Unemployment benefits in the period of crisis: the effect on unemployment duration

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Abstract

The current study shows that disincentive effects of unemployment benefits exist even during a period of deep recession. The study uses recent data for unemployment benefit recipients in Estonia – the country where the rise in unemployment during the global financial crisis was the highest in the whole European Union. Both higher benefit level and maximum duration of benefits decrease exit to leave unemployment to employment. Yet, compared to pre-crisis period, the effects of unemployment benefits are slightly milder. In addition, unemployed people directed to active measures tend to have lower hazard to leave unemployment just before the period of an active measure and during the period of receiving an active measure.

JEL Classification: J64, J65, C41

Keywords: unemployment benefits; disincentive effects; economic crisis; Estonia.

Introduction

The search model (Mortensen, 1977) predicts a strong disincentive effect of unemployment benefits on exiting unemployment into employment and this effect is also often proved in empirical studies (e.g. Meyer, 1990; Katz and Meyer, 1990). It is empirically tested that an increase in the amount or in the maximum duration of unemployment benefits reduces the probability to leave unemployment into employment and that the probability to leave unemployment rises during the benefit period (several studies on UK, US and German data; only few studies on Eastern European data).

Yet, it is questionable whether the disincentive effect still remains in the period of economic recession as the research in this respect is rather limited. Many studies that estimate empirically the disincentive effect do include some covariates about economic situation in the model (usually unemployment rate and/or vacancies). For example a study by Bover, Arellano and Bentolila (2002) is assessing an impact of business cycle and effects of benefits on unemployment duration on Spanish data. They find that a better economic situation increases the hazard of leaving unemployment, but this effect is significantly smaller than that of benefit receipt. However, in the studies regarding benefit effects it is not explored whether the disincentive effect could itself be different during different economic situation and whether it still exists in case of very high unemployment in the economy.

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The current study explores disincentive effect in times of skyrocketing unemployment and takes advantage of Estonian data as the rise in unemployment there during the last crisis was the highest in the whole European Union. In Estonia, the number of unemployed people grew more than five times during less than two years while the growth was less than two times in most countries of European Union. It is shown that the receipt of unemployment benefits has a significant effect on labour market behaviour even when unemployment is extremely high. The results are compared with the study conducted on Estonian data before the crisis (Lauringson 2010) to draw conclusions about the size of disincentive effect during different economic situations.

In addition, the current study also covers participation in active measures during the unemployment spell. Recent literature suggests that active labour market programmes might work as a stick rather than a carrot (see for example Black et. al. 2003). A threat to participate in an active measure might have an *ex ante* effect and make people to leave unemployment. For that reason, when estimating the piecewise-constant proportional hazard model, also covariates before, during and after active measures are included in the model. As in Estonia the active measures are applied more on people who themselves want to participate rather than forcing unemployed to participate, the results show that unemployed people tend to wait for the measures and the probability to leave unemployment into employment is lower just before the start of a measure.

The paper proceeds as follows: the first section gives a background overview of the Estonian unemployment benefit system and the data used in this study. The second section compares the results gained from using crisis and pre-crisis data. Third section has a closer look at benefit length during the crisis period and forth section deals in more detail with the size of the benefit. The final section concludes the results.

Background overview

The current paper focuses on the Estonian data on unemployment benefit recipients as during the last global economic downturn Estonia witnessed the highest rise in unemployment in the whole European Union. Although by the beginning of the global financial crises Estonian economy had already started to shrink, the unemployment rate was still low (see Figure 1). In the second quarter of 2008, the unemployment rate in Estonia was 4%, being one of the lowest in the European Union. During the crises, Estonia witnessed fast growth in unemployment rate and by the first quarter of 2010 it had reached the level of 20%, being one of the highest in the European Union.

The study looks at unemployment benefits granted in Estonia from July 2008 until March 2009 i.e. the beginning of the study period is when unemployment started to rise sharply. The data for unemployment benefits and the characteristics of recipients from the Estonian Unemployment Insurance Fund are combined with wage data from the Estonian Tax and Customs Board up to March 2010 i.e. when unemployment achieved its peak. As it is possible to use tax data, it is quite a unique data set that makes it possible to determine unemployment spells up to the point when the person really gets a job and starts earning a wage (rather than looking only at benefit periods or registered unemployment periods). The results for the period of crisis are compared with the results for pre-crisis period i.e. for benefits granted in 2007 using a previous study by Lauringson (2010).

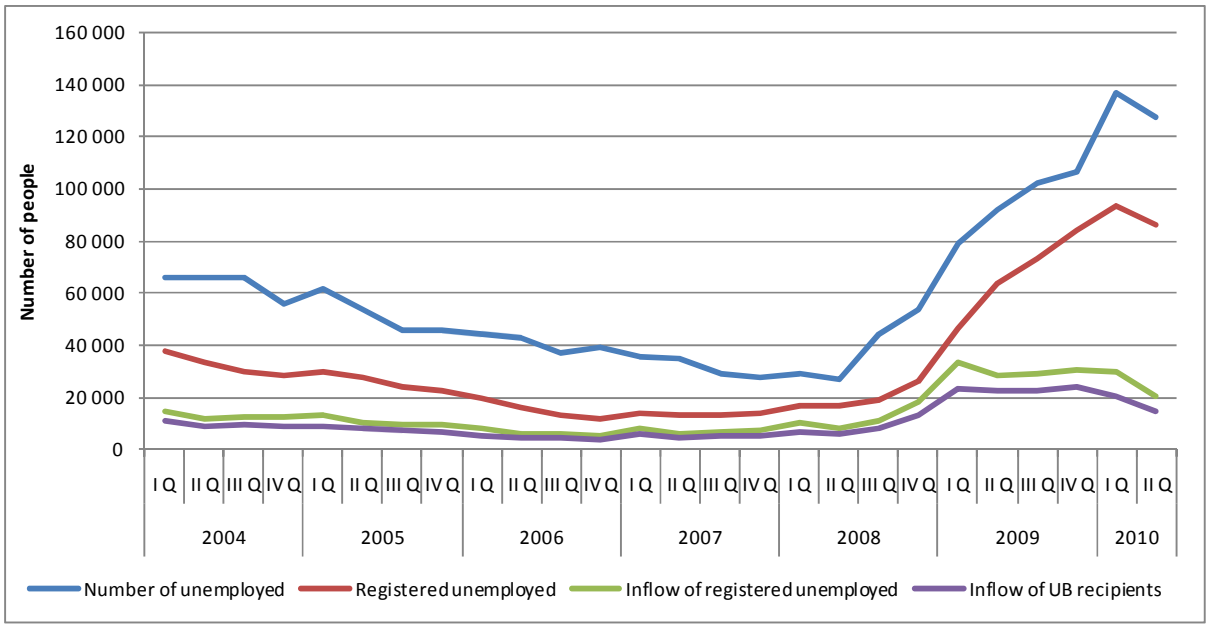

Figure 1. Number of unemployed in Estonia for 2004 – 2010 Q II
UB – unemployment benefits (unemployment insurance benefit and unemployment allowance)
Sources: Statistics Estonia, Estonian Unemployment Insurance Fund

The study looks at both possible unemployment benefits in Estonia – unemployment insurance benefit (UIB) and unemployment allowance (UA). Unemployment allowance is a flat and quite low rate[2] benefit that can be entitled to when a person has been in employment or certain similar activity for at least 180 days during the previous 12 months. Unemployment allowance is usually up to 270 days and extensions apply when a person has up to 180 days until the retirement age. Usual waiting period for UA is 7 days, yet if the person was before applying to benefit engaged with full-time studies or his or her employment contract was ended upon his or her breach of duties, a waiting period of 60 days applied during the period under study. In case of employees' breach of duties the maximum UA period was 210 days.

In order to be entitled to receive the unemployment insurance benefit, a person has to have made unemployment insurance contributions for at least 12 months during the previous 36 months. In addition, contrary to UA only involuntary unemployment is covered (employer has initiated the termination of the working contract). If a person has made contributions for 12 months, the maximum UIB period is 180 days. If a person is still registered as unemployed after this period, he or she can still apply for UA for the next 90 days (plus the extension until retirement). In order to be entitled to receive UIB for 270 days, a person has to have made contributions for 56 months. The waiting period for UIB is always 7 days.

UIB is usually 4-5 times higher than UA as it is 50% of the previous average wage during the first 100 days and 40% thereafter. When calculating a person's average wage for UIB, the maximum limit is three times the national average wage. The minimum UIB equalled during the period under study the UA rate. The minimum and maximum limits apply to rather small proportion of UIB recipients.

In order to make UIB and UA recipients more comparable, only these UA recipients are considered who were entitled to UA because of previous working record and not because of

[2] During the period under study, UA rate was 1000 EEK (about 64 EUR) a month.

alternative activities (studying, childcare etc). The characteristics of the benefit recipients under study are presented in Table 1.

Table 1. Description of unemployment benefit recipients by type of benefit

	UIB 180	UIB 270	UA
Number of observations	9971	12981	18022
UB daily rate on 1-100 days, EEK	163.2	198.3	32.9
UB daily rate on 101-180 days, EEK	130.5	158.6	32.9
UB daily rate on 180+ days, EEK	32.9	158.6	32.9
UA after UIB	51.9%	0.2%	x
Average previous daily wage	331.3	413.1	x
Average tenure of the previous job, years	1.6	6.2	2.3
Males	55%	56%	50%
Age in the beginning of UB period	36	44	35
Main language Estonian	54%	59%	51%
Knowledge of English	28%	19%	23%
Basic education or less	21%	13%	26%
Higher education	13%	17%	9%
Living in a town	69%	68%	69%
Disabled	7%	9%	2%
Exposed to training	19%	25%	19%
Exposed to any active measure	32%	36%	38%
Previous occupation			
Managers	8%	11%	6%
Professionals	6%	10%	3%
Technicians and associate professionals	5%	6%	4%
Clerical support workers	6%	6%	5%
Service and sales workers	14%	9%	21%
Skilled agricultural, forestry and fishery workers	1%	1%	1%
Craft and related trades workers	31%	27%	26%
Plant and machine operators, and assemblers	10%	14%	10%
Elementary occupations	19%	15%	23%

The major difference between 180-day-UIB and 270-day-UIB recipients lies in the average previous tenure as this highly correlated with insurance contributions that determine the length of UIB. In addition, 270-day-UIB recipients have earned previously higher wage, are more educated, older, have worked previously on jobs with a bit higher ranking and receive higher benefits. UA recipients are on average with even lower education than 180-day-UIB recipients and have worked on jobs with yet lower ranking. Compared to pre-crisis characteristics of UIB recipients (Lauringson 2010) the overall picture is similar (yet the characteristics reflect the fact that crisis hit more the real estate and construction market – there are slightly more unemployed during the crisis who used to work as craft and related trades workers and less who were employed as professionals, technicians and associate professionals; also the share of men is higher during the crisis period).

Crisis versus pre-crisis period

The crisis and pre-crisis period are compared using data for UIB recipients. First, the duration of unemployment is analysed using nonparametric methods. Figure 2 presents Kaplan-Meier

survival estimates. Before the crisis the survival function of 270-day-UIB recipients was constantly higher than the one of 180-day-UIB recipients. As the distance between the survival functions was the highest around the 270th day of unemployment spell, it was evident that the length of UIB affected the labour market behaviour. During the crisis, the survival functions are more similar and mostly the survival function of 270-day-UIB recipients is lower than the survival function of 180-day-UIB recipients. However, the only period when 270-day-UIB recipients survival function is higher than the one of 180-day-UIB recipients, is around the 270th day letting to conclude that the disincentive effect is still there during the crisis.

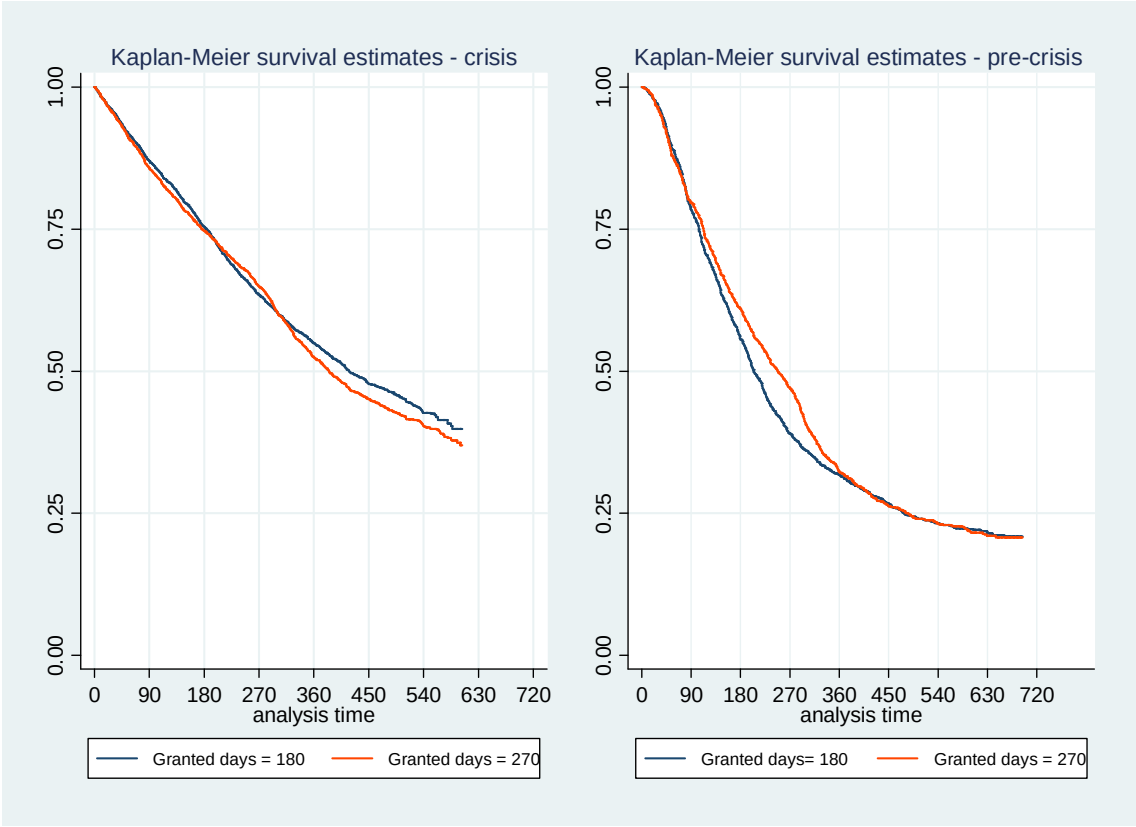

Figure 2. Kaplan-Meier survival estimates, crisis and pre-crisis period

The estimation of hazard rates during the crisis period (see Figure 3) reveals that unemployed eligible for 270-day-UIB experience a very sharp rise in the hazard rate to leave unemployment for employment around the end of benefit period and a fall in the hazard rate afterwards. 180-day-UIB recipients experience also a spike around the exhaustion of unemployment insurance benefit, though the spike is smaller. A smaller spike for 180-day-UIB recipients is also visible around the 270th day, when also their UA lapse. Both of these groups have also a change in the hazard rates around the 100th day, when the replacement rate of unemployment insurance benefits falls[3]. Compared to hazard functions during the pre-crisis period, the shape of the hazard functions has stayed similar, but at a much lower level. While the hump around the end of benefit has stayed very evident during the crisis for 270-day-UIB recipients, the hazard function of 180-day-UIB recipients has somewhat flattened.

[3] Less smooth hazard estimates are presented in Appendix 1. These less smooth hazard functions show that the rise in the end of benefit period is even sharper and coincides more with the end of maximum benefit period.

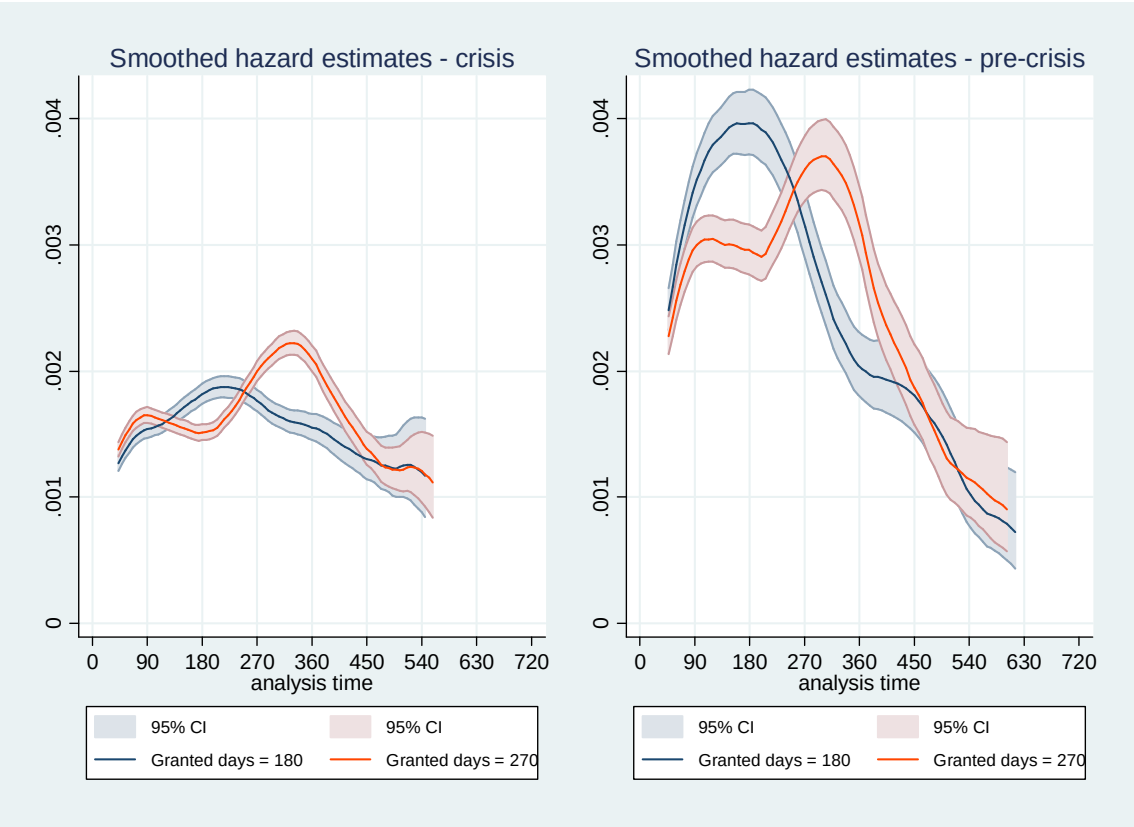

Figure 3. Smoothed hazard rates for exiting into employment with 95% confidence intervals, crisis and pre-crisis period

Besides nonparametric method, a piecewise-constant proportional hazard model is applied to estimate the impact of unemployment benefits as well as other covariates:

$$\lambda(t; \vartheta, x_m, \rho) = \vartheta \exp(x_m, \beta)\, \lambda_m,$$
$$a_{m-1} \leq t < a_m,$$

where $\lambda(\cdot)$ is the hazard function, t is the duration of unemployment, ϑ is unobserved heterogeneity, x is the vector of covariates, ρ is a vector of unknown parameters in the hazard function, vector λ_m is the baseline hazard to be estimated and β is a vector of the parameters to be estimated.

m denotes interval $(m = 1,\ldots,M)$ as time has been divided into intervals $[0, a_1)$, $[a_1, a_2) \ldots [a_{M-1}, a_M)$, $[a_M, \infty)$, where a_m are known constants and in the last interval all the observations are censored[4] at a_M (none of the durations is longer than a_M). In the piecewise-constant proportional hazard model, the hazard rate to exit unemployment can be different at every interval, yet it is assumed to be constant during each interval. Also, the time-varying covariates can be different in each interval, but constant during an interval.

Unobservable heterogeneity (frailty) is introduced in the model as an unobservable multiplicative effect to obtain a more general model. In essence, unobserved heterogeneity ϑ is a random positive quantity. For the purposes of model identifiability, ϑ is often assumed to have a mean of 1 and a variance of θ. In the current study, the individual specific unobserved heterogeneity is added to the model following a gamma distribution (mean 1 and variance θ).

[4] As usual in unemployment duration analysis, the data are subject to right censoring – it is known when an unemployment spell started, but it might still be continuing at the point of data collection.

The hazard function with unobservable heterogeneity reduces to a hazard function without unobservable heterogeneity when θ approaches 0.

Vector *x* is included in the model because the duration of unemployment and the hazard rate are usually expected to depend on a set of covariates. In the current paper, vector *x* includes covariates for unemployment benefit (in general the size of benefit as time-varying covariate); UIB recipients characteristics as in the beginning of unemployment spell (gender, age, education, tenure on the last job, being a native speaker of Estonian, being disabled, living in a town or countryside, previous profession, knowledge of English, previous job in Estonian public sector/ Estonian private sector/ abroad, reason of termination of the employment contract); exposure to active measures as time-varying covariates (before, during and after); and time-varying covariates for labour market situation (monthly regional registered unemployment rate, monthly change in registered unemployment rate and monthly inflow of registered vacancies).

First, 180-day-UIB and 270-day-UIB recipients are modelled separately. The parameter estimates for covariates of unemployment benefits are presented in Table 2. Compared to pre-crisis period, the benefit disincentive effects appear to be slightly smaller, more homogeneous among different benefit levels and in some cases also less significant. During the crisis period, the unemployment insurance benefits cause people to leave unemployment for employment two times less than they would leave unemployment when not receiving benefits. Yet, these coefficients turn out to be insignificant for 270-day-UIB recipients.

Table 2. Estimation results for benefit covariates in piecewise-constant proportional hazard models

Covariate	Compared to	Hazard ratio: pre-crisis		Hazard ratio: crisis	
		180	270	180	270
0 EEK < UB rate <100 EEK	UB = 0 EEK	0.388***	0.235**	0.392***	0.263
100 EEK <= UB rate <200 EEK		0.449***	0.239**	0.451***	0.337
200 EEK <= UB rate <300 EEK		0.366***	0.210**	0.414***	0.332
300 EEK <= UB rate <400 EEK		0.245***	0.199**	0.467***	0.354
400 EEK <= UB rate				0.418***	0.325

* p < 0.1; **p < 0.05; *** p < 0.01

The estimations of the baseline hazard rates are illustrated in Figure 4. It is visible that during the recession the baseline hazard to leave unemployment into employment is much lower, but the benefit effects are still there. The baseline hazard rates gradually rise during the benefit period and are highest in the end of maximum benefit period. The baseline hazard to leave unemployment is at its peak for 180-day-UIB recipients on the 180th day of unemployment spell, though the baseline hazard remains relatively higher also for the next 90 days when these people are still eligible for UA. 270-day-UIB recipients' baseline hazard is highest on the 270th day of unemployment spell.

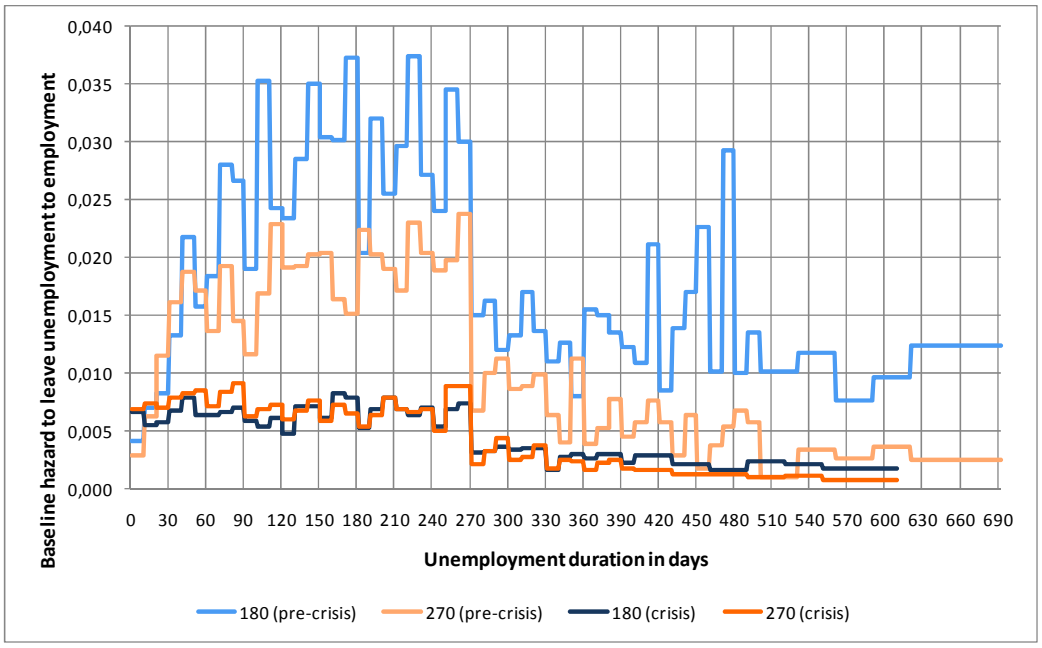

Figure 4. Estimation results for covariates of time intervals in piecewise-constant proportional hazard models

Impact of the period

As because of the crisis the number of unemployment benefit recipients grew sharply, the sample for crisis period is also quite large and enables to look at benefit effects in more detail. First, the 180-UIB-recipients and 270-day-UIB recipients are studied in depth. The main difference between 180-day-UIB and 270-day-UIB recipients lies in previous employment tenure as this is also the reason, why they get unemployment insurance benefit in different maximum length. In order to model these two groups in the same model for revealing differences in the effect of maximum benefit duration, only people with the record of unemployment insurance contributions of 54-58 months are considered. As 56 months of unemployment insurance contributions is the limit when people start to be eligible for the longer benefit there could be a threat that some people are able to convince their employer to extend the working contract to be entitled to the longer benefit. Figure 5 shows that the number of UIB recipients with insurance record of 56 months is not higher than the number of people having a few months less of unemployment insurance record (the full figure is presented in Appendix 2). It can be concluded that it is not likely that people can manipulate with their unemployment insurance record in Estonia.

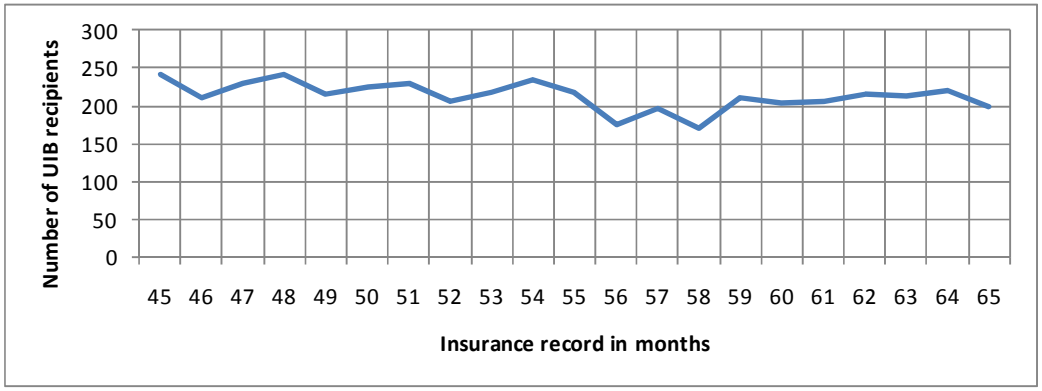

Figure 5. Number of UIB recipients by their previous unemployment insurance contributions

The descriptive statistics of UIB recipients with unemployment insurance records from 54 to 58 months are presented in Table 3. The table shows that after constraining the unemployment insurance record the two groups under study are now more similar not only by previous average tenure, but also by other characteristics. The biggest difference between these two groups is now the fact that 270-day-UIB recipients continue to receive relatively high UIB during the period 181-270 days of unemployment spell while the 180-day-UIB recipients are only eligible to very low UA (or not even that).

Table 3. Description of UIB recipients with unemployment insurance records 54-58 months

	UIB 180 (insurance record 54-55)	UIB 270 (insurance record 56-58)	H0: difference = 0 H1: difference <> 0
Number of observations	452	541	
UB daily rate on 1-100 days, EEK	175.6	185.5	0.1266
UB daily rate on 101-180 days, EEK	140.5	148.4	0.1278
UB daily rate on 180+ days, EEK	32.9	148.4	0.0000
UA after UIB	49%	0%	0.0000
Average previous daily wage	360.5	377.7	0.2496
Average tenure of the previous job, years	2.3	2.4	0.5796
Males	58%	57%	0.6568
Age in the beginning of UB period	39	39	0.9941
Main language Estonian	56%	60%	0.2317
Knowledge of English	21%	21%	0.9945
Basic education or less	17%	15%	0.4703
Higher education	16%	14%	0.2751
Living in a town	68%	68%	0.9630
Disabled	9%	9%	0.7529
Exposed to training	17%	23%	0.0383
Exposed to any active measure	28%	33%	0.0487
Previous occupation			
Managers	6%	7%	0.4369
Professionals	5%	5%	0.6182
Technicians and associate professionals	10%	11%	0.5471
Clerical support workers	5%	5%	0.9718
Service and sales workers	12%	10%	0.2728
Skilled agricultural, forestry and fishery workers	1%	0%	0.2359
Craft and related trades workers	31%	31%	0.9285
Plant and machine operators, and assemblers	11%	11%	0.7068
Elementary occupations	19%	20%	0.5842

The survival and hazard estimates for the constrained sample are illustrated in Figure 6. Even though the characteristics of the two groups are relatively similar, the labour market behaviour is quite different. The survival function for 270-day-UIB recipients is continuously higher than the survival function of 180-day-UIB recipients. The pictured hazard functions show again a spike at benefit exhaustion and a drop after the benefit period. Compared to the hazard function for the whole group of 180-day-UIB recipients (Figure 3), the hazard for the unemployed with insurance record of 54-55 months (i.e. maximum for this group) exhibit a higher hazard function (probability to leave unemployment into employment is higher).

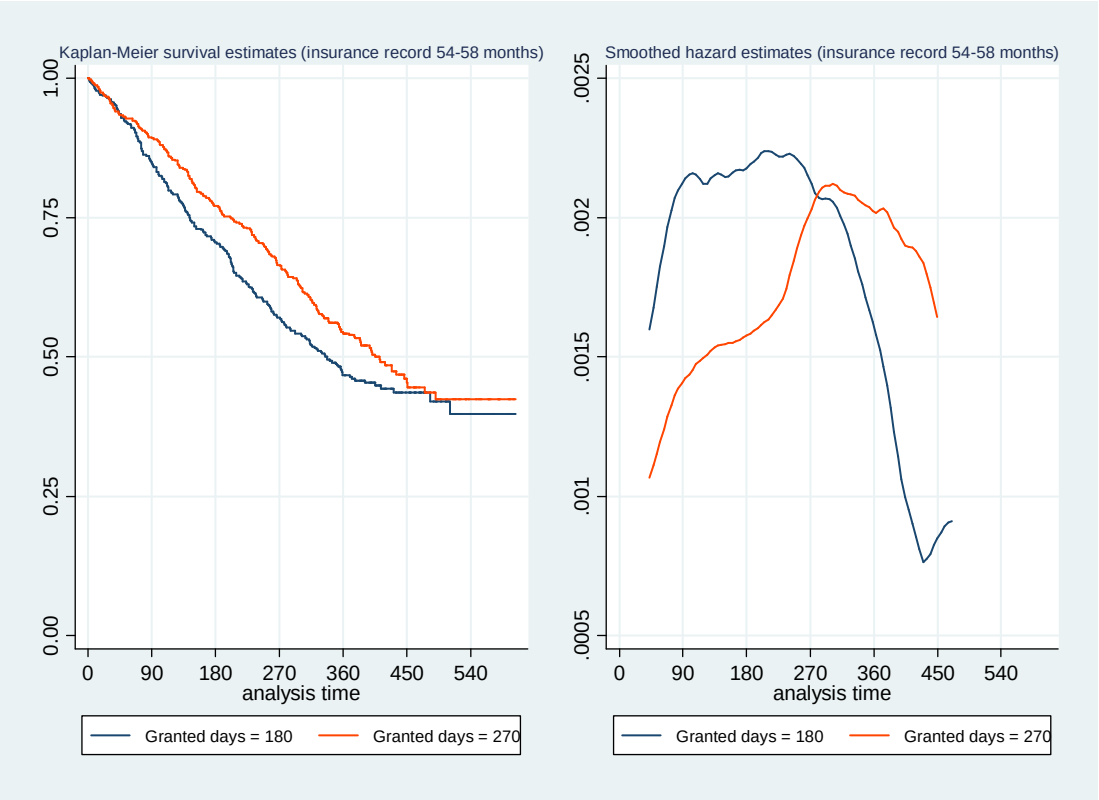

Figure 5. Kaplan-Meier survival estimates and smoothed hazard estimates of UIB recipients with unemployment insurance records 54-58 months

Next, the hazard function of these two groups is estimated in joint model using piecewise-constant proportional hazard model framework. At first, the model includes a covariate for UB (any amount of UB), a covariate showing that the UIB period is 270 days and the rest of the covariates that are not related to benefits. The hazard ratio estimate for UIB turns out to be 0.497 and highly significant meaning that on average people leave unemployment for employment about two times less likely when they get any amount of unemployment benefit. The hazard ratio estimate for covariate showing longer UIB period turned out to be 0.838 (significant at 0.1 level). This estimation reveals that in this group, people with longer unemployment insurance benefit experience indeed lower hazard to exit unemployment to employment than people eligible for shorter benefit. Similar results are produced also by a model where benefit level is included in more detail (see Table 4). Here, the hazard ratio estimation for 270-day-UIB recipients is 0.819 and even more significant.

Table 4. Estimation results for benefit covariates in piecewise-constant proportional hazard model of UIB recipients with unemployment insurance records 54-58 months

Covariate	Compared to	Hazard ratio
0 EEK < UB rate <100 EEK	UB = 0 EEK	0.469***
100 EEK <= UB rate <200 EEK		0.557**
200 EEK <= UB rate <300 EEK		0.565**
300 EEK <= UB rate <400 EEK		0.609
400 EEK <= UB rate		0.366**
UIB 270		0.819**

* p < 0.1; **p < 0.05; *** p < 0.01

Next, the estimations are carried through specifically for the time interval 181 to 270 days of unemployment spell as this is the period when benefit level is most different between the two groups under study (Table 5). The estimations show similar results for the period 181-270 days when only unemployed with insurance record 54-58 months are considered (270-day-UIB recipients exit unemployment less likely). The less constrained is the sample, the less is 270-day-UIB recipients' probability to leave unemployment hampered by unemployment benefits (in wider sample 180-day-UIB recipients' disincentive effect is bigger than the one of 270-day-UIB recipients).

Table 5. Estimation results for benefit covariates in piecewise-constant proportional hazard model of UIB recipients during 181 to 270 days of unemployment spell

180 < t <= 270 (insurance record 54-58 months)		
Covariate	Compared to	Hazard ratio
UIB 180 = 32.9	UB = 0 EEK	0.076***
UIB 270 > 0	(UIB 180)	0.074***
180 < t <= 270 (insurance record 50-62 months)		
Covariate	Compared to	Hazard ratio
UIB 180 = 32.9	UB = 0 EEK	0.141***
UIB 270 > 0	(UIB 180)	0.172***
180 < t <= 270 (insurance record 12+ months)		
Covariate	Compared to	Hazard ratio
UIB 180 = 32.9	UB = 0 EEK	0.239***
UIB 270 > 0	(UIB 180)	0.359***

* p < 0.1; **p < 0.05; *** p < 0.01

The size of benefit

In order to shed some more light on the effect of the size of benefit, 270-day-UIB and 270-day-UA recipients are compared. In order to make the groups comparable, only these UA recipients are considered whose last activity was employment (not any other similar activity) and who left employment formally because of mutual agreement or on an initiative of the employee. In both groups only these people are considered whose tenure on the last job was four to six years. These constraints should assure that the only major difference between these groups lies in the formal reason of termination of employment contract i.e. involuntary versus voluntary[5] unemployment and that is also the reason why some are eligible for unemployment insurance benefit and others only for unemployment allowance. The descriptive statistics for these two groups is presented in Table 6. The differences between UA and UIB recipients in the constrained sample are smaller than in unconstrained sample (Table 1) yet remain in some extent.

[5] There is a reason to believe that at least some part of the voluntary unemployment is only formally voluntary. During the period under study, employers in Estonia had to pay relatively high severance payment upon termination of employment contract on the initiative of the employer.

Table 6. Description of unemployment benefit recipients with tenure on the previous job 4 to 6 years

	UA 270 (tenure 4-6 years, voluntary unempl.)	UIB 270 (tenure 4-6 years)	H0: difference = 0 H1: difference <> 0
Number of observations	619	1354	
UB daily rate on 1-100 days, EEK	32.9	192.6	0.0000
UB daily rate on 100+ days, EEK	32.9	154.1	0.0000
Average tenure of the previous job, years	4.9	5.0	0.0021
Males	44%	55%	0.0000
Age in the beginning of UB period	40	44	0.0000
Main language Estonian	53%	61%	0.0004
Knowledge of English	17%	19%	0.4554
Basic education or less	17%	13%	0.0152
Higher education	11%	16%	0.0045
Living in a town	70%	65%	0.0538
Disabled	2%	8%	0.0000
Exposed to training	19%	24%	0.0078
Exposed to any active measure	31%	35%	0.0492
Previous occupation			
Managers	5%	10%	0.0001
Professionals	5%	7%	0.1009
Technicians and associate professionals	7%	10%	0.0069
Clerical support workers	4%	6%	0.1422
Service and sales workers	23%	10%	0.0000
Skilled agricultural, forestry and fishery workers	1%	1%	0.2494
Craft and related trades workers	24%	28%	0.0829
Plant and machine operators, and assemblers	12%	14%	0.3374
Elementary occupations	20%	15%	0.0001

The survival and hazard estimates for the constrained sample are illustrated in Figure 6. The survival estimates are higher for UIB recipients up to 270 days (i.e. end of benefit period) and lower after that point. This gives support to the assumption that higher benefits hamper exits from unemployment more than lower benefits. The picture of smoothed hazard functions shows that both groups are affected by the entitlement of benefit as both groups have spikes in hazard functions in the end of potential benefit period. Yet, the spike is much higher for UIB recipients confirming that this group is more influenced by the benefit disincentive effect.

Figure 6. Kaplan-Meier survival estimates and smoothed hazard estimates of unemployment benefit recipients with tenure on the previous job 4 to 6 years

Subsequently, the hazard function of these two groups is estimated in joint model using piecewise-constant proportional hazard model framework. The model includes a covariate for UIB recipients (UA recipients remaining the control group) and the rest of the covariates that are not related to benefits (see Table 7). The model is estimated separately for the whole period, for the benefit period and the period after benefit receipt. The estimations show that the exit rate from unemployment to employment is constantly higher for UIB recipients. Yet, the difference in the hazard rates is much smaller during the benefit period and greater thereafter. During the benefit period, UIB recipients leave unemployment 1.3 times more likely than UA recipients, but after the benefit period already twice as likely. This result gives reason to believe that during the benefit period, the exit rate to employment of UIB recipients is more hindered because of their higher unemployment benefit.

Table 7. Estimation results for benefit covariates in piecewise-constant proportional hazard model of benefit recipients with tenure on the previous job 4 to 6 years

Covariate	Compared to	Hazard ratio
1 <= t (tenure 4-6 years)		
UIB 270	UA 270	1.440***
1 <= t <= 270 (tenure 4-6 years)		
UIB 270	UA 270	1.257***
270 <= t (tenure 4-6 years)		
UIB 270	UA 270	1.980***

Other factors of unemployment duration

All the estimated piecewise-constant proportional hazard models described in previous sections also include other covariates besides covariates for unemployment benefit receipt.

The coefficients for other variables in different models turn out to be similar and also these results are quite similar to the study conducted on pre-crisis data (Lauringson 2010). The estimations for hazard ratios are presented in detail in Appendix 3 for models where all three types of unemployment benefits are modelled in separate models.

The hazard rate for men to exit unemployment into employment turns out to be lower than for women. Young people exit unemployment earlier and older people later. Estonian native speakers exit unemployment earlier, disabled people later, people living in towns (contrary to countryside) exit earlier, people with knowledge of English exit earlier. By previous occupation, managers, professionals and service and sales workers tend to exit earlier. Exit rate is lower for craft and related trades workers, which includes also construction workers. As the crises was especially deep in construction and real estate market, the results turn out to be as predicted.

People with longer tenure on the last job exit unemployment significantly later in the group of 270-day-UIB recipients. This means that also severance payments might have a hampering effect on exiting unemployment to employment. By reason of termination of employment contract, people who were unsuitable for their job, people who were incapable for their work long-term and people who had unsatisfactory results of a probationary period all exit unemployment later than others.

For the economic situation, three different time varying covariates are included in the models: monthly regional registered unemployment rate, monthly change in registered unemployment rate and monthly inflow of vacancies mediated by the Unemployment Insurance Fund. Although the number of registered unemployed rose throughout the period under study, the inflow of vacancies declined until November 2009 and increased thereafter sharply (see Figure 7). This means that in the first quarter of 2010, it might have been easier to find a job than in the fourth quarter of 2009, even though the unemployment rate was higher. Estimations show that both the level and increase in the registered unemployment rate lower hazard rates significantly. The inflow of vacancies increases hazard to leave unemployment.

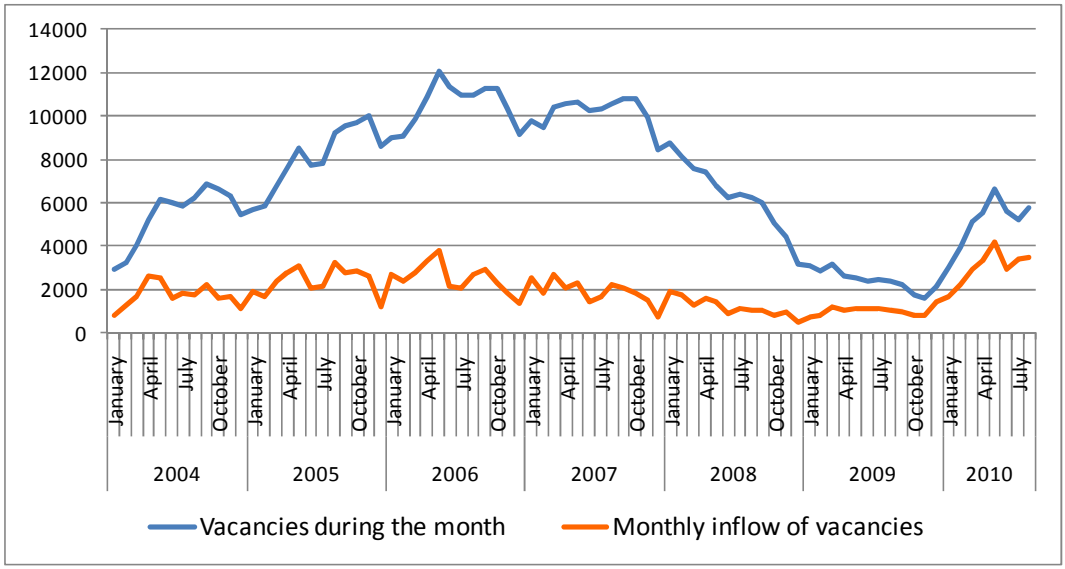

Figure 7. Number of vacancies mediated by the Estonian Unemployment Insurance Fund 2004 – 2010 August
Sources: Estonian Unemployment Insurance Fund

Interesting results of the study concern time-varying covariates for participation in active labour market measures. Recent literature suggests that active labour market programmes might work as a stick rather than a carrot as an *ex ante* threat effect might reveal and make people to leave unemployment. In the current study, time-varying covariates are added for waiting periods of active measures, periods of receiving active measures and periods after receiving active measures. It turns out that people who are addressed to different trainings or counselling have much lower exit rates before the start of the measure (also these people are included who finally do not get the measure). Exit rates are also lower during the period of receiving different active measures. Hazard rates are significantly higher after receiving work practice and occupational training. Post-effects turn out to be insignificant for Estonian language courses and job search trainings. Counselling has a positive effect for 270-day-UIB recipients, i.e. for people who have generally worked a longer period for the same employer and have not had to look for a job for a longer period. The results that people eligible for active measures tend to wait for the measure rather than increase their job search intensity is in accordance with the reality in Estonia. In general, unemployed people in Estonia are complaining for not receiving active measures rather than the other way around. Contrary to several other countries unemployed people in Estonia are not forced to participate in active measures on threat of ending the unemployment benefit.

Conclusion

The search theory predicts disincentive effects of unemployment benefits i.e. higher benefit or longer benefit duration hinder unemployed people to leave unemployment into employment. However, a question arises whether the disincentive effect still exists when economy is in recession and unemployment rate extremely high. This paper uses data for Estonian unemployment benefit recipients to answer the question. During the global financial crisis the number of unemployed people rose in Estonia more than five times in less than two years i.e. the rise was more severe than in any other country in the European Union.

The current study shows that disincentive effects of unemployment benefits exist even during a period of deep recession, though the size of the effect is slightly smaller than in better economic situation. The study looks in more detail also the effect of the length and the effect of the size of the benefit on the hazard to leave unemployment into employment. It is showed that both higher benefit level and longer potential benefit period cause disincentive effect during a period of sharply rising unemployment.

In addition, the models for estimating benefit disincentive effects include covariates for active measures (besides personal characteristics and covariates for economic environment). The participation in active measures is modelled using time-varying covariates showing the period before the measures, during the measures and after the measures. The study shows that people directed to active measures tend to have lower hazard to leave unemployment just before the period of an active measure and during the period of receiving an active measure. This is also in accordance with the setup of active measures in Estonia as people are not forced to participate, but are rather willing to.

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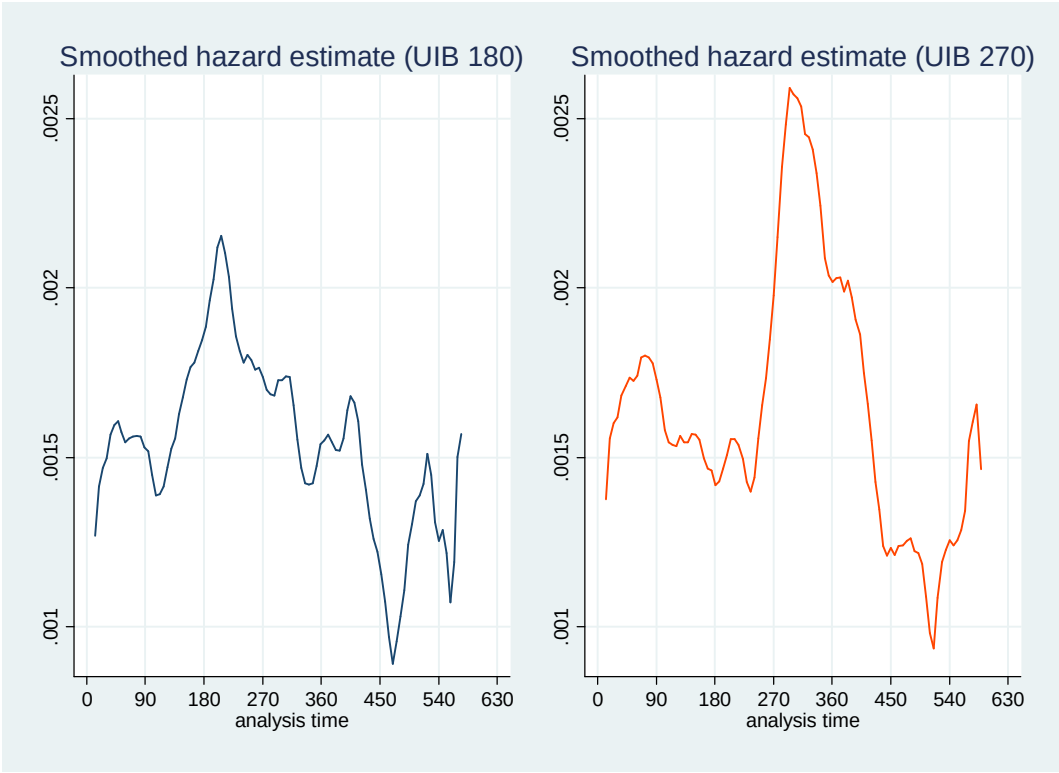
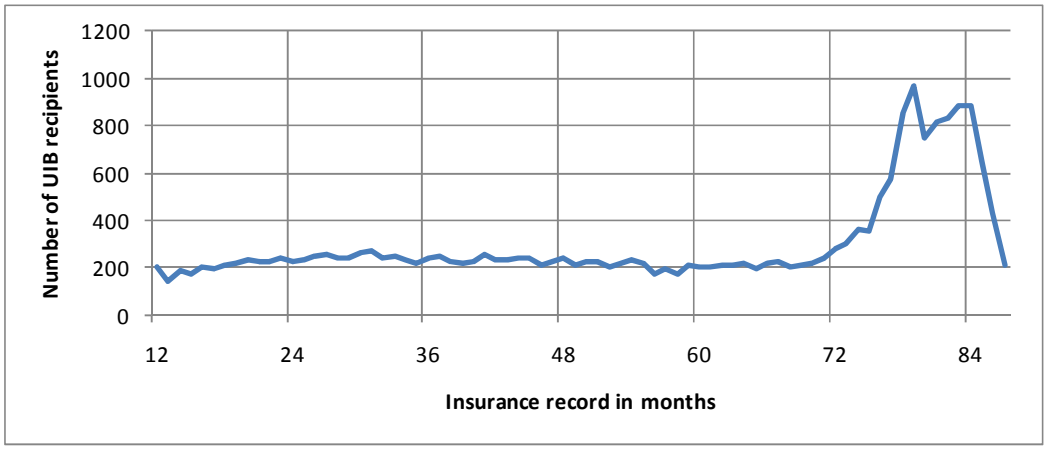
Appendix 1. Smoothed hazard rates for exiting into employment (crisis)



Appendix 2. Number of UIB recipients by their previous unemployment insurance contributions (crisis)



Note: There are more people with longer records of unemployment insurance contributions, because the distribution of insurance records is truncated from the right side as the unemployment insurance system was created in Estonia only in 2002. If the system was older, the insurance records would be more evenly distributed.

Appendix 3. Estimation results of piecewise-constant proportional hazard models where different types of benefits are modelled separately (crisis period)[6]

Covariate	Compared to	UIB 180		UIB 270		UA		UA 270 tenure 1+ years, volunt. unempl.	
		Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z
0 EEK < UB rate <100 EEK	UB = 0 EEK	0.392	0.000	0.263	0.182	x	x	x	x
100 EEK <= UB rate <200 EEK		0.451	0.000	0.337	0.278	x	x	x	x
200 EEK <= UB rate <300 EEK		0.414	0.000	0.332	0.271	x	x	x	x
300 EEK <= UB rate <400 EEK		0.467	0.000	0.354	0.300	x	x	x	x
400 EEK <= UB rate		0.418	0.000	0.325	0.263	x	x	x	x
UB rate > 0		x	x	x	x	0.035	0.000	0.030	0.000
Male	Female	0.792	0.000	0.802	0.000	0.849	0.000	0.898	0.056
Age 16-24	Age 25-54	1.138	0.006	1.133	0.413	0.877	0.000	0.863	0.058
Age 55+		0.640	0.000	0.599	0.000	0.613	0.000	0.582	0.000
Main language Estonian	Main language	1.485	0.000	1.330	0.000	1.427	0.000	1.437	0.000
Disabled	Not disabled	0.730	0.000	0.705	0.000	0.181	0.000	0.111	0.000
Living in a town	Countryside	1.075	0.081	0.983	0.549	0.998	0.955	1.119	0.054
Prev. job: managers	Technicians	1.011	0.904	1.019	0.730	0.996	0.964	1.277	0.078
Prev. job: professionals		0.934	0.496	1.041	0.503	1.065	0.472	1.316	0.059
Prev. job: clerks		0.949	0.568	1.024	0.703	0.987	0.880	1.169	0.250
Prev. job: service and sales workers		1.035	0.649	1.223	0.000	1.068	0.316	1.181	0.114
Prev. job: agriculturists		1.387	0.073	0.978	0.856	0.977	0.872	1.137	0.620
Prev. job: craft and related trades workers		0.817	0.006	1.003	0.944	0.860	0.023	0.944	0.586
Prev. job: plant and machine operators		0.922	0.330	1.079	0.142	1.096	0.217	1.168	0.182
Prev. job: elementary occupations		0.896	0.147	1.125	0.021	0.920	0.209	1.117	0.299
Elementary education or less	General secondary education	0.917	0.532	0.890	0.457	0.505	0.000	0.570	0.009
Basic education		0.929	0.182	0.933	0.117	0.784	0.000	0.824	0.008
Vocational secondary education		1.089	0.066	1.048	0.131	1.027	0.470	1.008	0.893
Professional secondary education		1.154	0.056	1.083	0.097	1.017	0.801	1.139	0.186
Vocational higher education		1.211	0.074	1.164	0.036	1.259	0.012	1.134	0.425
Bachelor's studies		1.148	0.062	1.108	0.033	1.271	0.001	1.287	0.022
Master's or doctoral studies		1.606	0.000	1.144	0.030	1.386	0.004	1.203	0.282
Knowledge of English	Low or none	1.224	0.000	1.125	0.001	1.098	0.014	1.025	0.710
Tenure 1-5 years	Tenure <1 year	0.825	0.000	0.912	0.016	0.834	0.000	comparison group	
Tenure 5-10 years		0.890	0.569	0.806	0.000	0.793	0.000	0.988	0.869
Tenure 10+ years		0.907	0.666	0.683	0.000	0.819	0.020	1.033	0.747
Prev. job in Estonian public sector	Prev. job in Estonian private sector	1.592	0.007	1.136	0.103	x	x	x	x
Prev. job abroad		0.435	0.000	0.575	0.000	x	x	x	x
Reason of unempl.: unsuitability for the job	End of fixed-term contract	0.730	0.004	0.741	0.001	x	x	x	x
work		0.646	0.049	0.521	0.001	x	x	x	x
Reason of unempl.: unsatisfactory results of a probationary period		0.876	0.054	1.062	0.327	x	x	x	x
Reason of unempl.: violation by employer		0.977	0.738	1.110	0.042	x	x	x	x
Reason of unempl.: bankruptcy		0.857	0.175	1.078	0.289	x	x	x	x
organisation		0.736	0.066	1.008	0.931	x	x	x	x
Reason of unempl.: lay-off		0.966	0.468	1.008	0.847	x	x	x	x
Reason of unempl.: mutual agreement	All other reasons (involuntary employment)	x	x	x	x	1.651	0.000	x	x
Reason of unempl.: initiative of employee		x	x	x	x	1.605	0.000	x	x
duties		x	x	x	x	0.699	0.000	x	x
Reason of unempl.: mutual agreement	Initiative of employee	x	x	x	x	x	x	1.066	0.195

[6] In addition, there are covariates for benefits and time intervals in these models.

Appendix 3 (continued)

Covariate	UIB 180		UIB 270		UA		UA 270 tenure 1+ years, volunt. unempl.	
	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z
Anticipation of training	0.215	0.000	0.099	0.000	0.342	0.000	0.431	0.012
Anticipation of job search training	0.119	0.033	0.220	0.002	0.338	0.062	x	x
Anticipation of Estonian course	0.153	0.061	0.088	0.015	0.414	0.131	0.445	0.421
Anticipation of work practice	x	x	x	x	0.497	0.122	0.589	0.459
Anticipation of counselling	0.252	0.000	0.281	0.000	0.614	0.000	0.724	0.182
Training period	0.231	0.000	0.178	0.000	0.398	0.000	0.386	0.001
Job search training period	x	x	0.352	0.071	0.566	0.424	0.886	0.904
Estonian course period	0.049	0.003	0.109	0.000	0.364	0.005	0.426	0.145
Work practice period	0.161	0.000	0.170	0.000	0.411	0.002	0.295	0.038
Post-training	1.115	0.084	1.215	0.000	1.306	0.000	1.317	0.001
After job search training	0.927	0.592	0.940	0.433	0.804	0.046	0.767	0.184
After Estonian course	1.258	0.224	1.018	0.891	1.164	0.290	1.053	0.839
After work practice	1.991	0.001	3.066	0.000	2.500	0.000	2.481	0.000
Post-counselling	0.941	0.239	1.097	0.007	0.979	0.561	0.991	0.894
Monthly regional registered unemployment rate (in percentage points)	0.990	0.163	0.975	0.000	0.989	0.028	0.987	0.133
Monthly change in registered unemployment rate (in percentage points)	0.434	0.000	0.538	0.000	0.626	0.000	0.724	0.000
Monthly inflow of registered vacancies (in hundreds)	1.028	0.000	1.046	0.000	1.027	0.000	1.023	0.001
day 1-10	0.007	0.000	0.007	0.000	0.019	0.000	0.021	0.000
day 11-20	0.006	0.000	0.007	0.000	0.023	0.000	0.027	0.000
day 21.30	0.006	0.000	0.007	0.000	0.020	0.000	0.026	0.000
day 31-40	0.007	0.000	0.008	0.000	0.021	0.000	0.023	0.000
day 41-50	0.008	0.000	0.008	0.000	0.022	0.000	0.025	0.000
day 51-60	0.006	0.000	0.009	0.000	0.019	0.000	0.017	0.000
day 61-70	0.006	0.000	0.007	0.000	0.018	0.000	0.017	0.000
day 71-80	0.007	0.000	0.008	0.000	0.016	0.000	0.017	0.000
day 81-90	0.007	0.000	0.009	0.000	0.016	0.000	0.018	0.000
day 91-100	0.006	0.000	0.006	0.000	0.014	0.000	0.014	0.000
day 101-110	0.005	0.000	0.007	0.000	0.014	0.000	0.015	0.000
day 111-120	0.006	0.000	0.007	0.000	0.013	0.000	0.013	0.000
day 121-130	0.005	0.000	0.006	0.000	0.011	0.000	0.010	0.000
day 131-140	0.007	0.000	0.007	0.000	0.012	0.000	0.011	0.000
day 141-150	0.007	0.000	0.008	0.000	0.011	0.000	0.013	0.000
day 151-160	0.006	0.000	0.006	0.000	0.011	0.000	0.011	0.000
day 161-170	0.008	0.000	0.007	0.000	0.010	0.000	0.011	0.000
day 171-180	0.008	0.000	0.007	0.000	0.010	0.000	0.012	0.000
day 181-190	0.005	0.000	0.005	0.000	0.007	0.000	0.009	0.000
day 191-200	0.007	0.000	0.006	0.000	0.008	0.000	0.010	0.000
day 201-210	0.008	0.000	0.008	0.000	0.008	0.000	0.009	0.000
day 211-220	0.007	0.000	0.007	0.000	0.008	0.000	0.010	0.000
day 221-230	0.006	0.000	0.007	0.000	0.007	0.000	0.010	0.000
day 231-240	0.007	0.000	0.007	0.000	0.006	0.000	0.007	0.000

Appendix 3 (continued)

Covariate	UIB 180		UIB 270		UA		UA 270 tenure 1+ years, volunt. unempl.	
	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z
day 241-250	0.005	0.000	0.005	0.000	0.005	0.000	0.008	0.000
day 251-260	0.007	0.000	0.009	0.000	0.006	0.000	0.008	0.000
day 261-270	0.007	0.000	0.009	0.000	0.005	0.000	0.006	0.000
day 271-280	0.003	0.000	0.002	0.000	0.001	0.000	0.001	0.000
day 281-290	0.003	0.000	0.003	0.000	0.001	0.000	0.001	0.000
day 291-300	0.004	0.000	0.004	0.000	0.001	0.000	0.001	0.000
day 301-310	0.003	0.000	0.003	0.000	0.001	0.000	0.001	0.000
day 311-320	0.003	0.000	0.003	0.000	0.001	0.000	0.002	0.000
day 321-330	0.003	0.000	0.004	0.000	0.001	0.000	0.001	0.000
day 331-340	0.002	0.000	0.002	0.000	0.001	0.000	0.001	0.000
day 341-350	0.003	0.000	0.003	0.000	0.001	0.000	0.002	0.000
day 351-360	0.003	0.000	0.002	0.000	0.001	0.000	0.001	0.000
day 361-370	0.003	0.000	0.002	0.000	0.001	0.000	0.001	0.000
day 371-380	0.003	0.000	0.002	0.000	0.001	0.000	0.002	0.000
day 381-390	0.003	0.000	0.002	0.000	0.001	0.000	0.001	0.000
day 391-400	0.002	0.000	0.002	0.000	0.001	0.000	0.001	0.000
day 401-430	0.003	0.000	0.002	0.000	0.001	0.000	0.001	0.000
day 431-460	0.002	0.000	0.001	0.000	0.001	0.000	0.001	0.000
day 461-490	0.002	0.000	0.001	0.000	0.001	0.000	0.001	0.000
day 491-520	0.002	0.000	0.001	0.000	0.001	0.000	0.001	0.000
day 521-550	0.002	0.000	0.001	0.000	0.001	0.000	0.001	0.000
day 551-602	0.002	0.000	0.001	0.000	0.001	0.000	0.001	0.000
θ (variance of gamma shared frailty; Likelihood-ratio test of θ =0)	0.694	0.206	0.000	0.949	0.806	0.000	0.637	0.000
Wald test	66191.1	0.000	262289	0.000	124278	0.000	46081.0	0.000
Akaike IC	23292.9		30527.3		30578.5		10008.2	
No. of observations	293811		383301		543658		172864	
No. of subjects	9971		12981		18022		5813	
No. of failures	4898		6849		7732		2723	