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PALKANSAAJA-SÄÄTIÖ

Helsinki 2007

ISBN 978–952–209–040–9
ISSN 1795–1801

The effect of unemployment benefits on re-employment rates: Evidence from the Finnish UI-benefit reform[♣]

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This version: February 15, 2007

Abstract

In January 2003, the unemployment benefits increased in Finland for workers with long employment histories. The average benefit increase was 15% for the first 150 days of unemployment spell. In this paper we evaluate the effect of benefit increase on the duration of unemployment by comparing the changes in the re-employment hazard profiles between the unemployed who became eligible to the increased benefits to a control group whose benefit structure remained unchanged. We find that benefit increase reduced re-employment hazards in the beginning of the unemployment spell but that the effect disappears after the period with increased benefits expires.

[♣] This research project has been financed by The Federation of Unemployment Funds in Finland and The Finnish Employees' Foundation. We are thankful for Ulla Kaipainen at Insurance Supervisory Authority and Eija Savaja at Labor Institute for Economic Research for their invaluable help with the data.

1. Introduction

In January 2003, the unemployment insurance (UI) benefits increased in Finland for workers with long employment histories. The average benefit increase was 15 percent for the first 150 days of unemployment spell. The benefit increase was a part of a reform aiming to simplify the rules regarding unemployment benefits. An increase in benefits was compensation for abolishing a severance pay system that had existed until the end of 2002.

The Finnish benefit reform provides a clean natural experiment that can be used to evaluate the effect of UI-benefits on the re-employment rates. The eligibility for increased UI-benefits was based on sharp limits on the length of previous work history and on the length of membership in a UI-fund. This allows estimating the effect of benefit increase by comparing the changes in the job finding rates after the reform in the "treatment group" that became eligible for higher benefits to a "comparison group" whose benefit system was unchanged but otherwise was reasonably similar to the treatment group. The reform took place at a time when macroeconomic environment was stable with aggregate unemployment rates almost constant over the four year period that we use in the analysis. Also no other major policy reforms that might have an effect on the re-employment rates were implemented simultaneously. Together these two facts minimize the risk that our results would be contaminated by macroeconomic cycles or other policy changes.

A fundamental problem in identifying the effects of generosity of UI-benefits on the duration of unemployment is that the UI-benefits are usually linked to the previous earnings. Previous earnings again may well be correlated with other factors affecting re-employment rates. Lack of independent variation in UI-benefits in typical cross-section data makes it very difficult to disentangle the effect of benefit level from other factors correlated with previous earnings and re-employment rates. Early research that identifies the effect of UI-benefits from cross-section variation in replacement rates often relies on strong assumptions on the functional form on the relationship between previous earnings and spell length. [1]

[1] Most previous Finnish studies on the effect of UI-benefits on the duration of unemployment rely exclusively on cross-section variation in replacement rates (eg. Kettunen 1993, Kyyrä 1999). Uusitalo and Moisala (2003) use variation in benefit rules in late 1980s to evaluate the effects of benefit changes on re-employment probabilities but due to small sample sizes, measurement problems and volatile economic situation the estimates are not very

Our paper belongs to a more recent tradition that attempts to identify causal effects of the level of unemployment benefits using data on policy reforms that lead to different changes in benefits in different groups of unemployed. Similar analyses has been performed earlier in Germany (Hunt 1995), Sweden (Carling, Holmlund, and Vejsiu, 2001; Bennmarker, Carling and Holmlund, 2005), Austria (Lalive, van Ours and Zweimüller, 2006) and New York State (Meyer and Mok, 2007). Compared to these papers our setup differs in two ways. First, we identify the effect of UI-benefits based on differences in the benefit change across groups that differ in the length of previous work experience while most others are based on different changes across groups that differ in the pre-unemployment wage. Second, in our case the benefit increase involved only new entrants to unemployment which makes it easier to account for possible anticipatory effects.

We have access to high quality administrative data on the dates of entry and exit from unemployment. Our data also include detailed information on the benefits actually paid out reported by UI-funds themselves. These data include daily amounts of benefits, dates when the benefits are paid out and, importantly, administrative information on the remaining benefit eligibility at the end of each quarter. To demonstrate the impact of data quality, we also propose a new method for accounting the effects of classification error in benefit eligibility. Our proposed method resembles two-sample IV approach used in a different context by Angrist and Krueger (1992) and Björklund and Jäntti (1997).

We evaluate the effect of benefit increase on the entire hazard profile of exiting from unemployment into employment. We specify a flexible baseline hazard function and allow the effect of benefit increase to vary across elapsed duration of unemployment. In this way our empirical model can be used to test the key prediction of the job search theory which implies that the effect of an increase in UI-benefits depends on the remaining benefit duration.

We find that an increase in the unemployment benefits has a large effect negative on the job finding rates during first months after entry into unemployment. However, the effect diminishes over time and after the first 200 days the re-employment hazards are similar in the in the treatment and the comparison groups. Our results do not suggest that the unemployed

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precise. The 2003 UI-reform provides the best opportunity so far to evaluate the effects of UI-benefits on re-employment hazards in Finland.

would anticipate the changes in benefits nor that a benefit increase would have substantial entitlement effects.

The remaining part of this paper is organized as follows. In Section 2, we present the details of the Finnish unemployment benefit system and the 2003 benefit reform. Section 3 describes the data and Section 4 the empirical methods. The main results are presented in Section 5. Extensions and robustness checks follow in Section 6. Section 7 concludes.

2. The Finnish unemployment benefit system

The Finnish unemployment benefit system consists of an earnings-related unemployment allowance paid by unemployment insurance funds and a flat-rate labor market subsidy paid by the Social Insurance Institution. Eligibility for unemployment allowance requires that the unemployed have been employed for at least 43 weeks during past 28 months before entering unemployment. The allowance is earnings-related for the members of UI-funds and basic allowance for non-members. Those unemployed who do not fulfill the employment condition or who have exhausted their UI-benefits are eligible for labor market subsidy. Labor market subsidy is means-tested and depends on the earnings of other family members. Full rate without child supplements is equal to the basic unemployment allowance. (22.75 euros per day in 2002)

The unemployed who fulfill the employment condition and have been members of an UI-fund for at least ten months before becoming unemployed are eligible for an earnings-related allowance. This consists of a basic component equal to the basic allowance and an earnings-related component that is 45% of the difference between the previous daily wage and the basic component. There is no cap in benefit-level but the benefits are progressive so that monthly wages exceeding 2047€ (in 2002) increase the benefits only by 20% of the exceeding amount. For a median earner (2300 e/month) the earnings-related benefits are 52 % of the pre-unemployment wage. For a low-income earner (1500 e / month) the replacement rate is 60% and for a high income earner (4000 e/month) 38%. In 2002, average earnings-related benefit was 41.30 euros per day.

Earnings-related unemployment allowance can be paid for five days per week up to 500 days after which those still unemployed may receive labor market subsidy. At the end of 2002, a

total of 130,000 persons were receiving earnings-related allowance; 19,000 basic unemployment allowance and 151,000 labor market subsidy.

An important feature of the Finnish Unemployment benefit system is a benefit extension for those who are over 55 when becoming unemployed. Those unemployed can receive earnings-related unemployment benefits up to age 60 and then apply for an unemployment pension. This benefit extension has dramatic effects for unemployment rates for those over 55. Entry rates into unemployment doubles and exit rates decrease dramatically when the unemployed are over 55. (Hakola and Uusitalo, 2005; Kyyrä and Wilke, 2007)

The 2003 reform

In the January 2003 those unemployed who had lost a permanent job for "economic of production related reasons", had been members of an UI-fund for at least five years before losing their job, had at least 20 years of employment history, and had not received severance pay during the past five years became eligible for increased earnings-related benefits.

The reform increased the earnings-related component of unemployment allowance from 45 to 55 percent of the difference between the daily wage and basic allowance. The increase affected also the higher earnings bracket. There the earnings-related component increased from 20 to 32.5 percent of the wages exceeding the threshold. The increased benefits could be paid up to 150 days after which the unemployed were still eligible for the usual earnings-related benefits.

Figure 1 displays the effect of the reform on the unemployment benefits by plotting the monthly UI-benefits against pre-unemployment monthly wage in 2003. On average, the reform increased the unemployment benefits for the eligible unemployed by 8.72 euros per day i.e. about 15%. The replacement rate for an eligible median earner increased from 52 to 60 percent. The increases in replacement rates were larger for high income earners and smaller for the low-income workers.

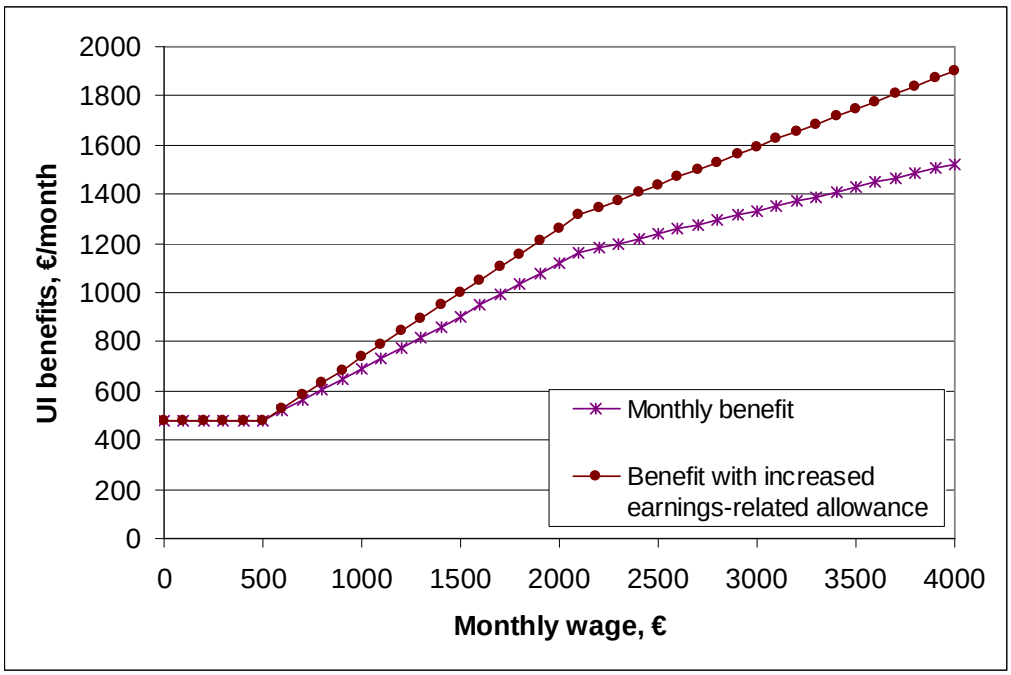

Figure 1 Earnings-related UI-benefits as a function of pre-unemployment wage

Figure 2 illustrates the time profile of the unemployment benefits for the median earner after the reform. For the unemployed not eligible for increased earnings-related benefits the replacement rate is 52% for the entire 500 day eligibility period. After 500 days the unemployed can receive labor market support which implies a drop in the replacement rate to 21% for the median earner. The reform increased benefits for the unemployed that were eligible for the increased earnings-related benefits over the first 150 days. After that they can receive usual earnings-related benefits. For this group the reform creates a declining time sequence of benefits with benefits being reduced first from 60 to 52 percent of pre-unemployment earnings after 150 and then again to 21 percent after 500 days of unemployment.

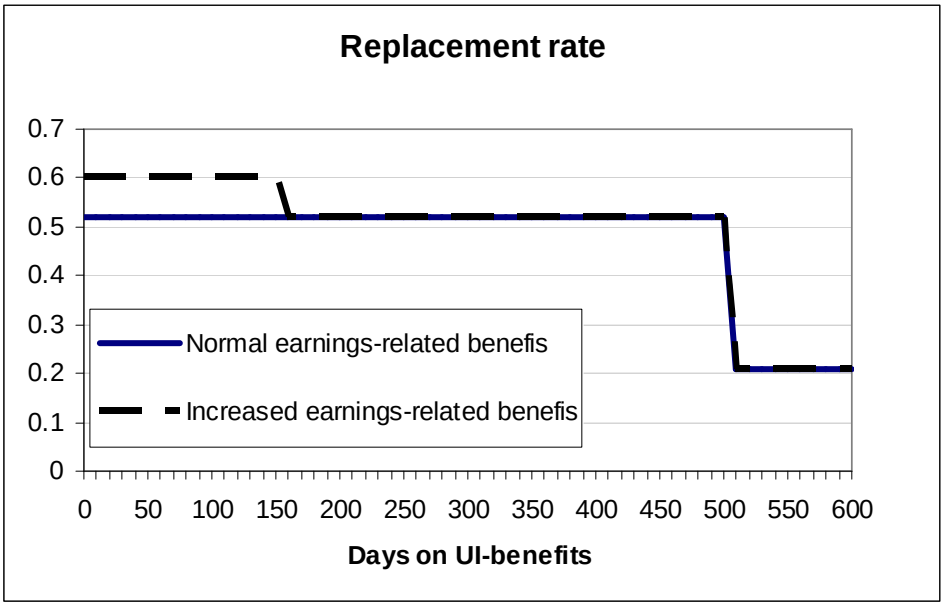

Figure 2. Replacement rate for a median earner without children

According to the government proposal to the parliament (HE 115/2002) the main motivation for the changes that took place in 2003 was to simplify legislation that governs unemployment benefit system. In this spirit, it was proposed that a severance pay system[2] that existed prior to 2003 would be merged to the unemployment benefit system. The government proposal noted that severance pay system was created in 1970 when the unemployment insurance benefits were much lower and not all workers were covered by UI. The proposal states that severance pay system had become a separate and unnecessary additional benefit.

The government proposed replacing severance pay with higher earnings-related benefits for the first 130 days of unemployment spell. The increase in benefits was calculated so that the expected cost for the UI-funds would be unchanged. As only the unemployed with long work histories were eligible for the severance pay, also increased benefits were tied to the length of

[2] Severance pay was a lump sum payment for the workers who lost a permanent job due to plant closing or downsizing and whose re-employment was expected to be difficult due to "age or other reasons". Lower age limit was 45. The size of the severance pay depended on age, previous earnings and number of years employed with somewhat different rules in different sectors. On average, severance pay corresponded to roughly one months pay.

the work history. Parliament changed the proposal so that the length of the increased benefit period was extended to 150 days.

Another motivation for the reform was the idea that a declining benefit sequence would improve job search incentives. In its final report (STM 2001), the government working group that planned the reform cited an article by Sinko (2001), where the author simulated the impacts of a declining benefit sequence. Sinko used a standard job search model to demonstrate that benefits that decline during the unemployment spell increase search incentives compared to time-invariant benefits with the same expected value of benefits in the beginning of the spell. The fact that the pre-reform lump sum severance pay system creates larger incentives for re-employment than the proposed time declining benefit sequence was not mentioned in the report.

Other simultaneous changes

The change in the unemployment benefit system rarely takes place in isolation. Other macroeconomic changes and other changes in legislation that are implemented simultaneously may also affect the changes in unemployment duration. As noted by, for example, Card and Levine (2000) and Lalive and Zweimüller (2004), the increase in benefits may also be an endogenous response to an increase in unemployment. Naturally it is also possible that increasing unemployment would force the government to curb unemployment benefits in order to contain the effects of increasing unemployment on the government budget.

The Finnish economic development during past twenty years has been extremely volatile. Starting from a very low level of about three percent in 1990, the unemployment rate rose rapidly to around seventeen percent in 1994. After that unemployment has declined to around nine percent in 2001. After this the decline has halted, and around the date when the UI-reform was implemented the unemployment rate had been quite stable for two years. Seasonally adjusted unemployment remained very close to nine percent from the beginning of 2001 to the summer of 2004. The unemployment rate started to decrease only in the end of 2004. For our analysis this is important because it indicates that the increase of UI-benefits was not a response to worsening re-employment opportunities but can safely be treated as an exogenous event with respect to job finding rates.

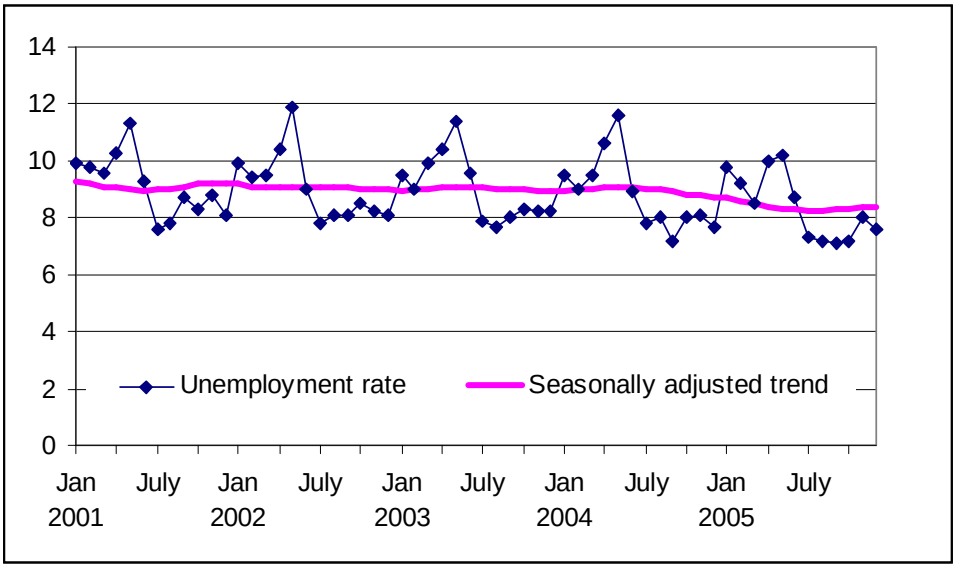

Figure 3 Monthly unemployment rate between 2001 and 2005

Other changes in legislation that took place around the reform date had to do with an increase in the benefit level, loosening of the employment condition, and restrictions on extended benefits for elderly unemployed. None of these should have major impacts on our estimates for the reform effects.

Earnings-related benefits increased for all unemployed in March 1st 2002, ten months before the UI-benefit reform that we analyze in this paper. This change increased the earnings-related component from 42 percent to 45 percent of the difference between daily wage and basic allowance. Since the change affected all unemployed, its effects can be accounted for using difference-in-differences approach. We also experimented by restricting the sample so that only those who entered unemployment after March 1st 2002 were included in the sample, with no effects on the results.

In 2002, the general eligibility requirement for unemployment allowance was that the unemployed have 43 weeks (about 10 months) of employment history during past 2 years and 4 months before the start of unemployment spell. In 2003, this condition was loosened so that benefits after having exhausted the 500 day benefit entitlement, only 34 weeks (about 8 months) employment spell were required to re-qualify for benefits. This made re-qualifying for UI-benefits easier and could increase the incentives to search for temporary employment via the entitlement effect but we would argue that the effect is likely to be minor. In any case,

also this change affected all unemployed, so we can control for the effect using a suitable difference-in-differences approach.

Benefit extension increasing the entitlement period from 500 days to five years for workers who lost their jobs after age 55 had been unchanged since 1997. These rules were tightened and the lower age limit for the benefit extension rose to 57 in connection with the pension reform of 2005. Pension reform also implied other changes for elderly unemployed as unemployment pension system was replaced with unemployment benefits, but these changes did not affect those who became unemployed before 2005. However, in order to not confuse the changes in UI-benefits to changes in early retirement schemes we exclude all persons over 55 from the analysis.

3. Data

We analyze the effects of the benefit reform using individual-level administrative data from Ministry of Labor, Insurance Supervisory Authority and Pension Security Institute.

The Ministry of Labor (MOL) register covers all job-seekers registered at the unemployment agencies. Since registering at an unemployment agency is a requirement for UI-benefits, practically all unemployed are in the database. The data contain information on the starting and ending date of each unemployment spell. Also the reasons for entry and exit are recorded in the data. Therefore, those who enter unemployment because they were fired for "economic or production related reasons" and who, therefore, may be eligible for increased unemployment benefits can be identified from the data. We can also analyze exits from unemployment to employed, to out of labor force and to labor market programs separately. Large amount of background data on individuals is also available from the register including sex, age, education, occupation, region and previous unemployment history. The major weakness in the data is that it contains no information on pre-unemployment wage, on the amount of unemployment benefit or even on the eligibility for earnings-related benefits.

We, therefore, complement the information in the MOL database with information on the unemployment benefits from the registers of Insurance Supervisory Authority (ISA). Each unemployment fund submits each quarter detailed reports on benefits paid during the quarter to the ISA. These reports include daily benefit amounts and days compensated itemized by

individual and four-week compensation period. The benefits are further disaggregated so that the fraction of increased benefits is reported separately. Data also include the date when individual joined a UI-fund which is needed for determining eligibility for increased benefits. Another useful piece of information in the database is the remaining days of the benefit eligibility in the end of each quarter, a number that is extremely hard to calculate in a reliable way based on unemployment spell data alone.

The final piece of information required for determining the eligibility for higher benefits comes from the registers of Pension Security Institute. The UI-funds check the twenty-year work history requirement from the pension registers. We use exactly the same source and add each worker the information on the number of months worked after turning 18. This information is recorded in the pension records since 1962 when the current earnings-based pension system was created.

We drew a 50 percent sample from persons entering unemployment between January 1st 2002 and December 31th 2004. Since the reform increased the UI-benefits for those with at least 20 years of work experience, the average eligible unemployed are well over forty years old. To allow flexible choices of the control group we included in the data all unemployed over 35 in 2002. We follow these individuals until the end of year 2005. By then all unemployed whose unemployment spell started in 2002 or 2003 have exhausted their 500 day benefit eligibility. Many unemployment spells that started in 2004 are still ongoing in the end of 2005. These spells are treated as censored observations at that point. We also treat as censored observations all unemployment spells that end for any other reason than job finding, and all unemployment spells that are still ongoing after 600 days.

By drawing the sample from MOL, ISA and pension registers using the same individual id numbers we can match the data from different registers. While linking individuals is relatively easy, linking unemployment spells from different sources is quite complicated. The details of the matching procedures used are in appendix.

In the final dataset used in the analysis the observation unit is an unemployment spell. Time is measured in days of benefit recipiency (5 days per week). We focus on the unemployed who lost a permanent job and keep only those who had no previous unemployment spells during past three years, counting backwards from the date of entry into unemployment. Only the unemployed who receive some earnings-related benefits are included since the ISA data

contains information on those not eligible for benefits. All time-varying background information is linked to the starting date of each spell.

Descriptive statistics

In Table 1 we report some descriptive statistics of the sample that is used in the analysis. We report these separately for the treatment group that became eligible for increased benefits and for the control group whose benefits remained unchanged.

There are some clear differences between the treatment and the control groups. Since the key criteria for eligibility was the length of the previous work history, it is natural that the treatment group has more work experience. The treatment group is also on average older and has higher earnings than the control group. On the other hand the average level of education is lower in the treatment group, reflecting the fact that those with more education have on average less work experience at given age and the fact that younger generations tend to have better education. Also occupational distribution is somewhat different. A large fraction of the treatment group had been employed in manufacturing occupations while health care occupations are over-represented in the control group.

Daily unemployment benefits are on average higher in the treatment group. This is partly due to higher pre-unemployment wages and partly to the benefit increase. Only 43 percent of the treatment group received increased benefits, but this number includes those who entered unemployment before the reform. We will analyze take-up rates more carefully after presenting the main results.

In the third column we report the same descriptive statistics for those who actually received increased benefits. This naturally contains only those who entered unemployment after the reform date. Still it is useful to compare the characteristics of those whose benefits increased to the treatment group averages. The groups seem to be rather similar which indicates that there are no clear signs of selectivity within the treatment group.

Table 1 Descriptive statistics

		Ineligible	Eligible	Treated
Age		44.16	48.75	48.69
Sex	male	0.447	0.563	0.495
Education	primary	0.128	0.273	0.234
	secondary 1	0.119	0.124	0.129
	secondary 2	0.397	0.375	0.38
	tertiary 1	0.184	0.131	0.156
	tertiary 2	0.172	0.096	0.101
Occupation	agriculture	0.032	0.024	0.015
	specialist	0.166	0.111	0.114
	heath care	0.103	0.028	0.014
	administration	0.173	0.144	0.179
	commercial	0.119	0.128	0.157
	transport	0.042	0.036	0.039
	construction	0.066	0.062	0.037
	industry	0.211	0.401	0.386
	service	0.088	0.065	0.058
Wage		1928	2115	2176
Region	Uusimaa	0.284	0.276	0.315
	Vars.Suomi	0.088	0.095	0.09
	Satakunta	0.086	0.092	0.098
	Häme	0.056	0.053	0.039
	Pirkanmaa	0.029	0.025	0.026
	Kaak.Suomi	0.035	0.044	0.042
	E.Savo	0.057	0.05	0.05
	P.Savo	0.045	0.037	0.032
	P.Karjala	0.034	0.034	0.034
	K.Suomi	0.019	0.015	0.017
	E.Pohjanmaa	0.078	0.076	0.061
	Pohjanmaa	0.044	0.027	0.033
	P.Pohjanmaa	0.043	0.051	0.041
	Kainuu	0.073	0.092	0.096
	Lappi	0.03	0.035	0.027
Disability		0.062	0.047	0.037
Work experience	(years)	18.4	26.7	26.3
UI-membership	(years)	11.7	19.1	17.0
Daily benefits	(eur)	53.14	58.32	64.09
Increased benefits received		0.053	0.438	1
Reason for entry	Unknown	0.05	0.123	0.032
	Displaced	0.23	0.877	0.804
	Other	0.284	0	0.029
	Temporary contract ended	0.436	0	0.135
Reason for exit	Re-employed	0.496	0.447	0.393
	Unknown	0.07	0.05	0.035
	Exit from LF	0.345	0.406	0.469
	End of follow-up	0.089	0.097	0.103
Year of entry	2002	5461	1428	0
	2003	5678	1420	1381
	2004	4615	1244	1253
	Sum	15754	4092	2634

Figure 4 displays the unconditional hazard rates of exiting from unemployment into work in each four-week interval from the date of entry into unemployment. As can be seen from the figure, the re-employment hazard declines smoothly from the beginning of unemployment spell up to about 400 days. As the unemployed approach the expiry date of unemployment benefits (500 workdays), the job finding rate starts to increase. The shape of the hazard rate is consistent with previous research (eg. Meyer, 1990) and has been interpreted as evidence for the effect of limited duration of UI-benefits. Note however, that this conclusion is not based on a comparison to some other group whose benefits do not expire after 500 days. In fact, Kyyrä and Wilke (2006) use Finnish data to show that extending the duration of benefits beyond 500 days for workers over 55 dramatically reduced the job finding rates throughout the unemployment spell, not just close the benefit expiry date.

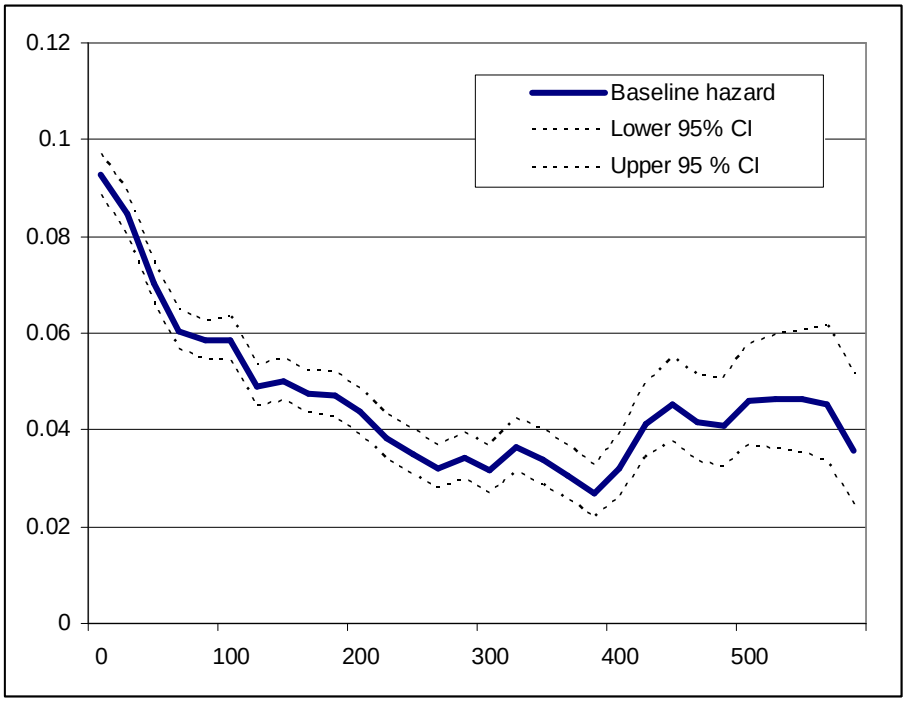

Figure 4 Re-employment hazard

4 Methods

According to the search theory the increase of unemployment benefits affects exit rates from unemployment during the entire benefit period. The increase in the UI-benefits increases reservation wages and decreases the incentives to search for work, thus reducing the exit rates from unemployment. The effect is strongest at the beginning of the unemployment spell because at that point the change in the value of remaining future benefits is the highest. By the time the unemployed have received increased UI-benefits for 150 days, the benefits are reduced to the normal level, and the search intensity should increase to the pre-reform level. At this point the search intensity may be even higher than before the reform because of the "entitlement effect" i.e. the increase in the value of finding a job that could re-qualify for higher benefits.

To evaluate the effect of the benefit increase we have to model the effects to the exit hazards in a way that allows different effects at different points during the unemployment spell. We do this by specifying a proportional hazard model with a flexible baseline hazard profile and time-varying effects of benefit increase. Although the determinants of the hazard rate are also interesting, we are primarily interested in the changes in the baseline hazard profile due the reform. The empirical hazard function is therefore

$$\theta(t) = \lambda(t)\exp\{x\beta\} \qquad (1)$$

where $\lambda(t)$ is time-varying baseline hazard function, x a vector of individual characteristics and t indexes time in days on benefits starting from the date of entry into unemployment. We assume that the baseline hazard function is constant within each four-week (20 weekdays) interval but place no restrictions on the change in baseline hazard between these intervals.

$$\lambda(t) = \exp\left\{\sum_{i=0}^{30} \lambda_i I(20i < t \le 20(i+1))\right\} \qquad (2)$$

To identify the effects of benefit increase on the hazard profile we then compare the changes in the period specific hazard rates in the treatment and the control group using a difference-in-differences approach

$$\lambda_i = \beta_{i0} + \beta_{i1}TREAT + \beta_{i2}REFORM + \beta_{i3}TREAT \times REFORM \qquad (3)$$

where *TREAT* is an indicator of the eligibility for increased benefits and *REFORM* an indicator that the unemployment spell started after January 1st 2003. We are primarily interested in the coefficients of the interaction terms (β_{i3}) that measure the differences in the change of the hazard estimates after the reform between the treatment and the control groups.[3]

We also estimate a more restrictive model where the effect of the reform on λ_i is a linear function of elapsed duration up to the point where increased benefits expire (150 days) and constant thereafter. Since the latter model is nested within more general model we can test the restriction using a simple likelihood ratio test. We also estimate even more restrictive model where the benefit increase has a constant proportional effect at all durations. This model is nested within the linear model allowing a simple test of constant effects.

5 Results

We first compare the changes in duration of unemployment in the treatment and the comparison groups after the reform. In table 2 we report median durations for all UI-benefit spells without any restrictions on the reason of exit. It turns out that the median duration is higher in the treatment group, perhaps due to age difference between treatment and the control groups. Median durations declined after the reform in both treatment and control groups so that unemployment spells that started after January 2003 are shorter. The difference can be contributed to two factors. First the unemployment rate decreased slightly in 2004 improving re-employment chances. Second, our data ends in the end of 2005 allowing shorter follow-up period for those who became unemployed after the reform.

Most interesting result in the table is that the decline in the median duration was substantially larger in the control group. A simple difference-in-differences estimate indicates that the

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[3] Note that we do not assume that the duration dependence is similar in the treatment and the control groups but estimate all β_{i1} terms freely. However, in the empirical analysis we assume that duration dependence is constant over time i.e that $\beta_{i2} = \beta_2$ for all i = 0 … 30. This restriction seems plausible given that the time horizon only three years. We also tested this restriction with a simple likelihood ratio test. The test did not reject the null of time-invariant duration dependence but its power is rather weak.

reform would have increased median duration by 40 days. The difference is highly significant with a bootstrapped standard error of 10.1 days.

Table 2 Median duration of unemployment

	Before Jan 1st 2003	After Jan 1st 2003	Difference	Difference-in-differences
Control	200	153	-47	
	(4.5)	(2.1)	(4.9)	
Treatment	183	177	-6	41
	(7.3)	(5.0)	(8.9)	(10.1)

Note: Bootsrapped standard errors with 2000 replications in parenthesis

The comparison of median durations in Table 2 does not account for the effect of right censoring due to exits to other destinations than employment or due to the end of the follow-up period. Also it provides no evidence on whether the effect is due to an increase in re-employment rates in the beginning of the unemployment spell or an improvement in the prospects for long-term unemployed.

In Figure 5, we plot unconditional empirical hazard rates of exits into employment separately for the treatment and the control groups. In the figure the hazard rates are assumed constant in each four week period. Exits out of labor force and into labor market programs as well as ongoing spells after 600 days and ongoing spells at the end of 2005 are treated as censored observations.

The figure indicates that the re-employment hazards decreased in the treatment group after the reform but only in the beginning of the unemployment spell. After about 200 days on benefits, the job finding rate returns to the pre-reform level. Thereafter, the estimates are noisy, but do not indicate clear changes in the re-employment rates. The change in the control group is rather different. There the increase in re-employment hazards is roughly constant across different points of elapsed duration.

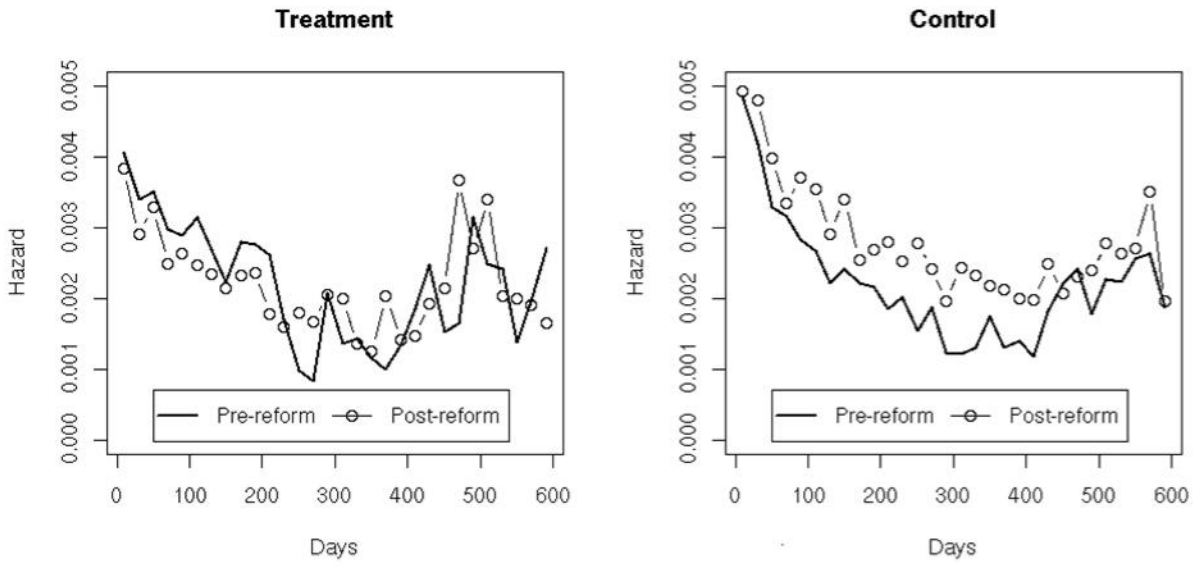

Figure 5 Re-employment rates before and after UI-reform

To account for the differences in the composition of the treatment and the control groups we estimate the proportional hazards model as described in the previous section. In addition to the treatment and control status and the reform effects we add to the model indicators of age, sex, education (5 categories), occupation (9 categories), region (15 categories), previous work experience, pre-unemployment wage, reason for entry into unemployment (5 categories) and indicators for the month and year when unemployment spell started. Also duration dependence is allowed to differ between treatment and the control groups resulting to 60 additional parameters. These parameter estimates can be found in the appendix. Here we concentrate in the reform effects.

Figure 6 plots these estimates specified so that each point in the figure refers to the reform effect at specific interval of elapsed benefit duration. We use four-week intervals up to 200 days in unemployment but aggregate data into 12 week intervals after that to reduce noise in the estimates. The first estimates (hollow circles) report the unconstrained estimates where the effect of the reform on re-employment hazard may vary freely across the elapsed duration of unemployment. These estimates indicate that the increase in benefits caused a substantial decline in the re-employment hazard but that the effect only occurs during first 250 days of unemployment. After that the effect of the reform is close to zero, although the estimates are not very precise. We also estimate a model where the effect of the reform on re-employment

rates is restricted to be equal across all elapsed durations and a model where the effect may increase in a linear fashion over first 150 days and remain constant thereafter. Since these models are nested within the more general model we can test these restrictions with a simple likelihood ratio test. The results indicate that a constant effect model is not rejected when tested against the unrestricted alternative (p=0.48). However, this is due to large standard errors in the estimates. The constant effect model is rejected when tested against the linear alternative or when tested against an alternative that allows a change in hazard after 150 days.

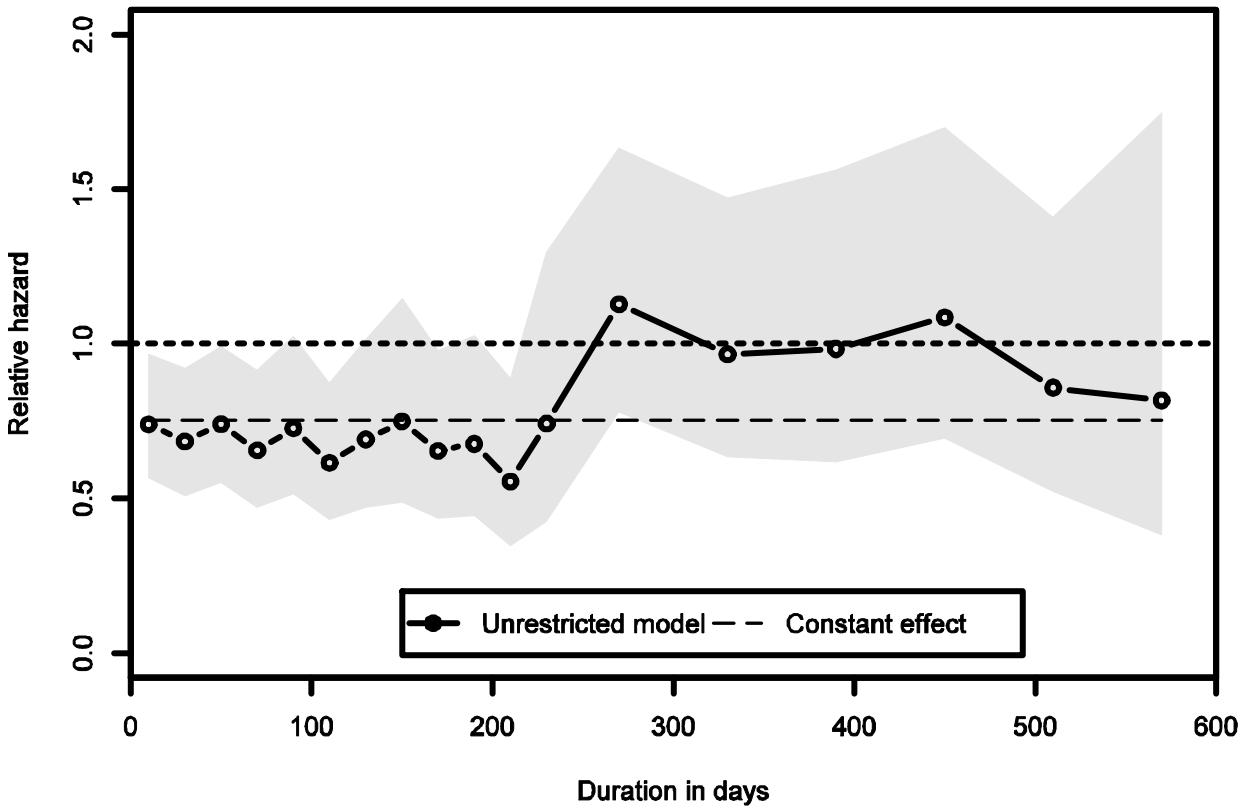

Figure 6 Effect of the reform on re-employment hazard

6 Extensions

One of the concerns in the previous research has been that the unemployed may anticipate the changes in the benefit system. The search theory assumes that the unemployed are aware of the expiry date of UI-benefits and increase their search effort already before the benefits

actually expire. In a similar way, the unemployed might react to the change in the benefit system already before the system changes if the change can be anticipated. It would be awkward to assume that the unemployed are forward-looking with respect to their future benefit sequence but completely myopic with respect to a change in the benefit system. For example, Carling et al. (2001) note that a benefit reform affected hazard rates of exiting unemployment already several months before the policy change.

In the Finnish UI-reform the benefit increase applied only to those entering unemployment after January 1st 2003. The benefits remained unchanged for those already unemployed on the reform date. By comparing the change in the hazard profile before and after the reform, we therefore compare unemployed whose benefit sequence changes for the entire unemployment spell avoiding the confusion between future changes in the system and future changes in the benefits under a given benefit system.

However, there might still be anticipatory effects if the change in the benefit system has an effect on the incidence of unemployment. We are primarily concerned about potential effects of changing a lump-sum severance pay to increased benefits. Even though the expected value of increased benefits in the whole eligible population is roughly equal to severance pay, it is possible that those who expect to find jobs quickly would try to affect the timing of dismissals so that they could still be eligible for the severance pay. Such strategic timing of dismissals could affect our results.

Figure 7 attempts to provide evidence on the question reporting the monthly numbers of new entrants into unemployment around the reform date. The figure displays clear seasonal variation in the entry rates but no pattern that would suggest systematically higher entry rates just before the reform in the group eligible for the severance pay. To assure that there is no effect on the results, we also dropped those entering unemployment in November or December from the data with no significant changes in the results.

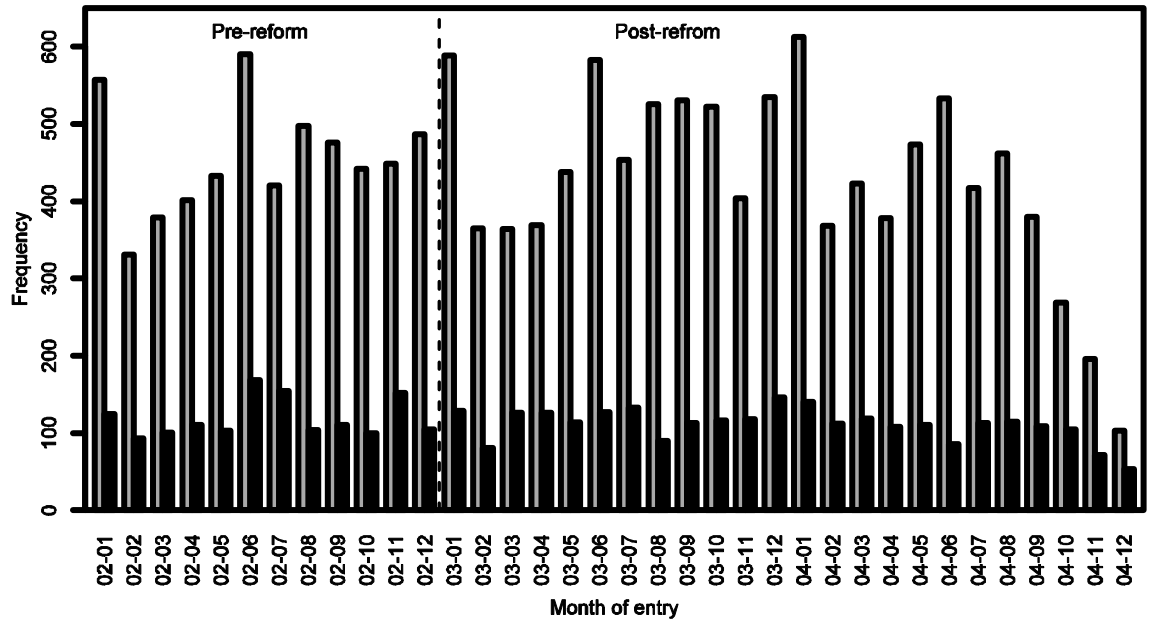

Figure 7 Number of new unemployment spells by month in the treatment (dark bars) and comparison (light bars) groups

A potentially more relevant question has to do with classification error in the eligibility data. Although our data is of high quality, there is substantial uncertainty about the eligibility status. The eligibility for increased unemployment benefits depends on work history, UI-fund membership and recent unemployment experience. In an ideal case we could observe all these factors and evaluate the effect of benefit increase by comparing the changes in exit hazards between the eligible and ineligible groups. Unfortunately none of these criteria can be precisely determined from the data.

The problem in identifying eligibility based on twenty-year work history criteria is caused by the fact that according to the Unemployment Security Act the twenty-year work history requirement may also contain spells of maternity leave, sickness absence, military service, and disability that are not recorded in the pension register[4]. There is also some uncertainty on the length of UI-fund membership. The length of UI-fund membership is recorded in the data only for the current UI-fund. Therefore, individuals who switched UI-fund during past five years may be falsely classified as not filling the membership criteria. Third, we have no

[4] When claiming increased benefits the unemployed who are close to fulfilling the twenty-year work history criteria must provide documentation on maternity leave spells, military service etc. to the UI-fund.

information on the recipiency of severance pay. The unemployed who have received severance pay during past five years before entry into unemployment may, therefore, be falsely classified into eligible group though they are not entitled to increased benefits. We mitigated this problem by excluding from the data all unemployed who have a previous unemployment episode during three years before entry into unemployment. In practice, this also limits the analysis to those displaced from a relatively stable career, which is also the main target group of the reform. Finally, some unemployed may not be aware that they might have a right to increased benefits. UI-funds provide advice for the applicants, but since many applications are received by mail without a personal contact, not all claimants receive this information.[5]

However, since both actual benefits and the variables needed to determine benefit eligibility are included in the data, the accuracy of predictions can be assessed by comparing the rule-based classification to the actual recipiency of increased benefits in the post-reform data.

Table 3 presents cross-tabulation of the data according to whether an unemployed should be eligible for increased benefits and whether s/he actually received increased benefits. Based on information on work history, length of UI-fund membership, and reason of entering unemployment we can correctly predict 87 percent of actual benefit recipiency, which still leaves a substantial classification error.

Table 3 Eligibility for increased benefits vs. actual recipiency

		Received increased UI - benefits	
		No	Yes
Eligible for increased UI – benefits	No	9452	841
	Yes	871	1793

Correcting the effects of misclassification in the treatment status

By defining treatment status according to eligibility criteria that are available in our data we can estimate the effect of "intention to treat". In an experimental setting this would be

[5] This explanation is based on personal communication with UI-fund managers in February 2005.

equivalent to including drop-outs to the treatment group and randomized out program participants to the control group. If classification errors are random the effect of program assignment is a downward biased estimate of program participation. The bias can be corrected by using treatment assignment as an instrument for the treatment status and estimating the model using two-stage least squares.

In our case the treatment status is only observed in the post-reform data. Therefore, standard two-stage least squares estimator cannot be used. However, we can use post-treatment data to estimate a first-stage equation that explains the recipiency of increased unemployment benefits with variables that are included in the eligibility criteria. We can then use these estimates to predict the treatment status in both pre-reform and the post-reform data. The method resembles two-sample IV estimate (Angrist and Krueger, 1992; Börklund and Jäntti, 1997) where two different samples are used to construct the moments required for consistent IV estimate. The final equation replaces the treatment indicator in equation 3 with the predicted treatment status and yields unbiased estimates of the benefit increase (assuming that classification errors are random).

Figure 8 reports the results from the two-sample IV procedure. Qualitatively the results are rather similar to those presented in Figure 6. The decline in the hazard rate is larger in the beginning if the unemployment spell indicating that classification error causes a downward bias in the previous estimates. Now also the hazard rate increases after the increased benefits expire in a way that would be consistent with entitlement effects. However, this difference is not statistically significant.

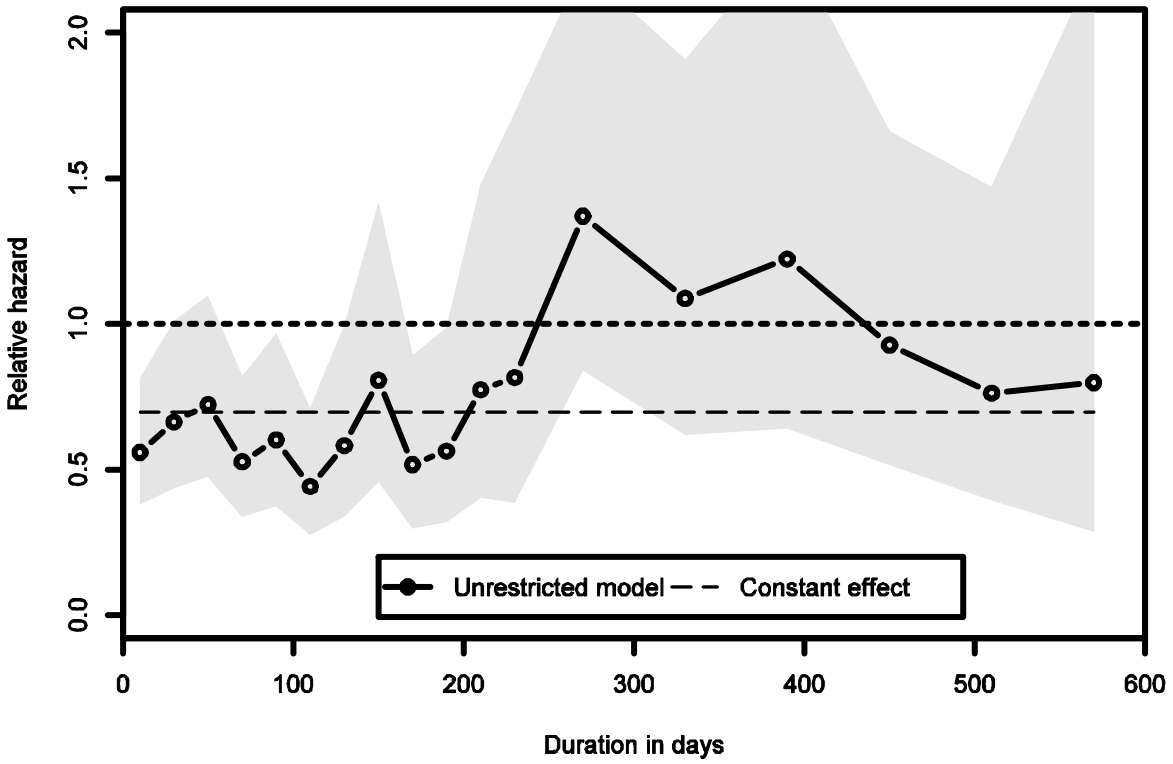

FIGURE 8 ”Two-sample IV estimates”

7 Conclusion

Concerns on the effect of job destruction on the most vulnerable groups increase the demand for social insurance provided by the unemployment benefits. While better benefits may cushion the effect of job loss in groups that have hardest to find new employment, such benefit increases also have a side effect of decreasing the incentives to search for new jobs. In this paper we have evaluated the effects of improving unemployment benefits for a group of older workers. According to our results the effects of benefit increase on re-employment rates may be substantial. Based on our estimates one can calculate that a fifteen percent increase in benefits for the first 150 days of unemployment increases the expected time until re-employment by about 50 days. This implies that the elasticity of time until re-employment with respect to benefit level would be above 1. However, since many unemployed exit from

data for other reasons before finding work, this number cannot be directly interpreted as an effect on unemployment duration.

We also find that an increase of UI-benefits decreases the re-employment hazard but the hazard rate returns to pre-reform level once the period on increased benefits expires. We find no evidence that the unemployed would anticipate the change in the benefit level by increasing their search effort before benefits are decreased. In contrast it seems that a decline in benefits increases re-employment rates only about one or two months after benefits have been reduced. Taken at face value this would imply that the unemployed are myopic and start searching more actively only after benefits have been reduced.

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Data Appendix

Abbreviations: UI Unemployment insurance, US Unemployment spell

Datasets

The data used in the analysis is combined from three databases. The main source of information is the register of Ministry of Labour which contains all unemployment spells and a rich set of individual covariates. However, this register does not contain information on unemployment benefits. The earnings related benefits are administered by Insurance Supervisory Authority. Further, information on work experience is obtained from Pension Security Institute. The supplementary datasets are linked to the US data by individual using individual identifier and payment dates.

Sampling

A representative inflow sample was drawn from the US database. The sample contains all individuals who start their unemployment spell between 1.1.2002 and 31.12.2004 and were born on an odd date before 1967. These individuals are followed until 31.12.2005. Unemployment spells with no match in the UI data are excluded from the analysis. We assume that most of these are ineligible for UI-benefits and receive only unemployment assistance.

Processing UI data

The unemployment insurance data is organised as yearly datasets from 2002 to 2005. The observation unit in the dataset is a payment report provided by unemployment insurance fund. The payment report lists the first and the last calendar date compensated for each payment period (typically two or four weeks) the amount of daily allowance during this period. The most important variable in the data is a counter that gives a number of benefits days used recorded in the end of each quarter.

Those over 55 years old may receive benefits until retirement but others receive it only for 500 working days. If employment condition is met between unemployment spells, the counter is reset to zero.

The counter information is updated only quarterly. Therefore no essential information is lost in merging subsequent payment reports for every individual within a quarter. Before merging, inconsistent rows are removed (duplicated rows and rows with payment period within another

payment period). More recent reports are preferred to older reports and a high daily allowance is preferred to low if information is ambiguous.

However, the rows that contain corections to an earlier report are removed as there are relatively few of them and it is unclear how the information should be processed. The merged rows contain information on the start and end date of report period, the counter value of that quarter and maximum daily allowance and maximum increased allowance that is paid during the period.

Processing US data

The observation unit in the unemployment spell data is a spell. The data consists of 104 941 individuals between 37 and 66 years of age. They experience 474 144 unemployment spells from the beginning of 2002 to the end of 2004. The follow-up continues until the end of 2005. Each spell is linked with a number of background characteristics of individuals. To obtain a more consistent picture of the length of unemployment, spells with short interruptions are merged. If the break in unemployment is less than five working days, the spells are merged. This reduces the number of spells to 267 385.

Linking datasets

Both UI and US dataset contain information in spell format. The US dataset provides unambiguous information on the dates of unemployment for each individual but the UI dataset may contain conflicting rows due to database correction after initial reports. In order to get the most reliable estimate for the number of days on daily allowance at the beginning each unemployment spell, reports that consider early part of the spell are preferred. When datasets are matched, it is checked that the unemployment spell intersects with a report period and that the same report period does not intersect with a subsequent spell.

Other variables which are matched at the same time with the number of days on daily allowance are the amount of daily benefit, the amount of increased benefits, the previous monthly wage and the date of joining in unemployment fund. In case of conflict, the highest benefit and wage information is used. Lastly, the information on work experience is linked to US data. Because the information is available only for the end of 2001 and 2002, the time out of unemployment between the date of information and the beginning of unemployment is computed. This sum should provide the length of work experience at the time of unemployment fairly accurately.

Further procedures

The linked dataset contains information on the dates of unemployment and how many days daily allowance is paid at some point of the unemployment spell. Firstly, this provides information if individuals are eligible for daily allowance. Secondly, this allows to compute the date when the allowance is exhausted. For some individuals with repeated short spells, it is possible that no unique match was found for each unemployment spell from the UI data. For those spells with missing information that are within 10 months from the subsequent spell, the information is inferred using the subsequent spell. After this operation, the spells with no daily allowance information are removed. This leaves 216 844 rows in the dataset.

There remains a major drawback in the structure of the data considering modeling the duration of benefits. 500 days eligibility for daily allowance may be exhausted during a number of short unemployment spells. Typically, this is either because of short employment spells between unemployment or participation in active labour market programmes. In order to obtain single observation for each individual, the subsequent spells that are related to same daily allowance are merged.

The possibility of renewing eligibility by full filling the employment criteria is taken into account by merging only rows were the day counter increases (within 10 day error marginal). After this operation, the number of rows is 151 984 which now equals to the number of individuals.

The analysis sample is further restricted by using the following criteria. Many individuals experience multiple spells or have experienced unemployment before the follow-up period. These individuals are not likely to be eligible for the increased benefit because the rules exclude those who have received severance pay earlier. This reduces the sample dramatically to 34 073 individuals of whom 48 % belong to ITT group. A large proportion of the sample consists of elderly people who are eligible for daily allowance without a time limit. After including only individuals between 37 and 54 years of age, the sample size is 19 862 of whom 30 % belong to ITT group.

Appendix 2. Coefficient estimates from an unrestricted model

		Coefficient	Std. Error
Intercept		-5.245	0.090
Age	(ref 37-40)		
	41-46	-0.150	0.026
	47-54	-0.376	0.034
Sex	Female	-0.047	0.024
Education	(ref: primary)		
	secondary 1	-0.053	0.040
	secondary 2	0.128	0.032
	tertiary 1	0.133	0.040
	tertiary 2	0.259	0.044
Occupartion	(ref: agriculture)		
	specialist	-0.129	0.064
	health care	0.358	0.065
	administration	-0.249	0.063
	commercial	-0.176	0.064
	transport	0.082	0.073
	construction	0.602	0.066
	industrial	-0.191	0.060
	service	0.015	0.066
Log wage	(ref: <1.37)		
	(1.37,1.63]	0.062	0.032
	(1.63,1.91]	0.092	0.033
	(1.91,2.36]	0.148	0.034
	>2.36	0.203	0.037
Region	(ref: uusimaa)		
	Vars.Suomi	0.197	0.036
	Satakunta	-0.005	0.038
	Häme	0.014	0.045
	Pirkanmaa	0.152	0.060
	Kaak.Suomi	0.249	0.052
	E.Savo	-0.037	0.047
	P.Savo	0.112	0.050
	P.Karjala	-0.071	0.057
	K.Suomi	0.130	0.075
	E.Pohjanmaa	0.049	0.039
	Pohjanmaa	0.108	0.051
	P.Pohjanmaa	0.045	0.050
	Kainuu	0.045	0.040
	Lappi	0.306	0.056
Disability		-0.574	0.050
Experience	(ref <15)		
	(15,20]	0.115	0.028
	(20,25]	0.166	0.035
	>25	0.126	0.041
Reason for entry	(ref. Unknown)		
	displaced	-0.531	0.039
	other	-0.824	0.043
	temporary	-0.221	0.040

Month of entry (ref: January)			
	February	0.017	0.046
	March	-0.007	0.045
	April	-0.042	0.046
	May	-0.010	0.044
	June	0.114	0.041
	July	0.038	0.044
	August	-0.004	0.043
	September	0.024	0.044
	October	0.080	0.044
	November	0.074	0.046
	December	0.265	0.045
Year	(ref 2002)		
	2003	0.128	0.025
	2004	0.236	0.024
Duration dependence (weeks)			
	4-8	-0.048	0.043
	9-12	-0.231	0.046
	13-16	-0.349	0.049
	17-20	-0.303	0.050
	21-24	-0.335	0.052
	25-28	-0.517	0.057
	29-32	-0.374	0.056
	33-36	-0.592	0.062
	37-40	-0.557	0.064
	41-44	-0.569	0.066
	45-48	-0.602	0.069
	49-60	-0.710	0.051
	61-72	-0.758	0.056
	73-84	-0.859	0.065
	85-96	-0.564	0.065
	97-108	-0.514	0.074
	109-120	-0.387	0.089
Treatment group		0.146	0.116
Treatment * duration dependece			
	4-8	-0.139	0.165
	9-12	0.096	0.165
	13-16	0.057	0.176
	17-20	-0.030	0.181
	21-24	0.114	0.181
	25-28	0.147	0.195
	29-32	-0.167	0.210
	33-36	0.283	0.201
	37-40	0.243	0.206
	41-44	0.179	0.217
	45-48	-0.186	0.257
	49-60	-0.357	0.196
	61-72	-0.292	0.208
	73-84	-0.122	0.219
	85-96	-0.098	0.212
	97-108	0.218	0.217
	109-120	-0.239	0.293

Treatment effects

0-4	-0.302	0.137
5-8	-0.380	0.152
9-12	-0.302	0.149
13-16	-0.423	0.170
17-20	-0.320	0.175
21-24	-0.486	0.179
25-28	-0.371	0.196
29-32	-0.290	0.217
33-36	-0.425	0.206
37-40	-0.392	0.213
41-44	-0.590	0.240
45-48	-0.299	0.284
49-60	0.120	0.188
61-72	-0.035	0.215
73-84	-0.017	0.237
85-96	0.082	0.229
97-108	-0.154	0.254
109-120	-0.203	0.388

Log likelihood -73529.9
n (intervals) = 163324