylähankkeiden kansantaloudellinen merkitys. Helsinki 2004.

342. Mustonen Esko: Välittömän verotuksen progressiivisuus. Helsinki 2004.

343. Kiander Jaakko: Onko Suomessa liian vähän yrittäjiä? Helsinki 2004.

344. Kiander Jaakko: The Evolution of the Finnish Model in the 1990s: from Depression to High-tech Boom. Helsinki 2004.

345. Riihelä Marja – Sullström Risto: Välittömien verojen ja tulonsiirtojen vaikutus tulonsaajajärjestyksen ja tuloerojen muutoksiin Suomessa. Helsinki 2004.

346. Kyyrä Tomi – Wilke Ralf: Reduction in the Long-Term Unemployment of the Elderly. A Success Story from Finland. Helsinki 2004.

347. Kröger Outi: Kansainvälinen yhteistyö haitallisen verokilpailun estämiseksi. Helsinki 2004.

348. Honkatukia Juha: Sähköntuotannon voitot päästökaupan yhteydessä. Helsinki 2004.

349. Sinko Pekka: Progressive Taxation under Centralised Wage Setting. Helsinki 2004.

350. Pettersson-Lidbom Per: Does the Size of the Legislature Affect the Size of Government? Evidence from Two Natural Experiments. Helsinki 2004.

351. Perrels Adriaan – Sullström Risto: Finnish Household Consumption in Monetary and Physical Terms – Trends and Clarifications. Helsinki 2004.

352. Räisänen Heikki: What Kind of Job-broker is the Public Employment Service? Evidence from Finnish Job Vacancy Microdata in 2002-2003. Helsinki 2005.

353. Kari Seppo – Heikkilä Tuomo – Junka Teuvo – Kröger Outi – Mustonen Esko – Rauhanen Timo – Virtanen Sari – Östring Timo: Verotuet Suomessa vuosina 1985-2002. Helsinki 2004.

354. Aaltonen Juho – Järviö Maija-Liisa – Luoma Kalevi – Räty Tarmo: Terveyskeskusten tuottavuuden ja tehokkuuserojen kehitys vuosina1988-2002. Helsinki 2004.

355. Honkatukia Juha: Kivihiilen käytön rajoittamisen kansantaloudelliset vaikutukset päästökaupan yhteydessä. Helsinki 2004.

356. Sulamaa Pekka – Widgrén Mika: EU-Enlargement and Beyond: A Simulation Study on EU and Russia Integration. Helsinki 2004.

357. van Beers Cees – Berghäll Elina – Poot Tom: Foreign Direct Investment and Science and Technology Infrastructure in Small Countries: Evidence from Finland and the Netherlands. Helsinki 2004.

358. Kerkelä Leena – Huan-Niemi Ellen: Trade Preferences in the EU Sugar Sector: Winners and Losers. Helsinki 2005.

359. Pekkala Sari – Lucas Robert E.B.: On the Importance of Finnishing School: Half a Century of Inter-generational Economic Mobility in Finland. Helsinki 2005.

360. Peltola Mikko: Työmarkkinasiirtymät Suomessa. Työllisyyden päättymisen jälkeinen työmarkkinasiirtymien dynamiikka vuosina 1995-1999. Helsinki 2005.

361. Lyytikäinen Teemu – Lönnqvist Henrik: Asumiskustannukset suurissa asutuskeskuksissa. Helsinki 2005.

362. Pekkala Sari: Economic Impacts of Immigration: A Survey. Helsinki 2005.

363. Honkatukia Juha – Parkkinen Pekka – Perrels Adriaan: Pitkän aikavälin talousskenaariot. Helsinki 2005.

364. Hjerppe Reino – Honkatukia Juha: Liikenteen kansantaloudellinen merkitys ja liikenneinfrastruktuuri toimintojen yhdistäjänä. Helsinki 2005.

365. Pekkala Sari – Intonen Nina – Järviö Maija-Liisa: Suomen koulutusmenojen kehitys 1900-luvulla ja tulevaisuudessa. Helsinki 2005.

366. Saarimaa Tuukka: Taxation and Debt Financing of Home Acquisition: Evidence from the Finnish 1993 Tax Reform. Helsinki 2005.

367. Kari Seppo – Ylä-Liedenpohja Jouko: Cost of Capital for Cross-border Investment: The Fallacy of Estonia as a Tax Haven. Helsinki 2005.

368. Honkatukia Juha – Törmä Hannu: Stora Enso Oyj:n Kemijärven sellutehtaan 40-vuotisen toiminnan alueellinen kokonaisvaikuttavuus. Helsinki 2005.

369. Honkatukia Juha –Törmä Hannu: Stora Enso Oyj:n Veitsiluodon paperiteollisuuden 50-vuotisen toiminnan alueellinen kokonaisvaikuttavuus. Helsinki 2005.

370. Räisänen Heikki with the contribution of Heinonen Elisabet: Comparative Analysis on the Job-Broking Market in Japan and Finland. Helsinki 2005.

371. Riihelä Marja – Sullström Risto – Tuomala Matti: Trends in Top Income Shares in Finland. Helsinki 2005.

372. Aaltonen, Juho – Räty Tarmo – Järviö Maija-Liisa – Luoma Kalevi: Perusterveydenhuollon kustannukset ja tuotetut palvelut – tuottavuuden kehitys 1997–2003. Helsinki 2005.

373. Honkatukia Juha – Kemppi Heikki – Kerkelä Leena: Arvioita ilmasto- ja energiastrategian kansantaloudellisista vaikutuksista. Helsinki 2005.

374. Aaltonen Juho – Kirjavainen Tanja – Moisio Antti: Kuntien perusopetuksen tehokkuuserot ja tuottavuus 1998-2003. Helsinki 2005.

375. Kerkelä Leena – Lehtonen Heikki – Niemi Jyrki: The Impacts of WTO Export Subsidy Abolition on the Agri-food Industry in EU: A Preliminary Assessment. Helsinki 2005.

376. Hietala Harri – Kari Seppo: Formula Apportionment osana yritysverotuksen harmonisointia Euroopassa. Helsinki 2005.

377. Kiander Jaakko –Romppanen Antti (eds.): Finland's First 10 Years in the European Union – Economic Consequences. Helsinki 2005.

378. Kangasharju Aki: Do Wage-subsidies Increase Employment in Subsidised Firms? Helsinki 2005.

379. Jones Ronald W.: Aspects of Globalization. Helsinki 2005.

380. Virén Matti: Miten arvonlisävero vaikuttaa kuluttajahintoihin. Helsinki 2005.

381. Hjerppe Reino – Kiander Jaakko – Virén Matti: Are Government Expenditure Productive? Measuring the Effect on Private Sector Production. Helsinki 2006.

382. Riihelä Marja – Sullström Risto: Väestön ikääntyminen, kulutus, säästäminen ja eriarvoisuus. Helsinki 2006.

383. Hynninen Sanna-Mari – Kangasharju Aki – Pehkonen Jaakko: Regional Matching Frictions and Aggregate Unemployment. Helsinki 2006.

384. Ghatak Subrata – Sánchez-Fung José R.: Is Fiscal Policy Sustainable in Developing Economies? Helsinki 2006.

385. Lyytikäinen Teemu: Rent Control and Tenants' Welfare: the Effects of Deregulating Rental Markets in Finland. Helsinki 2006.

386. Riihelä Marja: Kotitalouksien kulutus ja säästäminen: Ikäprofiilien ja kohorttien kuvaus. Helsinki 2006.

387. Siivonen Erkki: Finanssisäännöt ja varallisuusoikeudet julkisten investointien analyysissa. Helsinki 2006.

388. Berghäll Elina: R&D and Productivity Growth in Finnish ICT Manufacturing. Helsinki 2006.

389. Berghäll Elina: Technical Efficiency in an R&D Intensive Industry: Finnish ICT Manufacturing. Helsinki 2006.

390. Berghäll Elina: Technical Change, Efficiency, Firm Size and Age in an R&D Intensive Sector. Helsinki 2006.

391. Ervasti Heikki Venetoklis Takis: Unemployment and Subjective Well-being: Does Money Make a Difference? Helsinki 2006.

392. Hietala Harri – Kari Seppo: Investment Incentives in Closely Held Corporations and Finland's 2005 Tax Reform. Helsinki 2006.

393. Räisänen Heikki: Kaksi näkökulmaa julkisen työnvälityksen tehokkuuteen. Helsinki 2006.

394. Honkatukia Juha – Moilanen Paavo – Törmä Hannu: Runkoverkkosuunnitelman aluetaloudelliset vaikutukset. Helsinki 2006.

395. Honkatukia Juha – Rajala Rami – Sulamaa Pekka: Julkisen sektorin tuottavuuden kasvu ja työikäisen väestön määrän muutos 2005–2020, Rakenteellinen pitkän aikavälin tarkastelu alueellisella tasapainomallilla. Helsinki 2006.