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UNEMPLOYMENT BENEFITS IN A PERIOD OF CRISIS: THE EFFECT ON UNEMPLOYMENT DURATION

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

Anne Lauringson[1]

Abstract

The current study shows that the disincentive effects of unemployment benefits exist even during a period of deep recession. The study uses recent data for unemployment benefit recipients in Estonia – a country where the rise in unemployment during the global financial crisis was the highest in the entire European Union. Both a higher benefit level and a longer maximum duration of benefits decrease exits from unemployment to employment. Yet, compared to the pre-crisis period, the effects of unemployment benefits are slightly milder and more homogenous. In addition, unemployed people directed to active measures tend to exhibit a lower hazard of leaving 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.

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1. INTRODUCTION

The search model predicts a strong disincentive effect of unemployment benefits on exiting unemployment into employment, and this effect is also often proven by 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 of leaving unemployment into employment, and that the probability of leaving unemployment rises during the benefit period (several studies based on UK, US and German data; only few studies on Eastern European data, e.g. Van Ours and Vodopivec 2006).

Yet, it is questionable whether the disincentive effect still remains in a period of economic recession when the job arrival rate decreases. The conclusions drawn from search theory are ambiguous in terms of the impact of the business cycle both on unemployment duration and the disincentive effect. According to the search model, on the one hand, the reservation wage declines and the unemployed become less selective during an economic downturn. On the other hand, the unemployed might decrease their job search intensity as the marginal benefit of the search effort might fall (because the probability of entering employment conditional on the current job search intensity and the expected present value of income from a job might both decrease). Unemployment benefits are rather expected to have less distortionary effects on unemployment duration during a recession, though it ultimately remains an empirical question. Yet, the empirical research in this respect is also rather scarce and only very few empirical studies try to take into account that the disincentive effect can vary over the business cycle. In most cases this variation is included in the model as an interaction term of the unemployment rate and the generosity of unemployment benefits. One of the earliest papers considering the varying disincentive effect is by Moffitt (1985) who finds on US data a significant positive coefficient for the interaction term of the unemployment rate and the potential unemployment benefit period, concluding that the disincentive effects of benefits are lower during times of high unemployment. Some later studies by Jurajda and Tannery (2003) also based on US data, and Schmieder *et al* (2010) on German data, also find a decline in the disincentive effect during a recession, although somewhat more modest. Kroft and Notowidigdo (2010) find on US data that disincentive effects are less distortionary when local labour market conditions are poor. Bover *et al* (2002) assess the impact of the business cycle and the effects of benefits on unemployment duration based on Spanish data. Their results also indicate that the disincentive effects of benefits might be milder in a recession. Hence, the few existing empirical studies rather refer to lower disincentive effects during times of high unemployment. However, studies concerning the disincentive effects do not explore whether it still exists in the case of extremely high unemployment in the economy.

This paper explores the disincentive effect in times of skyrocketing unemployment using Estonian data, as the rise in Estonian unemployment during the last crisis was the highest in the European Union. In Estonia, the number of unemployed people grew more than five times in less than two years, while the growth in the unemployed was less than two times in most countries of the 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 a study conducted on Estonian data before the crisis (Lauringson 2011) to draw conclusions about the size of the disincentive effect during different economic situations.

In addition, the study 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, Geerdsen and Holm 2007). A threat to

participate in an active measure might have an *ex ante* effect and make people leave unemployment. For that reason, when estimating the piecewise-constant proportional hazard model, covariates before, during and after active measures are also included in the model. As the active measures in Estonia are applied more on people who themselves want to participate rather than forcing the unemployed to participate, the results show that the unemployed tend to wait for the measures and the probability of leaving unemployment into employment is lower just before the start of these measures.

The paper proceeds as follows: the first section describes the theoretical framework for the research and the second section provides a background overview of the Estonian unemployment benefit system and the data used. The third section compares the results gained from using crisis and pre-crisis data. The fourth section has a closer look at benefit length during the crisis period and the fifth section deals with the size of the benefit in more detail. The final section concludes the results.

2. THEORETICAL FRAMEWORK – THE SEARCH MODEL AND ECONOMIC DOWNTURN

The basic search model is a stationary model to describe the behaviour of the unemployed in a dynamic setting. In this model, job offers are drawn randomly from a wage offer distribution on the market. When a job offer arrives, the unemployed person has to decide whether to decline this offer and continue the job search or to accept the offer and enter employment. It is assumed in the model that the unemployed know the job arrival rate and the wage offer distribution, but they do not know in advance exactly when the next job offer will arrive or its wage level.

An unemployed person maximizes the expected present value of income over an infinite horizon. As long as the unemployment spell lasts, unemployment benefits are received. When entering employment, the accepted full-time jobs are kept forever with the same wage. A job offer is accepted if the offered wage exceeds the reservation wage. The reservation wage depends on the level of unemployment benefits, job arrival rate, wage distribution on the market and the subjective discount rate, and does not depend on elapsed unemployment duration due to stationarity and infinite horizon assumptions. The hazard rate of exiting unemployment into employment equals the probability of receiving a job offer times the probability of accepting it.

A crisis on the labour market means in this model above all a very low job arrival rate. Mortensen (1986) shows that an increase in the job arrival rate increases the reservation wage. Yet, the sign and magnitude of the effect on the hazard of leaving unemployment (and on unemployment duration) is ambiguous. The direct effect of a higher job arrival rate on the hazard rate is positive. However, as the reservation wage also becomes higher, an unemployed person becomes more selective facing more job offers and there is a negative indirect effect on the hazard of leaving unemployment. So, in the case of a crisis, a lower job arrival rate lowers the reservation wage, but the effect on the escape rate from unemployment is again ambiguous.

Although it is intuitive that a higher job arrival rate means shorter unemployment duration and vice versa, the sufficient conditions for that in the search model are not so straightforward. Sufficient conditions regarding wage offer distributions are developed for

example in Burdett and Ondrich (1985), and even more generally (larger set of possible distributions) in Van den Berg (1994).

However, a more realistic approach to a crisis means that variables also change over time (above all the job offer arrival rate). So, nonstationarity is required to introduce changes in exogenous variables. In addition, with a nonstationary search model, it is possible to take into account that unemployment benefits usually depend on the length of unemployment duration, that policy changes can occur (changing the length or size of the benefit) or that the job arrival rate and wage offer distribution can deteriorate over the unemployment spell. Hence, the optimal strategy is not generally constant over time in a nonstationary model. In relation to the economic situation, a nonstationary model without anticipation describes a situation where a sudden macroeconomic shock takes place. So, a change in the labour market (primarily a change in the job arrival rate, but also in the wage offer distribution) is not anticipated by the unemployed. It is not always realistic to assume no anticipation effects. For example, when unemployment is on a rising trend and the job arrival rate is declining, people might also anticipate a declining job arrival rate in the future. A nonstationary search model with anticipation is extensively discussed by Van den Berg (1990). This model assumes the unemployed have perfect foresight and hence anticipate changes in the values of job arrival rate, wage offer distribution and unemployment benefits correctly[2].

Van den Berg (1990) shows that in this model an anticipated decline in unemployment benefits, the job arrival rate or the mean or variance of wage distribution will make the value of search in the present smaller than without the anticipated decline. So, the reservation wage decreases (people become less selective) as the anticipated declines in the exogenous variables come closer. Hence, when a crisis (or its deepening) and a decline in the job arrival rate are anticipated, the reservation wage decreases. The same effect takes place when a decrease in the wage rate on the market is expected to occur.

Although most of the search literature concentrates mostly on the individual search problem and job offer acceptance decision, it is also possible to model the generation of the job arrival rate. The job arrival rate can be handled as an endogenous variable as it depends on how much time and effort an unemployed person puts into the job search (the job search intensity). Earlier works incorporating job search intensity usually also incorporate on-the-job search (e.g. Mortensen 1977, Mortensen 1986). Cahuc and Zylberberg (2004) include search intensity in the model without on-the-job search. In this modification, the job offer arrival rate is an increasing function of job search effort, as greater effort should result in more offers (although marginal returns of search are decreasing). In addition, the job arrival rate depends on the labour market situation and the individual's characteristics (sex, age, etc.) independently of the job search. The cost of the job search is an increasing function of the job search effort with decreasing marginal cost.

It can be shown that worse economic environment does not only lower the reservation wage, but also decreases the effort put in the job search. Furthermore, Cahuc and Zylberberg (2004) show that in this model a decrease in the unemployment benefit increases the job search effort while lowering the reservation wage. However, a simultaneous decrease in unemployment benefit and a worsening of the economic situation has an ambiguous effect on the optimal job search intensity.

[2] It can be argued that is approach is not very realistic either as there is always some uncertainty in the economic environment and unanticipated changes can occur.

Other popular ways to look at the job arrival rate and/or wage distribution as endogenous include using equilibrium search (-matching) models (e.g. Burdett and Mortensen 1998, Coles 2001, Burdett and Coles 2003, Rogerson, Shimer and Wright 2005) or what is known as the Diamond-Mortensen-Pissarides model (e.g. Pissarides 1985, Mortensen and Pissarides 1994, Pissarides 2000, see a thorough discussion of the literature in Albrecht 2011). These approaches also consider the labour demand side in the model. The problem with these models is that they are not very consistent with observed time series on labour markets in regard to economic cycles, but explain the economy only in a steady state.

According to Shimer (2004), when the economy is doing worse, the marginal benefit of search intensity might fall because both the likelihood of becoming employed conditional on the current job search intensity and the expected present value of income from a job will likely decrease. Aggregate labour market data should reflect lower job search intensity in a decrease in labour market participation, an increase in discouraged persons or just a decrease in the search intensity of the unemployed still actively seeking a job. He argues that this is not the case in the empirical data (unemployment does not decline when the economy slows down). Shimer (2005) argues that the inconsistency between the model and the data arises from the commonly used Nash bargaining assumption for wage determination. Pissarides (2009) looks for solutions to the inconsistency in other mechanisms than wage stickiness, such as cyclical job separations, fixed job creation and negotiation costs, asymmetric information about idiosyncratic shocks, on-the-job search and non-uniform productivity shocks[3].

In job search literature, both the effect on unemployment duration stemming from unemployment benefits and from the economic environment are discussed rather thoroughly. While the total effect of the economic situation is ambiguous, the benefits are expected to increase unemployment duration regardless of the job search environment (more generous benefits increase the reservation wage and lower the job search intensity). Yet, in recent years the question of variance in the benefit disincentive effect over the business cycle has also been addressed (i.e. the interaction between unemployment benefits and the economic situation). Krueger and Meyer (2002) note that it is likely that the disincentive effect is different in different economic environments as during an economic slowdown there might be less of an efficiency loss from reduced job search effort. Jurajda and Tannery (2003) argue that the disincentive effect is stronger in boom periods as the effect on job search strategies is probably stronger when the productivity of the search is higher. In addition, during a recession the unemployed might be more hesitant to reject job offers in the fear that they will not find a job before the benefits cease.

The effect of the business cycle on the disincentive effect is more formally dealt with in the literature of optimal unemployment insurance. Kroft and Notowidigdo (2011) show in their model that there are two opposite effects shaping the cyclicality of unemployment duration elasticity. Firstly, the job offer arrival rate or labour demand is less responsive to an increase in labour supply or search effort during an economic slowdown, reducing duration elasticity. This basically means that during times of low levels of available vacancies, the unemployed cannot have much effect on the job finding probability and hence, the distortionary effects of benefits on the search effort are lower. Yet, during a recession, the unemployed value an increase in the benefit level more as they expect to receive benefits for a longer period and so duration elasticity increases. Hence, Kroft and Notowidigdo suggest that the cyclicality of the disincentive effect is theoretically ambiguous. Landais, Michaillat and Saez (2010) consider

[3] See also Mortensen and Nagypál (2007) for the discussion.

both micro-elasticity (stemming from a change in an individual's unemployment benefits) and macro-elasticity (the elasticity of aggregate unemployment due to changes in unemployment benefits that also accounts for the equilibrium adjustment in labour market tightness). They suggest that micro-elasticity is acyclical (stays constant during recessions and booms), while macro-elasticity decreases during periods of high unemployment[4].

In conclusion, the behaviour of the unemployed during a recession within the framework of search theory is ambiguous. As the job arrival rate declines, there are fewer opportunities to exit unemployment. At the same time, the unemployed decrease their reservation wage and become less selective among the job offers received and that benefits the exit from unemployment. As generally, unemployment benefits decrease during the unemployment spell, the unemployed increase their job search intensity to receive more offers. Yet, the deteriorating economic environment has a decreasing effect on job search intensity and the total effect on the behaviour remains ambiguous. In addition, even unemployment benefits can have cyclically different (though theoretically ambiguous) effects on unemployment duration.

3. DATA

The current paper focuses on Estonian data on unemployment benefit recipients during the last global economic downturn. Although by the beginning of the global financial crises the 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 crisis, Estonia witnessed a rapid growth of the unemployment rate and by the first quarter of 2010 it had reached 20%, being one of the highest in the European Union.

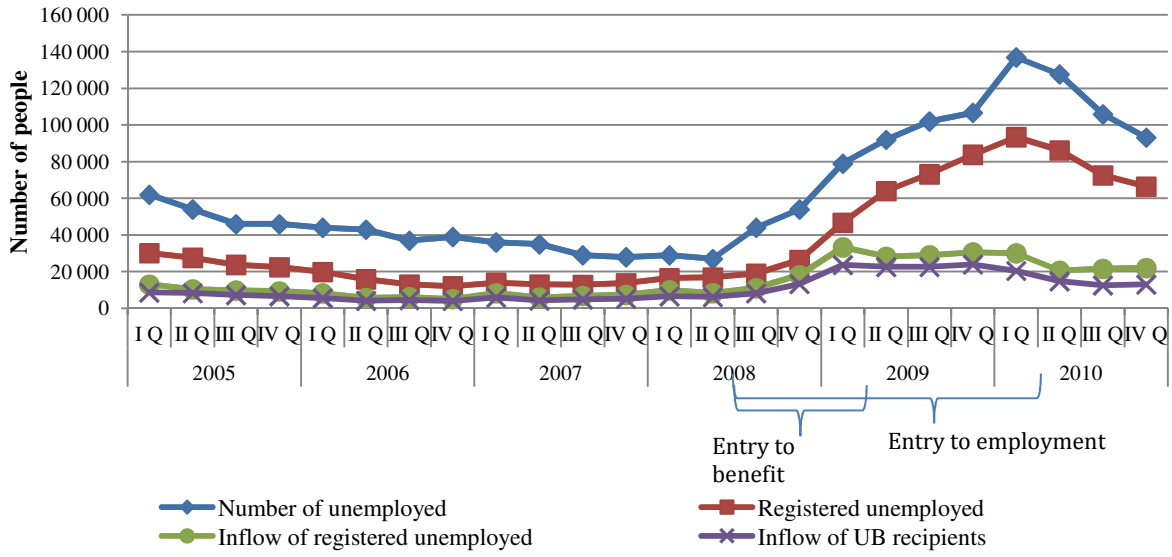

Figure 1. Number of unemployed in Estonia for 2004 – 2010 and the scope of the study
UB – unemployment benefits (unemployment insurance benefit and unemployment allowance)
Sources: Statistics Estonia, Estonian Unemployment Insurance Fund

[4] As a consequence Landais *et al* suggest that unemployment benefit generosity should be countercyclical (more generous during recessions) similarly to several others such as Kiley (2003) and Sanches (2008).

The study looks at unemployment benefits granted in Estonia from July 2008 until March 2009; that is, 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; that is, when unemployment reached its peak. The combination of data on both benefits and wages makes this a unique data set that makes it possible to determine unemployment spells up to the point when the person indeed enters employment and starts earning a wage (rather than looking only at benefit periods or registered unemployment spells). The results for the period of crisis are compared with the results for the pre-crisis period – for benefits granted in 2007 using a previous study by Lauringson (2011).

The study looks at both forms of unemployment benefits available in Estonia – unemployment insurance benefit (UIB) and unemployment allowance (UA). Unemployment allowance is a flat and quite low rate[5] benefit that can be granted 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 retirement age. The usual waiting period for UA is 7 days, although if the person was engaged in full-time studies or his or her employment contract was ended upon his or her breach of duties, a waiting period of 60 days is applied during the period under study. In the case of employees breaching their contractual duties, the maximum UA period is 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.

When an unemployment benefit recipient accepts a job, but becomes unemployed again within a year since the start of the initial benefit period, he or she can continue receiving the benefit for the remaining days of the benefit period. This applies to both types of benefits and should encourage benefit recipients to become employed. UA recipients could even start receiving UIB if they accumulate the necessary unemployment insurance record because of short-term work, and become unemployed involuntarily.

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 during the period under study equalled the UA rate. The minimum and maximum limits apply to rather a small proportion of UIB recipients.

In order to make UIB and UA recipients more comparable, only those UA recipients who were entitled to UA because of their previous work record and not because of alternative activities (studying, childcare etc.) have been considered. The characteristics of the benefit recipients studied here are presented in Table 1. In addition to three main groups of benefit

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

recipients (UIB for 180 days, UIB for 270 days and UA), characteristics for the main subgroup of UA recipients are also provided. These are UA recipients who are eligible for UA for 270 days after a waiting period of 7 days (so, people who were previously engaged with full-time studies or whose employment contract was ended upon ones breach of duties are excluded).

Table 1. Description of unemployment benefit recipients on the basis of type of benefit

		UIB 180	UIB 270	UA	UA 270
Number of observations		10148	13232	17645	15925
UB daily rate on 1-100 days, EEK		163.1	197.6	32.9	32.9
UB daily rate on 101-180 days, EEK		130.5	158.1	32.9	32.9
UB daily rate on 180+ days, EEK		32.9	158.1	32.9	32.9
UA after UIB		54.3%	0.3%	x	x
Continuing benefit for the remaining days from a previous benefit period		2.8%	3.1%	3.1%	3.4%
Average previous daily wage, EEK		331.2	411.6	x	x
Average tenure of the previous job, years		1.5	6.1	2.2	2.2
Males		55%	56%	50%	48%
Age in the beginning of UB period		36.7	44.8	35.5	36.3
Main language Estonian		54%	58%	51%	50%
Knowledge of English		27%	18%	23%	21%
Basic education or less		21%	13%	25%	25%
Higher education		13%	17%	9%	9%
Living in a town		69%	68%	69%	69%
Disabled		8%	9%	2%	2%
Exposed to training		15%	20%	15%	15%
Exposed to any active measure		31%	35%	38%	37%
Previous occupation	Managers	6%	9%	3%	3%
	Professionals	5%	6%	4%	4%
	Technicians and associate professionals	8%	11%	6%	6%
	Clerical support workers	6%	6%	5%	5%
	Service and sales workers	14%	10%	21%	22%
	Skilled agricultural, forestry and fishery workers	1%	1%	1%	1%
	Craft and related trades workers	31%	27%	26%	26%
	Plant and machine operators, and assemblers	10%	14%	10%	10%
	Elementary occupations	19%	16%	23%	23%

The major difference between 180-day-UIB and 270-day-UIB recipients lies in the average previous tenure as this is highly correlated with insurance contributions that determine the length of UIB. In addition, 270-day-UIB recipients previously earned a higher wage, are more educated, older, have worked in slightly higher-ranking jobs and receive higher benefits. UA recipients on average have less education than 180-day-UIB recipients and have worked in yet lower ranking jobs. Compared to the pre-crisis characteristics of UIB recipients (Lauringson 2011), the overall picture is similar (yet the characteristics reflect the fact that the crisis hit the real estate and construction market more – 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 unemployed men is higher during the crisis period).

4. CRISIS VERSUS PRE-CRISIS PERIOD

The crisis and pre-crisis period are compared using data on 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 for 180-day-UIB recipients. As the distance between the survival functions was the highest around the 270th day of the unemployment spell, it was evident that the length of the UIB affected the labour market behaviour. During the crisis, the survival functions are more similar and the survival function of 270-day-UIB recipients is mostly lower than the survival function of 180-day-UIB recipients. However, the only period when the survival function of 270-day-UIB recipients is higher than for 180-day-UIB recipients, is around the 270th day. This suggests that the disincentive effect is still there during the crisis.

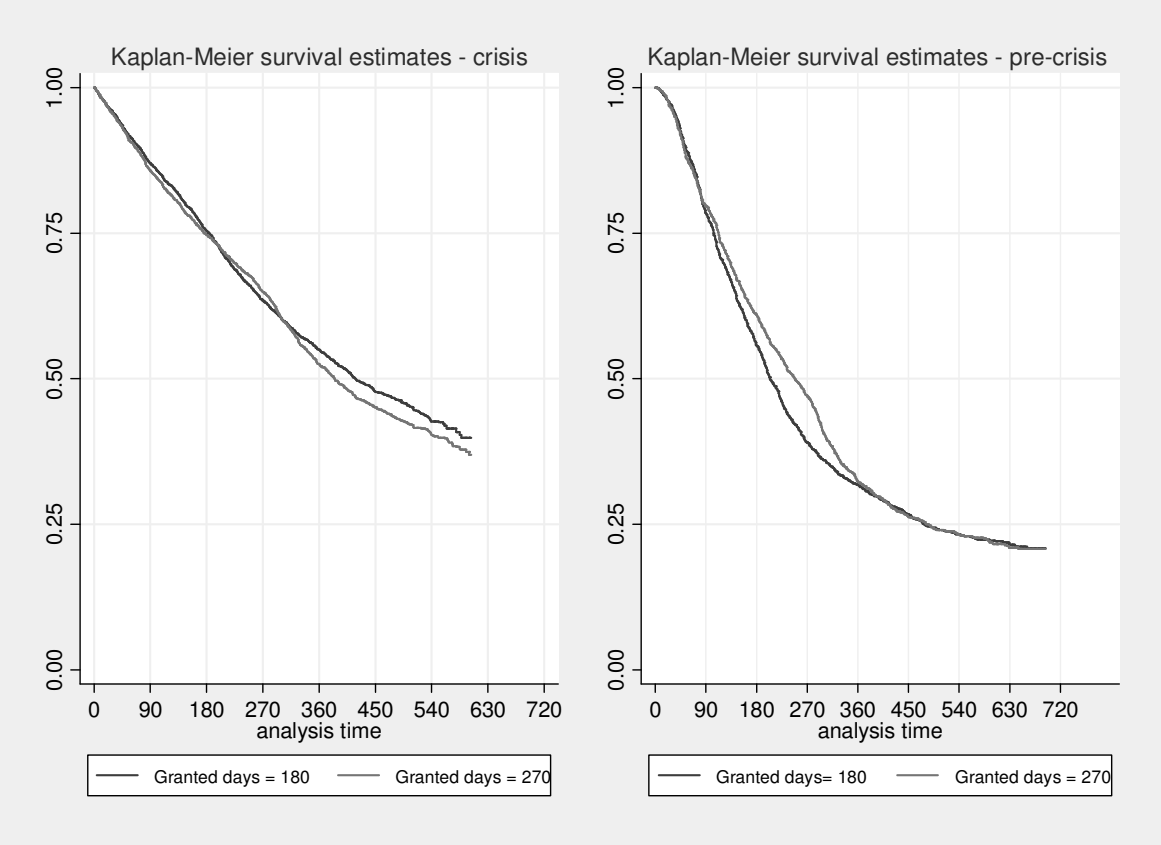

Figure 2. Kaplan-Meier survival estimates, crisis and pre-crisis period
Note: Benefit recipients who are continuing the remaining days of benefit from a previous benefit period are excluded to show more explicitly the impact of the potential benefit period.

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 the benefit period, and a fall in the hazard rate afterwards. The 180-day-UIB recipients also experience a spike around the exhaustion of the unemployment insurance benefit, though the spike is smaller. A smaller spike for 180-day-UIB recipients is also visible around the 270th day, when their UA also ceases. Both of these groups also have a change in the hazard rates around the 100th day, when the replacement rate of unemployment insurance benefits falls[6]. Compared to hazard functions during the pre-crisis period, the shape of the hazard functions has remained similar, but at a much lower level. While the hump around the end of the benefit has remained clearly evident

[6] 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 the maximum benefit period.

during the crisis for 270-day-UIB recipients, the hazard function for 180-day-UIB recipients has somewhat flattened[7].

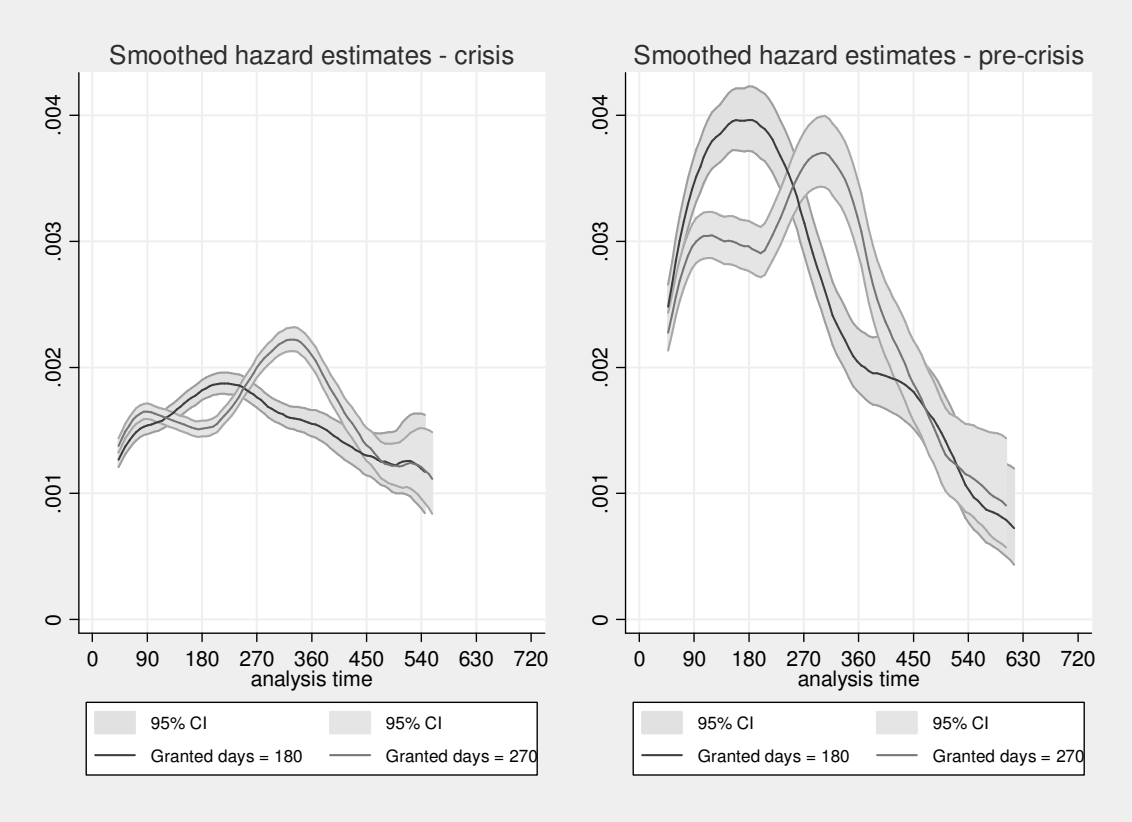

Figure 3. Smoothed hazard rates for exiting into employment with 95% confidence intervals, crisis and pre-crisis period

Note: Benefit recipients who are continuing the remaining days of their benefit from a previous benefit period are excluded to show the impact of the potential benefit period more explicitly.

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

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

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 the interval $(m = 1,...,M)$ 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[8] 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

[7] The survival and smoothed hazard estimates for 270-day-UA recipients are presented in Appendix 2. It is visible that this group also exhibits a small spike in the hazard rate at the end of benefit period i.e. around 270th day of the unemployment spell.

[8] 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. As the wage data used in this study are until March 2010, all the spells are censored as of the beginning of March 2010.

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). 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 the benefit as a time-varying covariate), UIB recipient characteristics in the beginning of the unemployment spell (gender, age, education, tenure at last job, being a native speaker of Estonian, being disabled, living in a town or the countryside, previous profession, knowledge of English, previous job in Estonian public sector/ Estonian private sector/ abroad, reason for termination of employment contract), exposure to active measures as time-varying covariates (before, during and after), and time-varying covariates for the 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 (full estimation results in Appendix 3). Compared to the pre-crisis period, the benefit disincentive effects appear to be somewhat smaller and more homogeneous for both benefit levels and the different potential benefit periods[9]. During the crisis period, unemployment insurance benefits cause people to leave unemployment for employment about two times less than they would leave unemployment when not receiving benefits.

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

Covariate	Refe-rence	Hazard ratio: pre-crisis		Hazard ratio: crisis			
		UIB 180	UIB 270	UIB 180	UIB 270	UA	UA 270
0 EEK < UB rate <100 EEK	UB = 0 EEK	0.388***	0.235**	0.435***	0.466***	0.708***	0.667***
100 EEK <= UB rate <200 EEK		0.449***	0.239**	0.492***	0.589***	x	x
200 EEK <= UB rate <300 EEK		0.366***	0.210**	0.462***	0.577***	x	x
300 EEK <= UB rate <400 EEK		0.245***	0.199**	0.516***	0.612***	x	x
400 EEK <= UB rate				0.465***	0.560***	x	x

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

In addition to estimation results for UIB recipients, estimations for UA recipients are also provided in Table 2 and Appendix 3. UA recipients exhibit smaller disincentive effects, yet their benefit level is also lower (fixed at 32.9 EEK per day i.e. the lower bound of the benefit

[9] Some differences in the estimates can also be caused by the differences in the pool of benefit recipients. The pool of benefit recipients in the pre-crisis period was very small and nearly none of those benefit recipients received active measures such as training. So, contrary to models using crisis data, it was not possible to include variables for participation in active measures in the models using pre-crisis data. In addition, those benefit recipients who were continuing benefit for the remaining days from a previous benefit period were not included in the models using pre-crisis data.

interval in the model). The estimation results for the crisis period indicate that very low benefit rates might incur lower disincentive effects. Yet, differences in disincentive effects might be smaller between higher benefit levels.

The estimations of the baseline hazard rates for UIB recipients 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 at the end of the maximum benefit period. The baseline hazard to leave unemployment is at its peak for 180-day-UIB recipients around the 180th day of the 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 the unemployment spell[10].

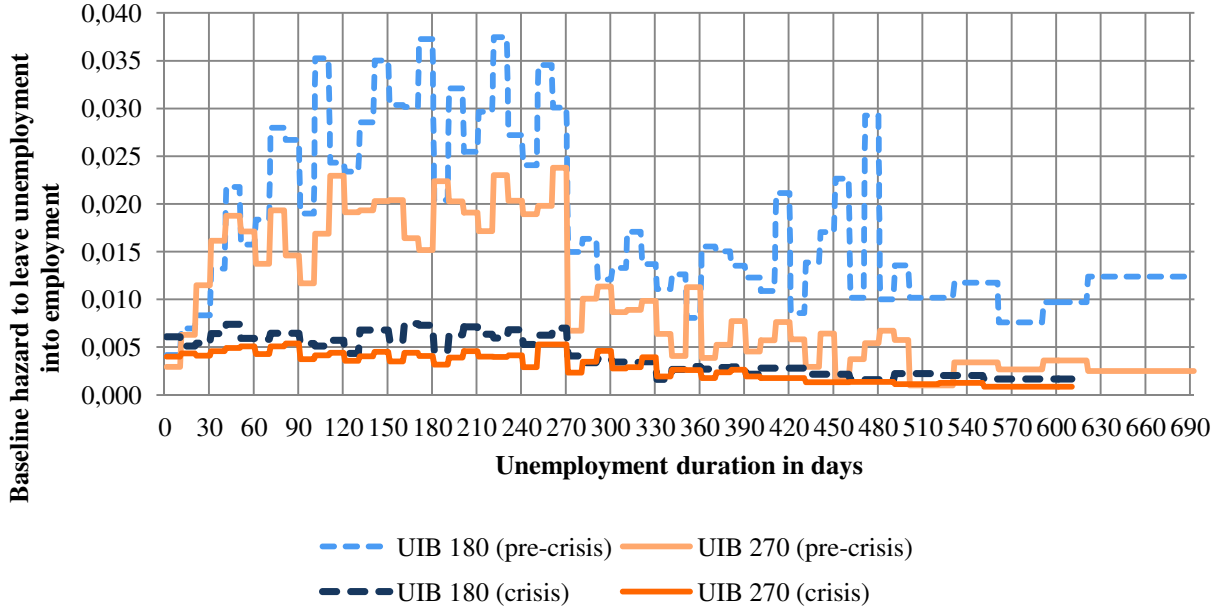

Figure 4. Estimation results for covariates of time intervals in piecewise-constant proportional hazard models

5. IMPACT OF THE BENEFIT PERIOD

Since because of the crisis the number of unemployment benefit recipients grew sharply, the sample for the crisis period is also quite large and this makes it possible to look at benefit effects in more detail. First, the 180-UIB-recipients and 270-day-UIB recipients are studied in-depth[11]. The main difference between 180-day-UIB and 270-day-UIB recipients lies in their previous employment tenure, as this is also why they receive unemployment insurance benefit for different maximum periods. In order to model these two groups in the same model to reveal differences in the effect of the maximum benefit duration, only people with the record of unemployment insurance contributions of 54–58 months are considered. As 56

[10] The baseline hazard estimates for 270-day-UA recipients are presented in Appendix 4. The baseline hazard for 270-day-UA recipients declines during the benefit period (contrary to UIB recipients). However, a change in the pattern is still there at the end of benefit period, as a slightly larger drop occurs after which the hazard stabilises at a lower level.

[11] In this chapter, benefit recipients who are continuing the remaining days of their benefit for from a previous benefit period are excluded to show more explicitly the impact of the potential benefit period.

months of unemployment insurance contributions is 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 employment contract so they qualify for the longer benefit. Figure 5 shows that the number of UIB recipients with an insurance record of 56 months is not higher than the number of people with an unemployment insurance record a few months less (the full figure is presented in Appendix 5). It can be concluded that it is not likely that people can manipulate their unemployment insurance record in Estonia.

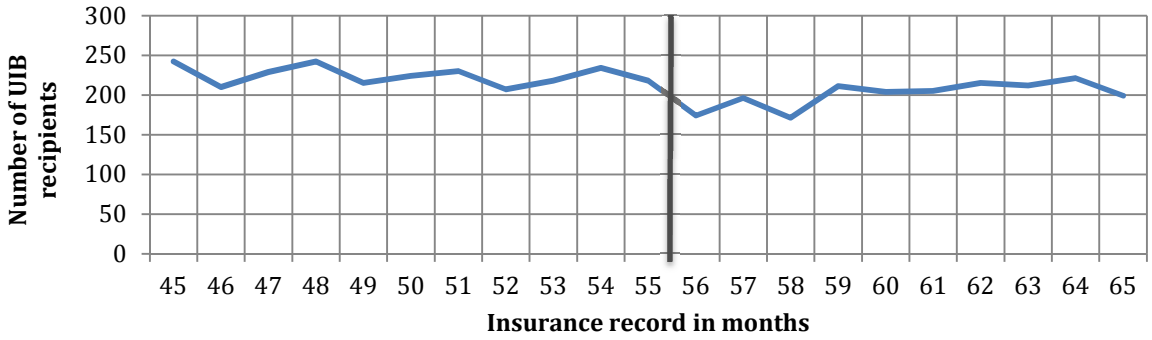

Figure 5. Number of UIB recipients on the basis of previous unemployment insurance contributions

The descriptive statistics for 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 on the basis of previous average tenure, but also other characteristics. The greatest 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 the unemployment spell, while the 180-day-UIB recipients are only eligible for a very low UA (or not even that).

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 for 180-day-UIB recipients. The pictured hazard functions again show 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 an insurance record of 54-55 months (i.e. maximum for this group) exhibit a higher hazard function (the probability of leaving unemployment into employment is higher).

Next, the hazard function of these two groups is estimated in a joint model using a 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 UB turns out to be 0.534 and highly significant, meaning that on average it is about two times less likely for people leave unemployment for employment when they get any amount of unemployment benefit. The hazard ratio estimate for the covariate showing a longer UIB period turned out to be 0.830 (significant at 0.05 level). This estimation reveals that in this group, people with longer unemployment insurance benefit indeed experience a lower hazard of exiting unemployment to employment than people eligible for the shorter benefit. Similar results are also produced by a model where the benefit level is included in more detail (see Table 4). Here, the hazard ratio estimation for 270-day-UIB recipients is 0.811 and even slightly more significant.

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

		UIB 180 (insurance record 54-55 months)	UIB 270 (insurance record 56-58 months)	Probability H0: difference = 0 H1: difference <> 0
Number of observations		452	541	
UB daily rate on 1-100 days, EEK		175.6	185.5	0.127
UB daily rate on 101-180 days, EEK		140.5	148.4	0.128
UB daily rate on 180+ days, EEK		32.9	148.4	0.000
UA after UIB		53%	0%	0.000
Average previous daily wage, EEK		360.5	377.7	0.250
Average tenure of the previous job, years		2.3	2.4	0.580
Males		58%	57%	0.657
Age in the beginning of UB period		39	39	0.994
Main language Estonian		56%	60%	0.232
Knowledge of English		21%	21%	0.995
Basic education or less		17%	15%	0.470
Higher education		16%	14%	0.275
Living in a town		68%	68%	0.963
Disabled		9%	9%	0.753
Previous occupation	Managers	6%	7%	0.437
	Professionals	5%	5%	0.618
	Technicians and associate professionals	10%	11%	0.547
	Clerical support workers	5%	5%	0.972
	Service and sales workers	12%	10%	0.273
	Skilled agricultural, forestry and fishery workers	1%	0%	0.236
	Craft and related trades workers	31%	31%	0.929
	Plant and machine operators, and assemblers	11%	11%	0.707
	Elementary occupations	19%	20%	0.584

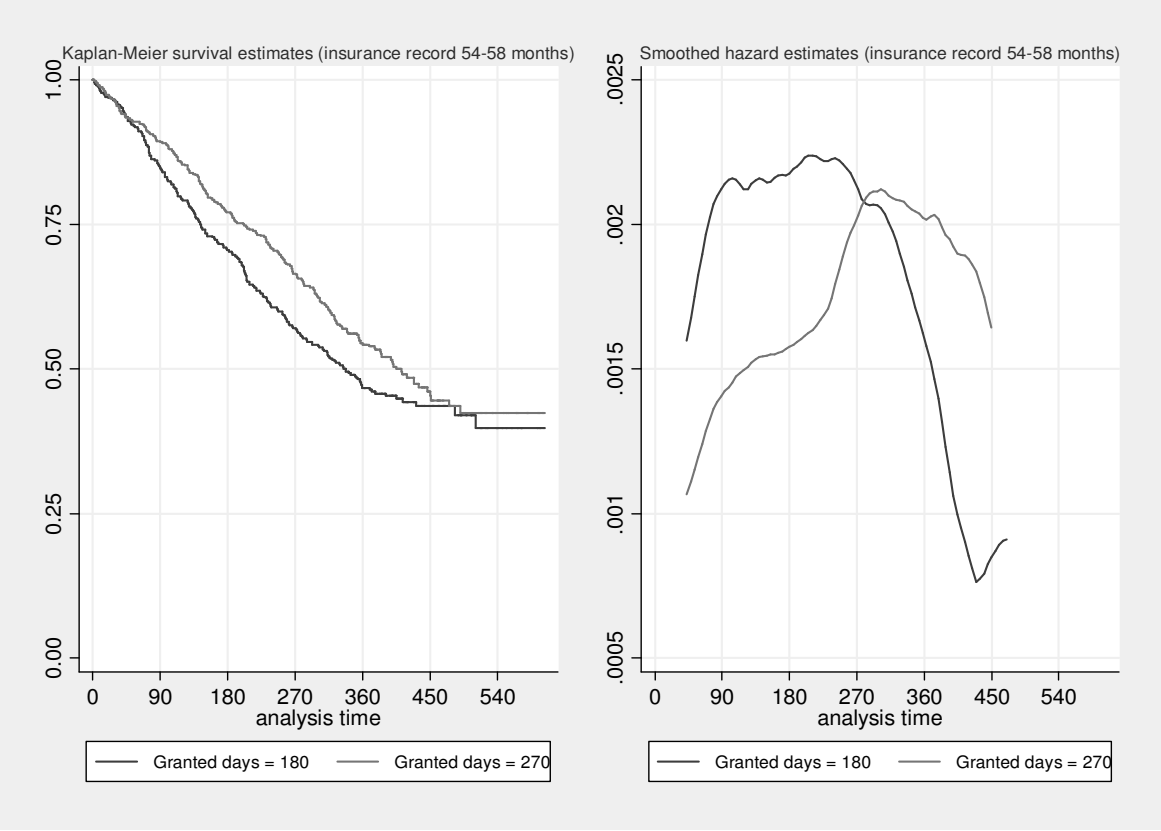

Figure 6. Kaplan-Meier survival estimates and smoothed hazard estimates of UIB recipients with unemployment insurance records of 54–58 months

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

Covariate	Compared to	Hazard ratio	P>z
0 EEK < UB rate <100 EEK	UB = 0 EEK	0.507	0.003
100 EEK <= UB rate <200 EEK		0.599	0.033
200 EEK <= UB rate <300 EEK		0.612	0.065
300 EEK <= UB rate <400 EEK		0.659	0.188
400 EEK <= UB rate		0.396	0.028
UIB 270	UIB 180	0.811	0.027

Next, the estimations are carried out specifically for the time interval 181 to 270 days of the unemployment spell as this is the period when the 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 the unemployed with an insurance record of 54–58 months are considered (270-day-UIB recipients are less likely to exit unemployment). The less constrained the sample, the less the probability that the 270-day-UIB recipients will be hampered from leaving unemployment by unemployment benefits (in the wider sample the disincentive effect for 180-day-UIB recipients is greater than for 270-day-UIB recipients).

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

180 < t <= 270 (insurance record 54-58 months)			
Covariate	Compared to	Hazard ratio	P>z
UIB 180 = 32.9	UB = 0 EEK (UIB 180)	0.164	0.011
UIB 270 > 0		0.130	0.002
180 < t <= 270 (insurance record 50-62 months)			
Covariate	Compared to	Hazard ratio	P>z
UIB 180 = 32.9	UB = 0 EEK (UIB 180)	0.200	0.000
UIB 270 > 0		0.229	0.000
180 < t <= 270 (insurance record 32-79 months)			
Covariate	Compared to	Hazard ratio	P>z
UIB 180 = 32.9	UB = 0 EEK (UIB 180)	0.322	0.000
UIB 270 > 0		0.370	0.000
180 < t <= 270 (insurance record 12+ months)			
Covariate	Compared to	Hazard ratio	P>z
UIB 180 = 32.9	UB = 0 EEK (UIB 180)	0.293	0.000
UIB 270 > 0		0.419	0.000

6. THE BENEFIT SIZE

In order to shed some more light on the effect of the size of the benefit, 270-day-UIB and 270-day-UA recipients are compared[12]. In order to make the groups comparable, only those

[12] In this chapter, benefit recipients who are continuing the remaining days of their benefit from a previous benefit period are excluded.

UA recipients are considered whose last activity was employment (not any other similar activity) and who left employment formally because of a mutual agreement or on an initiative of the employee. In both groups, only those people are considered whose tenure in their 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 the termination of the employment contract i.e. involuntary versus voluntary[13] 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 the unconstrained sample (Table 1) yet remain to some extent.

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

	UIB 270 (tenure 4-6 years)	**UA 270 (tenure 4-6 years, voluntary unempl.)**	**Probability H0: difference = 0 H1: difference <> 0**
Number of observations	1353	598	
UB daily rate on 1-100 days, EEK	192.7	32.9	0.000
UB daily rate on 100+ days, EEK	154.1	32.9	0.000
Average tenure of the previous job, years	5.0	4.9	0.002
Males	55%	43%	0.000
Age in the beginning of UB period	44.5	40.6	0.000
Main language Estonian	61%	53%	0.001
Knowledge of English	19%	17%	0.256
Basic education or less	13%	17%	0.015
Higher education	16%	11%	0.005
Living in a town	65%	70%	0.050
Disabled	8%	2%	0.000
Exposed to training	21%	17%	0.041
Exposed to any active measure	35%	31%	0.108
Previous occupation			
Managers	10%	5%	0.000
Professionals	7%	5%	0.104
Technicians and associate professionals	10%	7%	0.007
Clerical support workers	6%	4%	0.075
Service and sales workers	10%	23%	0.000
Skilled agricultural, forestry and fishery workers	1%	1%	0.224
Craft and related trades workers	28%	24%	0.077
Plant and machine operators, and assemblers	14%	13%	0.373
Elementary occupations	15%	20%	0.022

The survival and hazard estimates for the constrained sample are illustrated in Figure 7. The survival estimates are similar up to 270 days (i.e. end of the benefit period) and move apart after that point. During the benefit period, UIB recipients tend to have higher survival estimates, but after the benefit period much lower. This provides support for 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 the hazard functions at the end of the potential benefit period. Yet, the spike is much higher for UIB recipients, confirming that this group is more influenced by the benefit disincentive effect.

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

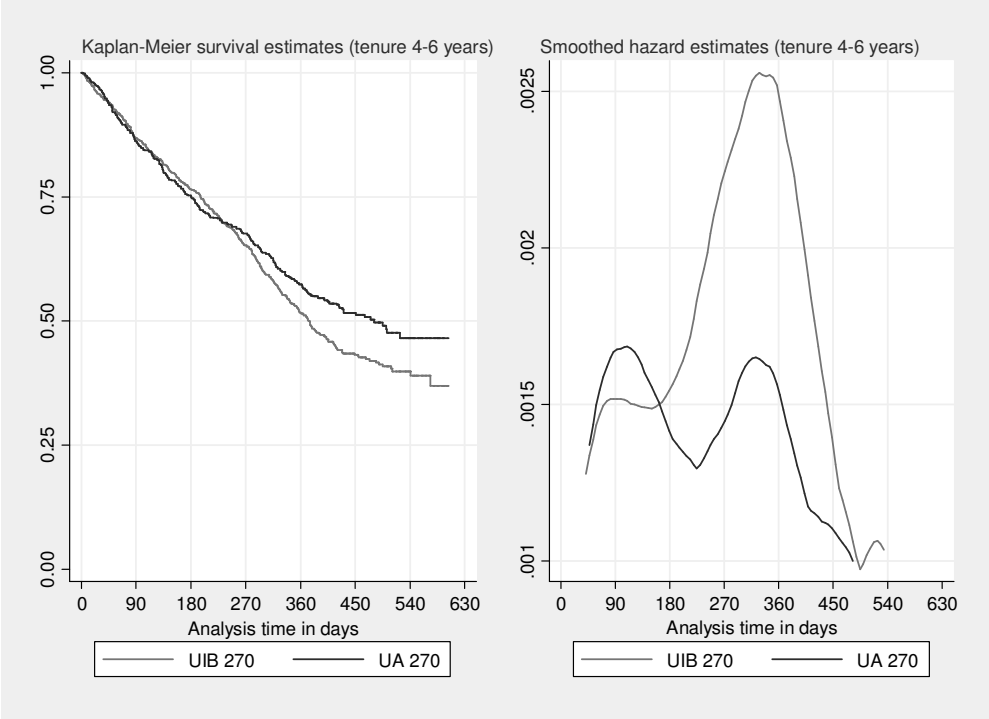

Figure 7. Kaplan-Meier survival estimates and smoothed hazard estimates for unemployment benefit recipients with tenure in their previous job of 4 to 6 years

Subsequently, the hazard function of these two groups is estimated in a joint model using a 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 in general higher for UIB recipients. Yet, the difference in the hazard rates is not significant during the benefit period, but significant and greater thereafter. After the benefit period, UIB recipients are 1.4 times more likely to leave unemployment than UA recipients. This result gives reason to believe that during the benefit period, the exit rate to employment for UIB recipients is more hindered because of their higher unemployment benefit.

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

Criteria in model	Covariate	Compared to	Hazard ratio	P>z
1 <= t; tenure 4-6 years	UIB 270	UA 270	1.167**	0.037
1 <= t <= 270; tenure 4-6 years	UIB 270	UA 270	1.087	0.354
270 < t; tenure 4-6 years	UIB 270	UA 270	1.384**	0.013

7. 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 these results are also quite similar to the study conducted on pre-crisis data (Lauringson 2011). 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 (in addition, the results for UA recipients who were granted UA for 270 days with a waiting period of 7 days is presented).

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 (as opposed to the countryside) exit earlier, and people with a knowledge of English exit earlier. On the basis of previous occupation, professionals and service and sales workers tend to exit earlier. The exit rate is lower for craft and related trades workers, which also includes construction workers. As the crisis was especially deep in construction and real estate markets, the results turn out to be as predicted.

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

To describe 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 8). 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 the hazard of leaving unemployment.

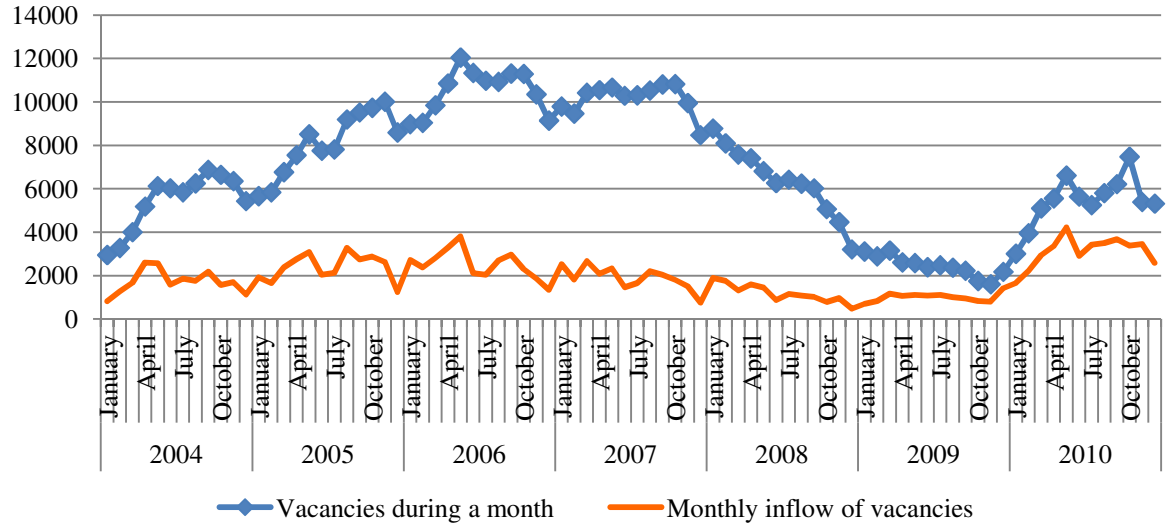

Figure 8. Number of vacancies mediated by the Estonian Unemployment Insurance Fund 2004 – 2010
Sources: Estonian Unemployment Insurance Fund

Interesting results from the study concern time-varying covariates for participating 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 emerge and make people leave unemployment. Here, time-varying covariates are added for the waiting periods for active measures[14], periods while receiving active measures and periods after receiving active measures. It turns out that people who are directed towards different trainings, work practice or counselling have much lower exit rates before the start of the measure. Exit rates are also lower during the period while receiving different active measures.

Hazard rates are significantly higher after receiving work practice and occupational training. Post effects for Estonian language courses turn out to be significant for UA recipients only. There are less Estonian speakers among UA recipients (see Table 1). So, this group might benefit more from Estonian lessons. Counselling has a small 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 reality in Estonia. Contrary to several other countries, the unemployed in Estonia are not forced to participate in active measures in order to continue drawing unemployment benefits. Yet, the results indicate negative anticipation effects and locking-in effects while the hazard rates are not significantly higher after every active measure. Hence, the results suggest that some of the measures provided might not benefit a higher employment rate, though more thorough evaluation of those measures is needed.

8. CONCLUSION

Search theory predicts the disincentive effects of unemployment benefits, meaning that a higher benefit or longer period of benefit hinders unemployed people from leaving unemployment into employment. However, the question arises whether the disincentive effect still exists when the economy is in recession and the unemployment rate is extremely high. This paper uses data on Estonian unemployment benefit recipients to answer this question. During the last global financial crisis the number of unemployed people rose in Estonia more than five times in less than two years.

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

The results indicate milder disincentive effects from unemployment benefits during a recession similarly to the few existing studies on the cyclicality of disincentive effects. Hence, it can be argued that it might be reasonable to increase the generosity of unemployment

[14] Anticipation periods are included also for these people who eventually did not get active measures (e.g. entered employment before the active measure started). Anticipation periods of 30 days are used in the calculations.

benefits during times of higher unemployment as the welfare effects of more generous benefits are likely to be positive.

In addition, the models for estimating benefit disincentive effects include covariates for active measures (besides personal characteristics and covariates for the economic environment). 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 hazards to leaving 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. While the study shows negative anticipation effects and locking-in effects, post effects are not positive for all measures. A more in-depth analysis of those measures is required to draw conclusions on their impact on employment.

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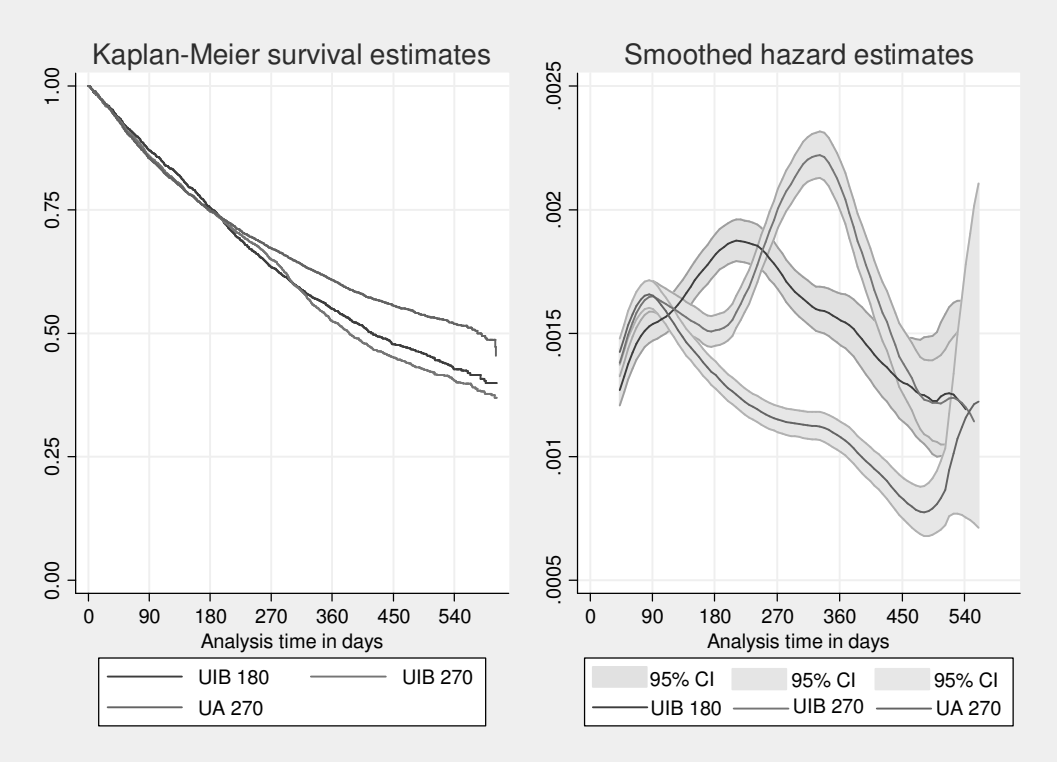
Appendix 1. Smoothed hazard rates for exiting into employment (crisis)

Appendix 2. Kaplan-Meier survival estimates and smoothed hazard rates for exiting into employment (crisis)



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

		UIB 180		UIB 270		UA		UA 270	
Covariate	**Compared to**	**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	0.435	0.000	0.466	0.000	0.708	0.002	0.667	0.004
100 EEK <= UB rate <200 EEK		0.492	0.000	0.589	0.000	x	x	x	x
200 EEK <= UB rate <300 EEK		0.462	0.000	0.577	0.000	x	x	x	x
300 EEK <= UB rate <400 EEK		0.516	0.000	0.612	0.000	x	x	x	x
400 EEK <= UB rate		0.465	0.000	0.560	0.000	x	x	x	x
Male	Female	0.793	0.000	0.800	0.000	0.976	0.384	0.998	0.939
Age 16-24	Age 25-54	1.135	0.005	1.135	0.421	1.080	0.013	1.101	0.004
Age 55+		0.654	0.000	0.593	0.000	0.660	0.000	0.672	0.000
Main language Estonian	Other language	1.472	0.000	1.344	0.000	1.382	0.000	1.380	0.000
Disabled	Not disabled	0.730	0.000	0.712	0.000	0.413	0.000	0.412	0.000
Living in a town	Countryside	1.073	0.079	0.982	0.533	1.068	0.022	1.073	0.020
Prev. job: managers	Technicians	1.020	0.827	1.011	0.839	1.091	0.243	1.135	0.107
Prev. job: professionals		0.958	0.657	1.042	0.498	1.140	0.066	1.153	0.064
Prev. job: clerks		0.962	0.662	1.018	0.781	0.999	0.984	1.007	0.927
Prev. job: service and sales workers		1.026	0.731	1.232	0.000	1.070	0.207	1.082	0.164
Prev. job: agriculturists		1.400	0.042	0.977	0.853	1.108	0.385	1.115	0.384
Prev. job: craft and related trades workers		0.825	0.006	0.998	0.961	0.888	0.029	0.877	0.023
Prev. job: plant and machine operators		0.917	0.283	1.075	0.171	1.094	0.141	1.096	0.154
Prev. job: elementary occupations		0.888	0.101	1.112	0.040	0.935	0.218	0.950	0.375
Elementary education or less	General secondary education	0.905	0.463	0.851	0.307	0.653	0.000	0.636	0.000
Basic education		0.944	0.273	0.932	0.116	0.829	0.000	0.841	0.000
Vocational secondary education		1.091	0.051	1.052	0.111	1.036	0.254	1.037	0.261
Professional secondary education		1.169	0.028	1.076	0.135	1.026	0.634	1.038	0.506
Vocational higher education		1.240	0.037	1.206	0.012	1.226	0.006	1.176	0.045
Bachelor's studies		1.158	0.039	1.127	0.015	1.189	0.002	1.155	0.015
Master's or doctoral studies		1.538	0.001	1.162	0.019	1.168	0.095	1.150	0.151
Knowledge of English	Low or none	1.190	0.000	1.132	0.001	1.208	0.000	1.217	0.000
Tenure 1-5 years	Tenure <1 year	0.819	0.000	0.899	0.006	0.797	0.000	0.777	0.000
Tenure 5-10 years		0.878	0.514	0.789	0.000	0.752	0.000	0.740	0.000
Tenure 10+ years		0.902	0.642	0.666	0.000	0.813	0.005	0.803	0.005
Prev. job in Estonian public sector	Prev. job in Estonian private sector	1.534	0.010	1.131	0.127	x	x	x	x
Prev. job abroad		0.427	0.000	0.504	0.000	x	x	x	x
Reason for unempl.: unsuitability for the job	End of fixed-term contract	0.737	0.004	0.733	0.000	x	x	x	x
Reason for unempl.: long-term incapacity for work		0.656	0.051	0.524	0.001	x	x	x	x
Reason for unempl.: unsatisfactory results of a probationary period		0.841	0.007	1.074	0.218	x	x	x	x
Reason for unempl.: violation by employer		0.970	0.651	1.109	0.049	x	x	x	x
Reason for unempl.: bankruptcy		0.854	0.154	1.072	0.342	x	x	x	x
Reason for unempl.: liquidation of the organisation		0.734	0.056	1.004	0.965	x	x	x	x
Reason for unempl.: lay-off		0.959	0.353	1.002	0.958	x	x	x	x
Reason for unempl.: mutual agreement	All other reasons (involunt. unempl.)	x	x	x	x	1.503	0.000	1.468	0.000
Reason for unempl.: initiative of employee		x	x	x	x	1.471	0.000	1.444	0.000
Reason for unempl.: employee's breach of duties		x	x	x	x	1.095	0.229	x	x

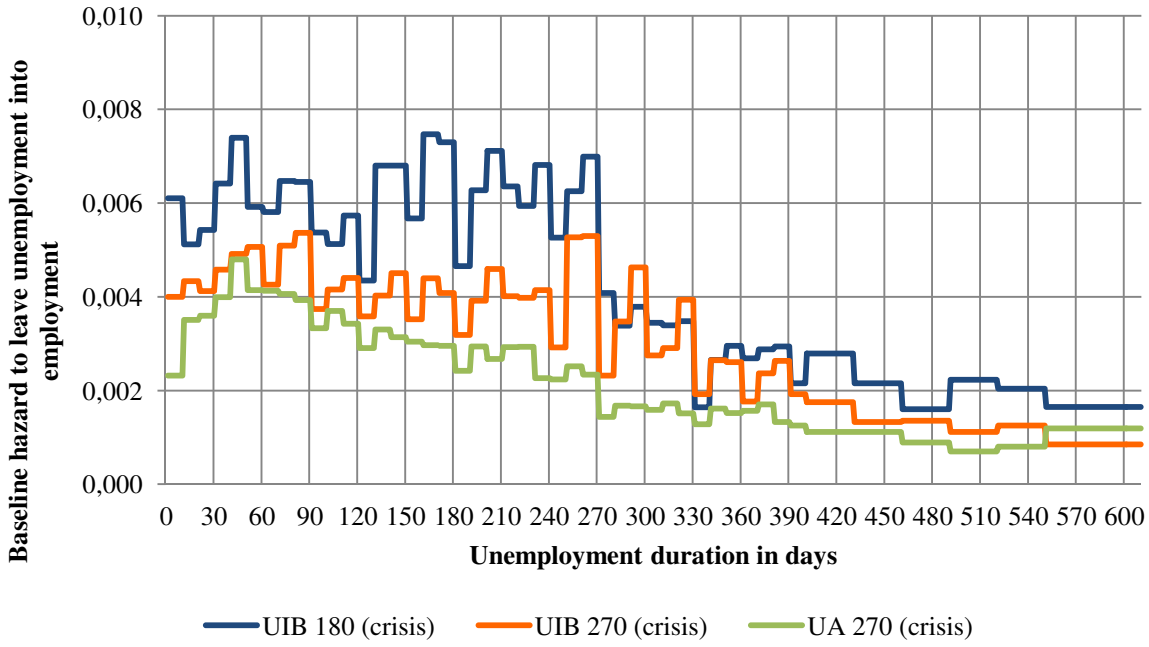
Appendix 3 (*continued*)

	UIB 180		UIB 270		UA		UA 270	
Covariate	**Hazard ratio**	**P>z**	**Hazard ratio**	**P>z**	**Hazard ratio**	**P>z**	**Hazard ratio**	**P>z**
Anticipation of training	0.199	0.000	0.098	0.000	0.155	0.000	0.165	0.000
Anticipation of job search training	0.109	0.027	0.203	0.001	0.168	0.002	0.120	0.003
Anticipation of Estonian course	0.146	0.055	0.083	0.013	0.228	0.011	0.166	0.011
Anticipation of work practice	0.102	0.023	0.116	0.002	0.417	0.021	0.469	0.046
Anticipation of counselling	0.277	0.000	0.275	0.000	0.305	0.000	0.299	0.000
Training period	0.209	0.000	0.218	0.000	0.210	0.000	0.214	0.000
Job search training period	0.283	0.075	0.318	0.011	0.146	0.006	0.159	0.009
Estonian course period	0.086	0.001	0.120	0.000	0.316	0.000	0.317	0.000
Work practice period	0.242	0.000	0.441	0.000	0.424	0.000	0.387	0.000
Post-training	1.196	0.002	1.259	0.000	1.365	0.000	1.340	0.000
After job search training	0.918	0.540	0.933	0.394	0.884	0.199	0.918	0.398
After Estonian course	1.305	0.155	1.041	0.760	1.524	0.001	1.558	0.001
After work practice	2.039	0.000	2.917	0.000	2.846	0.000	2.968	0.000
Post-counselling	0.983	0.722	1.134	0.000	0.990	0.749	1.008	0.808
Monthly regional registered unemployment rate (in percentage points)	0.990	0.115	0.976	0.000	0.963	0.000	0.964	0.000
Monthly change in registered unemployment rate (in percentage points)	0.444	0.000	0.534	0.000	0.492	0.000	0.493	0.000
Monthly inflow of registered vacancies (in hundreds)	1.026	0.000	1.045	0.000	1.023	0.000	1.020	0.000
day 1-10	0.006	0.000	0.004	0.000	0.002	0.000	0.002	0.000
day 11-20	0.005	0.000	0.004	0.000	0.003	0.000	0.004	0.000
day 21.30	0.005	0.000	0.004	0.000	0.003	0.000	0.004	0.000
day 31-40	0.006	0.000	0.005	0.000	0.004	0.000	0.004	0.000
day 41-50	0.007	0.000	0.005	0.000	0.004	0.000	0.005	0.000
day 51-60	0.006	0.000	0.005	0.000	0.004	0.000	0.004	0.000
day 61-70	0.006	0.000	0.004	0.000	0.004	0.000	0.004	0.000
day 71-80	0.006	0.000	0.005	0.000	0.004	0.000	0.004	0.000
day 81-90	0.006	0.000	0.005	0.000	0.004	0.000	0.004	0.000
day 91-100	0.005	0.000	0.004	0.000	0.003	0.000	0.003	0.000
day 101-110	0.005	0.000	0.004	0.000	0.003	0.000	0.004	0.000
day 111-120	0.006	0.000	0.004	0.000	0.003	0.000	0.003	0.000
day 121-130	0.004	0.000	0.004	0.000	0.003	0.000	0.003	0.000
day 131-140	0.007	0.000	0.004	0.000	0.003	0.000	0.003	0.000
day 141-150	0.007	0.000	0.005	0.000	0.003	0.000	0.003	0.000
day 151-160	0.006	0.000	0.004	0.000	0.003	0.000	0.003	0.000
day 161-170	0.007	0.000	0.004	0.000	0.003	0.000	0.003	0.000
day 171-180	0.007	0.000	0.004	0.000	0.003	0.000	0.003	0.000
day 181-190	0.005	0.000	0.003	0.000	0.002	0.000	0.002	0.000
day 191-200	0.006	0.000	0.004	0.000	0.003	0.000	0.003	0.000
day 201-210	0.007	0.000	0.005	0.000	0.002	0.000	0.003	0.000
day 211-220	0.006	0.000	0.004	0.000	0.003	0.000	0.003	0.000
day 221-230	0.006	0.000	0.004	0.000	0.003	0.000	0.003	0.000
day 231-240	0.007	0.000	0.004	0.000	0.002	0.000	0.002	0.000
day 241-250	0.005	0.000	0.003	0.000	0.002	0.000	0.002	0.000
day 251-260	0.006	0.000	0.005	0.000	0.002	0.000	0.003	0.000
day 261-270	0.007	0.000	0.005	0.000	0.002	0.000	0.002	0.000
day 271-280	0.004	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	0.002	0.000	0.002	0.000
day 291-300	0.004	0.000	0.005	0.000	0.002	0.000	0.002	0.000
day 301-310	0.003	0.000	0.003	0.000	0.002	0.000	0.002	0.000
day 311-320	0.003	0.000	0.003	0.000	0.002	0.000	0.002	0.000
day 321-330	0.003	0.000	0.004	0.000	0.001	0.000	0.002	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	0.002	0.000	0.002	0.000
day 351-360	0.003	0.000	0.003	0.000	0.001	0.000	0.002	0.000
day 361-370	0.003	0.000	0.002	0.000	0.001	0.000	0.002	0.000
day 371-380	0.003	0.000	0.002	0.000	0.002	0.000	0.002	0.000
day 381-390	0.003	0.000	0.003	0.000	0.001	0.000	0.001	0.000

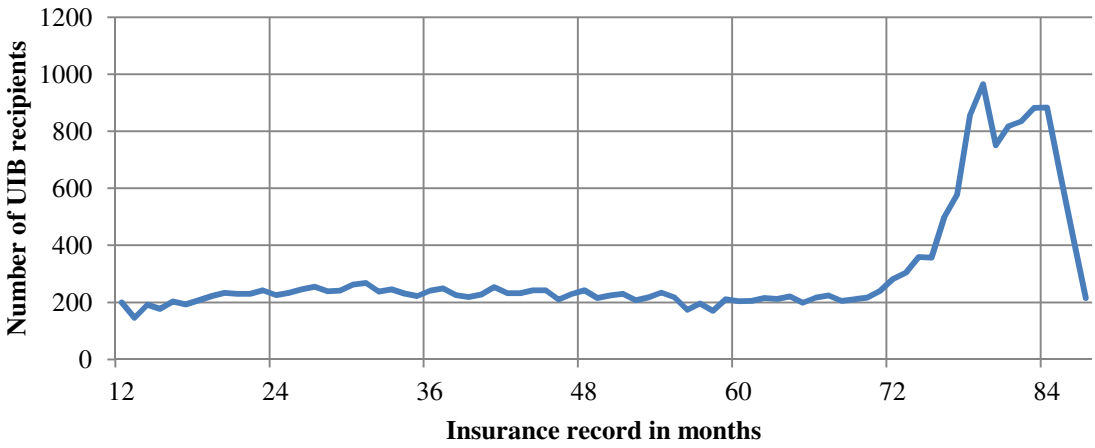
Appendix 3 (*continued*)

	UIB 180		UIB 270		UA		UA 270	
Covariate	**Hazard ratio**	**P>z**	**Hazard ratio**	**P>z**	**Hazard ratio**	**P>z**	**Hazard ratio**	**P>z**
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)	0.601	0.031	0.101	0.007	0.084	0.024	0.104	0.014
Wald test	73139	0.000	125253	0.000	140424	0.000	127182	0.000
Akaike IC	24018		31583		40603		37162	
No. of observations	300890		393615		542067		489914	
No. of subjects	10148		13232		17645		15925	
No. of failures	5076		7107		7594		6996	

Appendix 4. Estimation results for covariates of time intervals in piecewise-constant proportional hazard models (crisis)



Appendix 5. Number of UIB recipients on the basis of 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 only created in Estonia in 2002. If the system was older, the insurance records would be more evenly distributed.

KOKKUVÕTE

Töötushüvitised kriisiperioodil: mõju töötuse kestusele

Otsimisteooria kohaselt on töötushüvitistel hüvitisesaajatele mittestimuleeriv mõju, mis tähendab, et suurema hüvitise või pikema hüvitise maksmise perioodi puhul on töötute tööle liikumine pärsitud ja töötuse periood pikeneb. Hüvitiste mittestimuleeriv mõju on tihti kinnitust leidnud ka empiirilistes uuringutes. Samas tõstatub küsimus, kas hüvitiste mittestimuleeriv mõju esineb ka sügava majanduskriisi olukorras.

Otsimisteooria ei anna ühest vastust majandustsükli mõjudele ei töötuse kestusele ega hüvitiste mittestimuleerivale mõjule. Ühest küljest majanduslanguse olukorras reservatsioonipalk langeb ning töötud muutuvad töökohtade suhtes vähem valivaks. Teisest küljest võivad töötud vähendada tööotsimise intensiivsust, sest piirtulu tööotsimiseks tehtud pingutustest võib langeda.

Viimastel aastatel on otsimisteooriat puudutavas kirjanduses hakatud uurima ka seda, kas hüvitiste mittestimuleeriv mõju võib muutuda koos majandustsükliga. Seejuures majanduslanguse olukorras eeldatakse pigem väiksemat töötushüvitiste mittestimuleerivat mõju, kuigi lõplikku vastust mõju muutuste kohta teooria ei anna ja seega tuleb seda vastust otsida empiirilistest uuringutest. Samas on ka empiirilisi uuringuid, mis arvestaks mittestimuleeriva mõju muutustega koos majandustsükliga, ainult üksikuid. Need vähesed olemasolevad uuringud viitavada pigem mittestimuleeriva mõju vähenemisele halvemas majandusolukorras. Samas ei ole seni tehtud empiirilisi uuringuid, mis vaataks mittestimuleerivat mõju väga sügava majanduskriisi olukorras.

Käesolev uuring vaatleb hüvitiste mittestimuleerivat mõju väga kiire töötuse kasvu tingimustes, kasutades selleks Eesti andmeid hiljutise finantskriisi ajast. Nimelt oli töötute arvu kasv kriisi ajal Eestis kiirem kui üheski teises Euroopa Liidu riigis. Eestis kasvas töötute arv rohkem kui viis korda vähem kui kahe aasta jooksul, samal ajal kui teistes riikides kasvas töötute arv enamasti vähem kui kaks korda.

Uuringu tulemused näitavad, et hüvitiste mittestimuleeriv mõju esineb isegi väga sügava kriisi tingimustes, kuid see mõju on mõningal määral väiksem kui paremas majandusolukorras. Kuivõrd kriisiaja andmemaht hüvitisesaajate osas on suhteliselt suur, on nende andmete põhjal võimalik detailsemalt vaadata nii hüvitise suuruse kui hüvitise pikkuse mõju töötusest tööle liikumisele. Tulemustest nähtub, et nii kõrgem hüvitise suurus kui hüvitise pikem kestus omavad kriisiperioodil mittestimuleerivat mõju töötute tööle liikumisele.

Tulemused viitavad majanduslanguse olukorras väiksemale mittestimuleerivale mõjule sarnaselt teistele vähestele uuringutele, mis arvestavad mittestimuleeriva mõju tsüklilisusega. Seetõttu võib eeldada, et kõrge töötuse korral on mõistlik suurendada või pikendada töötushüvitisi, kuivõrd heaolu efekt on sellisel juhul tõenäoliselt positiivne.

Käesolevas uuringus hinnatud mudelid sisaldavad lisaks hüvitisi puudutavatele muutujatele ka aktiivsetes meetmetes osalemist (ja ka isiku sotsiaal-demograafilisi tunnuseid ning muutujaid majandusolukorra kohta). Aktiivsetes meetmetes osalemine on lisatud mudelitesse ajas muutuvate tunnustena, näitamaks perioodi enne meetmes osalemist, meetmes osalemise perioodi ja perioodi pärast meetmes osalemist. Hindamistulemused näitavad, et aktiivsetesse meetmetesse suunatud töötutel väheneb töötusest tööle liikumine just enne aktiivse meetme algust ning aktiivses meetmes osalemise ajal. Sellised tulemused on kooskõlas Eesti aktiivsete

meetmete osutamise süsteemiga, kuivõrd vastupidiselt mitmetele teistele riikidele ei sunnita töötuid meetmetes osalema (hüvitisest ilmajätmise ähvardusel), vaid suunataksegi meetmetesse eelkõige neid, kellel on endil valmisolek meetmetes osaleda. Samas ei ole töötusest tööle liikumise määr peale mõnda meedet suurem. Neid meetmeid on tarvis põhjalikumalt analüüsida, et teha järeldusi nende mõju kohta hõivele.