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DISINCENTIVE EFFECTS OF UNEMPLOYMENT INSURANCE BENEFITS: MAXIMUM BENEFIT DURATION VERSUS BENEFIT LEVEL

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Disincentive effects of unemployment insurance benefits: maximum benefit duration versus benefit level

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Abstract

This paper uses a unique dataset about unemployment insurance recipients and their exits to employment in Estonia to investigate the effects of benefits on unemployment duration. The administrative data used clearly pinpoints total unemployment spells and exits to employment. Both nonparametric and parametric estimations show that unemployment benefits have a strong and significant disincentive effect on hazard rates to exit into employment, just as search theory predicts. The effects of benefits are stronger and more homogeneous when the maximum duration of unemployment insurance benefit is longer. Unemployed people eligible for shorter unemployment insurance benefits are influenced more by the size of benefits and changes in the benefit replacement rate. Also, for both groups there is a rise in hazard rates during the benefit period and a sharp drop straight after.

JEL Classification: J64, J65, C41

Keywords: unemployment benefits; disincentive effects; Estonia.

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1. INTRODUCTION

The most common model for observing the impact of unemployment benefits on unemployment duration is the search model (Mortensen, 1977, see a thorough overview in Cahuc and Zylberberg, 2004, and Mortensen and Pissarides, 1999). Above all, the search model predicts the strong disincentive effect of unemployment benefits on exiting unemployment into employment. An increase in the amount or maximum duration of unemployment benefits reduces the probability of exiting unemployment. Yet, more generous benefits can encourage those unemployed people who are currently not entitled to unemployment benefits, to accept a job in order to be entitled to benefits in the future (entitlement effect). In addition, it predicts that the exit rate into employment increases when benefit exhaustion approaches, and as a result, there is a spike in the hazard rate prior to the end of the benefit period. After the benefit period, the exit rate should stay the same as the search intensity and the job search environment should stay the same. If the marginal utility of leisure is independent of income, the exit rate should remain as high as it was at benefit exhaustion. If income and leisure are complements, the exit rate should shift up and stay constant at a higher level. If income and leisure are substitutes, then it should fall and stabilize at a lower level (Meyer, 1990). Usually stabilization at a higher level is assumed.

As unemployment benefits are assumed to have a mainly negative impact on exiting unemployment[2], there can be a positive impact

[2] Atkinson and Micklewright (1991) are very critical about the search model, because it simplifies the world too much and the assumptions are too limiting. As conclusions drawn from search theory are quite negative they think that the conclusion would be less negative if the theory was closer to the real world. In recent years, the search model has been developed and brought closer to reality – taking into account that unemployed can receive unemployment insurance benefit as well as unemployment allowances, that unemployment benefit rates can change during the unemployment period and that there are certain conditions in order to be entitled to a benefit (for example Ortega and

on post-unemployment job quality. In the dynamic job search model, the unemployment benefit decreases the opportunity cost of the job search and so the limits of the job search become looser. Hence, an unemployed person can prolong the job search in order to find a better matching job that increases his or her utility in the long run. It can be argued that unemployment benefits support the job search rather than motivate people to be unemployed (Burdett, 1979). A better job can mean, for instance, a higher wage, a more permanent job, a full-time job, a job that better matches the person's skills etc.

In empirical work, the entitlement effect is not so easy to define or estimate. One of the very few works that tries to estimate this effect quantitatively is by Ortega and Rioux (2008). The disincentive effect has been tested quite often and in most cases the results confirm the theory (mostly on US and UK data, in Continental Europe the results vary a bit more). A spike at benefit exhaustion is also often found (e.g. Meyer, 1990; Katz and Meyer, 1990), though the results are less consistent than for the overall disincentive effect. One of the most important works on US data is by Meyer (1990), where the emphasis is on the last weeks of a potential benefit period. He finds a strong negative effect of unemployment insurance benefits on exiting unemployment, and also that the exit rate increases significantly just prior to benefit exhaustion.

There are only a few studies that exploit data on Eastern European unemployment insurance systems, and they tend to date back to the beginning of the transition period. One of the more recent studies is Van Ours and Vodopivec (2006) using Slovenian data. They find that a cut in the potential benefit period in 1998 increased the exit rate into employment and also exits to active labour market programmes. The study also reveals a steep increase in the exit rate during the last month of the benefit period. Yet, in their other study of the same reform (Van Ours and Vodopivec, 2008), they do not

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Rioux (2008), Coles and Masters (2006), Albrecht and Vroman (2005), Fredriksson and Holmlund (2001)). Above all, job search and matching equilibrium models have been used for these extensions.

find that the post-unemployment wage had changed after the unemployment benefit period or that the quality of post-unemployment jobs had improved in any other respect.

This paper examines benefit effects on very recent data in one of the CEE countries –Estonia. The topic is crucially important for Estonia as the country is in the middle of reforming its unemployment insurance system. The amendments to the law that would have increased both the coverage and replacement rates in the middle of 2009 were partially abolished because of a shortage of funds due to the economic crisis. Still, some amendments should be implemented in 2013. Yet, there is so far no thorough analysis of how the Estonian unemployment insurance system affects labour market behaviour among individuals.

Since it has been possible to separate 180-day and 270-day benefits since 2007, this paper looks at benefits granted in 2007, and also combines data about unemployment insurance payments and the characteristics of recipients. In addition, these data are combined with wage data from the Estonian Tax and Customs Board. Hence, altogether 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). First, the duration of unemployment is analysed using nonparametric methods. After that, a piecewise-constant proportional hazard model is applied to estimate the impact of unemployment benefits as well as other covariates. Both methods reveal strong disincentive effects and a spike at benefit exhaustion. The analysis shows that people with benefits of different duration exhibit different labour market behaviour even after controlling for other covariates. The baseline hazard rate to exit unemployment into employment is higher throughout the benefit period for unemployed with unemployment benefit of shorter maximum duration. Also, the amount of benefits matters less for the unemployed receiving benefits for longer periods than for short-term benefit recipients. There is much more variance in benefit effects across short-term benefit recipients in relation to the amount of benefits while benefit effects for long-term benefit

recipients are relatively homogeneous. Unemployed people receiving shorter unemployment insurance benefits are also influenced by changes in benefit replacement rates, while long-term benefit recipients are not.

The paper proceeds as follows: the first section describes the Estonian unemployment benefit system and the data used in this study. The second section presents the outcomes of the nonparametric method. After that, a piecewise-constant proportional hazard model is estimated. The final section discusses the results.

2. THE ESTONIAN UNEMPLOYMENT BENEFIT SYSTEM AND DATA SETS USED IN THE STUDY

The Estonian unemployment benefit system is a two-tier system as it consists of unemployment insurance benefit and unemployment allowance. Unemployment allowance (UA) is a flat (and rather low) rate benefit financed from the state budget. In order to be entitled to receive UA, a person has to have been in employment or certain similar activity for at least 180 days during the previous 12 months. If a person fulfils the job search criteria he or she can have this allowance for up to 270 days. Extensions to the allowance apply when a person has up to 180 days until the retirement age.

Estonia only established its unemployment insurance benefit system in 2002. The first people were entitled to it in 2003. Unemployment insurance benefits (UIB) are financed via statutory unemployment insurance contributions. In order to be entitled to receive this benefit, a person has to have made contributions for at least 12 months during the previous 36 months. In addition, only involuntary unemployment is covered, meaning that the state of unemployment should be caused by the employer. If a person has made contributions for 12 months, the potential 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 remaining 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. Hence, due to the youth of the Estonian UIB system, this has been possible since 2007. A benefit for 360 days will be possible from the end of 2011, as this requires 110 months of contributions[3].

From 2007 until June 2009, the minimum UIB equalled the UA flat rate. However, UIB is usually much higher as it is 50% of the previous average wage during the first 100 days and 40% thereafter. Earnings on the previous 12 employed months are taken into account (average for 9 employed months preceding the last 3 employed months). When calculating a person's average wage for UIB, the maximum limit is three times the national average wage. So, in general the replacement rate is 50% and later on 40%, but a small percentage of people have a higher replacement rate because of their low previous wage and about the same number of people have a lower replacement rate because of their very high previous earnings.

Until May 2009, registered unemployment and UA were administered by the Estonian Labour Market Board and UIB was administered by the Estonian Unemployment Insurance Fund. As the responsibilities of the Labour Market Board were taken over by the Unemployment Insurance Fund, it also became possible to merge the databases of registered unemployed and UIB recipients. There is a record for every UIB recipient in the registered unemployment database, because a person has to register as unemployed before applying for UIB.

The number of registered unemployed as well as the number of new UIB recipients fell to their lowest level by the end of 2006 – a

[3] When UIB and UA periods are exhausted, a person is not eligible to any unemployment benefits. However, a person can apply for a subsistence benefit from the local government. Subsistence benefits are rather low means-tested benefits that depend on the income of all members in the household. There are no time limits for subsistence benefits, though it has to be applied for every month anew.

year of very high (10%) economic growth (see Figure 1). In 2007, growth started to slow down and unemployment started to grow until in 2009 it had exceeded even the level of the last crisis at the beginning of the decade. This study looks at those UIB recipients to whom UIB was granted during 2007. Firstly, this is because then it is possible to distinguish between recipients to whom the benefit was granted for 180 days and those who received it for 270 days. Secondly, economic growth was slowing down in 2007, but the economy was not yet in deep crisis. In Estonia, GDP growth already started to be negative in the second quarter of 2008, earlier than in many other countries.

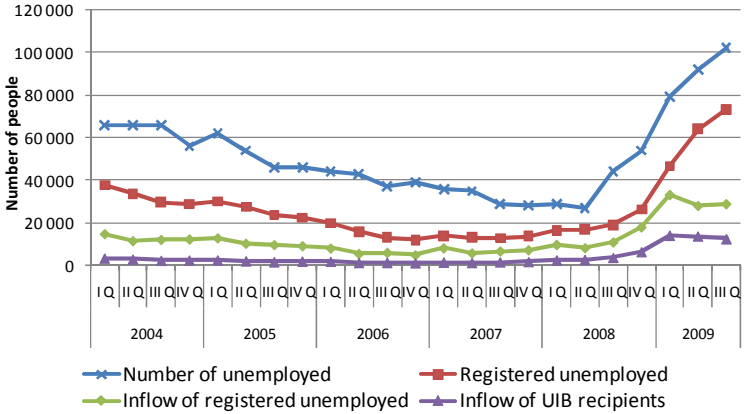

Figure 1. Number of unemployed in Estonia for 2004 – 2009
Sources: Statistics Estonia, Estonian Unemployment Insurance Fund

For the analysis, the following data about UIB grants in 2007 were taken from the database of the Unemployment Insurance Fund – date of applying for UIB, date of granting UIB, potential end of benefit period, actual end of benefit period, rate of UIB granted, average previous wage, reason for termination of employment contract. Data were also taken from the database of the former Labour Market Board for the same people about their personal characteristics, about being registered unemployed and about UA, including gender, date of birth, education, citizenship, main language, county, duration of last employment, previous

occupation, disability, lack of Estonian proficiency and UA receipt since the UIB period lapsed.

The groups of people granted UIB for 180 days and 270 days are different in several ways (see Table 1). Recipients for 270 days are on average slightly older, more educated and previously worked in higher-ranking occupations. Their tenure in their last job was on average longer, and this is the main reason they also received a higher severance payment from their last employer.

Table 1. Description of UIB recipients in 2007

	Granted days:	
	180	**270**
Number of observations	2 831	3 266
Average UIB daily rate on 1-100 days, EEK	122.4	147.0
Average UIB daily rate on 101+ days, EEK	97.5	117.6
Average UIB replacement rate on 1-100 days	51.1%	49.8%
Share of people who received UA after UIB	30.9%	1.1%
Average severance payment, EEK	8 329	21 773
Average severance payment, in monthly wages	1.1	2.5
Average tenure in previous job	2.1	9.4
Males	37%	38%
Average age at the beginning of UIB period	41	47
Estonian citizens	72%	74%
Main language Estonian	51%	53%
Proficient Estonian speakers	81%	77%
Disabled	14%	15%
Previous occupation		
Managers	7%	13%
Professionals	12%	16%
Technicians and associated professionals	22%	27%
Clerical support workers	0%	1%
Service and sales workers	16%	11%
Skilled agricultural, forestry and fishery workers	2%	1%
Craft and related trades workers	17%	16%
Plant and machine operators, and assemblers	11%	14%
Elementary occupations	24%	17%
Education		
Elementary or basic education	12%	8%
Vocational education with basic education	19%	17%
General secondary education	30%	28%
Vocational secondary education	14%	16%
Professional secondary education	10%	11%
Vocational higher education	4%	4%
Bachelor's studies	10%	12%
Master's or doctoral studies	2%	4%

The uniqueness of this study is that although it uses administrative data about registered unemployment, it can define relatively well whether and when exit to employment really occurs. Namely, data about registered unemployment is in turn combined with wage data from the Estonian Tax and Customs Board. Wage data for these individuals is observed for 2007–2008, so unemployment duration is studied during an economic slowdown, but before very rapid changes in the Estonian labour market took place.

An exit into employment is considered when the first wage observation appears in the data. Wage data is monthly indicating the month when a person received the wage. In general, wages are paid either at the end of the month for the current month or at the beginning of the month for the previous month. So, the first wage observation means that a person started a job either during the month that the wage observation appears or during the previous month. Hence, all entrances to employment are taken as occurring on the first day of the month that the wage observation appears as an average of starting a job whether 30 days earlier or 30 days later. The first wage observation is limited to being later than the beginning of the benefit period as this is considered the start of the spell. When this method is applied, 74.2% of spells ended in employment (74.6% of 180-day-UIB recipients and 73.8% of 270-day-UIB recipients).

Hence, altogether it is possible to determine unemployment spells quite precisely, up to the point when the person actually gets a job and starts earning a wage. The method for measuring the unemployment spell has proven to be very important when estimating a spike at benefit exhaustion. There are three different methods for measuring the unemployment spell – period of unemployment benefit, period of registered unemployment and period of not being employed (Card *et. al.* 2007). If the data is only about the unemployment insurance benefit period, it is not possible to estimate the exit rate at the end of benefit period, because then the exit rate is 100% anyway. If the data is about the period of registered unemployment, it might not tell the whole truth either because people might deregister themselves when the benefit period is over, although nothing changes in their status as

unemployed. When using unemployment benefit period and registered unemployment period, there are usually precise administrative data to be used, but for the whole benefit period there are usually only survey data. Studies using survey data often find a spike at benefit exhaustion, while studies on administrative data do not (Card *et. al.* 2007). Even when using survey data, the results may be affected by how the period of unemployment is defined – for example, whether the ILO definition is followed or it is considered enough that a person considers himself or herself unemployed (Atkinson, Micklewright, 1991). In the current study, the data used is better in this respect. Although it is administrative data, it is possible to detect the whole unemployment period.

The results are also different if only the exit rate is studied or if a distinction is made about whether the exit is to employment or somewhere else (e.g. to retirement, to study etc.). With the data used in this study, it is clearly visible whether the exit is really to employment.

Differences in results from studying the impact of unemployment benefits can also stem from the fact that several analyses use data from some political reform that has changed the amount or potential duration of unemployment insurance benefit for certain groups of unemployed (also in the aforementioned studies by Van Ours and Vodopivec, 2006 and 2008). Lalive, Van Ours and Zweimüller (2006) argue that very often the results of studying a reform are not reliable because the reforms tend to take place when a worsening of the labour market is expected and a political bias can change the results significantly. In the current paper, there was no reform of the unemployment insurance benefit system in Estonia during the period of the study. Hence political bias would not have occurred.

As employers in several countries tend to exploit the unemployment insurance system for temporary lay-offs, it might be necessary also to look separately at exits to the same employer. If a person is hoping to be re-employed by the same employer after a period, he or she may not be searching for a job very intensively and this would also be reflected in the results. Re-employment by

the same employer has represented quite a large share of exits to employment in the US (Katz 1986) and Canada (Belzil 2000), but also in some European countries (e.g. Austria – Card *et. al.* 2007; Sweden – Jansson, 2002; Denmark – Jensen and Nielsen, 2003). In Estonia, it is not very likely that the unemployment insurance benefit system is used for temporary lay-offs, at least not for seasonal lay-offs. In order to be entitled for unemployment insurance benefit, a person has to have been employed for at least 12 months.

An important feature of Eastern European countries is a relatively larger share of the shadow economy (Schneider and Buehn, 2009). People might start working without a formal contract during the benefit period and make their employment legal only when the benefits lapse. Hence, the data would show a spike at benefit exhaustion that is actually not there (Vodopivec, 1995). Although the share of the shadow economy in Estonia is likely to be smaller than in the beginning of the transition period, it might still have an impact on the results.

3. NONPARAMETRIC ANALYSIS

Kaplan-Meier survival estimates that consider exit to employment as described in the last section are presented in Figure 2. In addition, adjusted survival functions are calculated so that when an exit to employment on wage data is earlier than the actual end of benefit, the actual end of benefit is considered as an exit to employment. Exits to employment are more precisely detected during the benefit period, as exits to employment should not be earlier than the end of the benefit. In reality, this might not always be the case because in 2007 a benefit was terminated due to employment only when the person told to the Labour Market Board that he or she got a job. The benefit was also terminated when a person did not fulfil any of the activity criteria. Yet, whether the person received a wage was not confirmed (for example, via the Tax and Customs Board database since 2010).

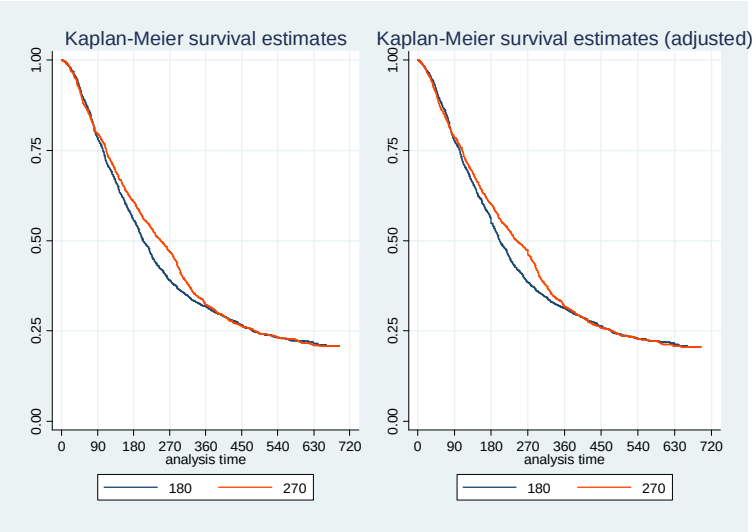

Figure 2. Kaplan-Meier survival estimates, non-adjusted and adjusted using the end of the benefit period

The two graphs look quite similar. The 270-day-benefit recipients exit unemployment less until a bit more than 270 days, after that the two survival functions approach each other again. When exit to employment is adjusted using the actual end of the benefit period, a small drop is visible at day 180 for 180-day-benefit recipients and at day 270 for 270-day-benefit recipients. This means that the method described earlier might overestimate the exit rate, yet only slightly.

The smoothed hazard rates for the non-adjusted and adjusted data also look almost identical (see Figure 3). For 180-day benefits the hazard rate is at its maximum at day 180 and for 270-day benefits the maximum is slightly after 270 days. When the hazard rates are smoothed less (see Appendix 1), then it is visible that adjusting the data might overestimate the spike at benefit exhaustion. In addition, for both benefit periods, there is also a smaller spike around day 100 when the benefit replacement rate changes (though this is somewhat delayed for 270-day-benefit recipients).

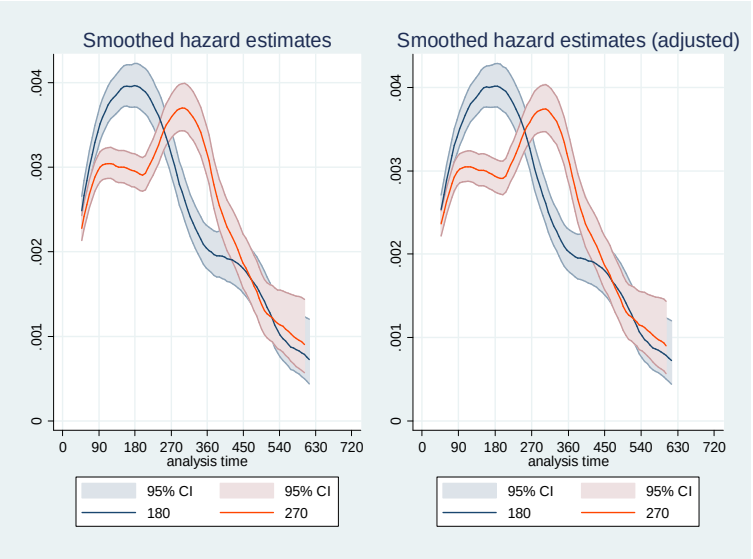

Figure 3. Smoothed hazard rates for exiting into employment with 95% confidence intervals, non-adjusted and adjusted using the end of the benefit period

Appendix 1 presents hazard functions for groups with different characteristics. According to these, males exit later, people with a higher education exit earlier when benefits are granted for longer periods, younger people rather exit earlier and older much later, disabled people exit much later, people who speak Estonian as their main language might exit earlier. Hazard functions grouped according to previous occupation differ more when benefits are granted for longer periods, meaning that it probably matters how long the tenure of the occupation has been. Plant and machine operators and also service and sales workers might exit earlier than others. Crafts and related trades workers tend to exit later.

In general, the regional differences in Estonia are not very large. Nevertheless, unemployment has always been much higher in Ida-Viru county in north-eastern Estonia. Large industries that employed a lot of people during the Soviet period have to a large extent been closed down. Yet, labour in the region is not mobile enough to move to other regions. In southern Estonia (Valga and

Võru counties), unemployment is also relatively higher. In Harju county, where the capital city is situated and a lot of enterprises operate, the situation is much better. The hazard functions for these counties show that indeed people in Ida-Viru, Valga and Võru counties exit later into employment. Harju county does not seem to differ very much from others.

An important factor determining unemployment duration might also be severance payment. During the period studied, it was paid as a lump sum on the last day of employment and it depended on the tenure and the exact reason for the termination of employment. In addition, severance payments were higher in the public sector (up to 12 monthly salaries) than in the private sector (up to 4 monthly salaries)[4]. Hazard functions grouped according to severance payment level differ more for 270-day-benefit recipients, probably because it is not very usual for a 180-day-benefit recipient to have higher severance payment because of the shorter tenure. In general, a higher severance payment seems to mean a lower exit rate. An exception to this is when the severance payment is equal to one monthly wage, which has lower hazard rates than any other level. It is very likely that here the reason for employment termination matters more than the amount of severance payment as this level of severance payment means basically that the employment was terminated because an employee was unsuitable for his or her office or the work to be performed due to professional skills or for reasons of health.

[4] In the current paper the level of severance payment is also calculated based on the reason for the employment termination and tenure. In reality, the severance payment may differ if an employer does not fulfil the law and refuses to pay the severance payment. In addition, in the case of bankruptcy, workers might not get their severance payment at the beginning of their unemployment spell.

4. RESULTS OF THE PIECEWISE-CONSTANT PROPORTIONAL HAZARD MODEL

To estimate the effects of UIB on unemployment duration, a piecewise-constant proportional hazard model is used[5]. It is a popular model because of its flexibility and with this model it is possible to incorporate time-varying covariates that are necessary to estimate the impact of unemployment benefits:

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

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[6] 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. In this study, up to 500 days, the intervals are formed as 10-day periods, after that as 30-day periods as then there is relatively few observations and exit rates then seem to change very little.

[5] Stemming from the search model, the focus in the duration analysis is on the exit rate of leaving unemployment for employment – the hazard rate framework (this framework is discussed extensively e.g. by Lancaster, 1990; Van den Berg, 2001; Wooldridge, 2002).

[6] 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.

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. Firstly, when estimating the impact of unemployment insurance benefits, the model has to contain some variable describing the benefits (amount of benefits, replacement rate of benefits, net replacement rate of benefits etc.). In addition, the hazard rate is usually also assumed to depend on some individual characteristics and characteristics of the job search environment. The more commonly used covariates describing individual characteristics are age, gender, citizenship, education, belonging to some minority group, marital status, children, work experience or tenure, previous wage, region, previous occupation and field of activity. As the labour market behaviour of men and women can differ a lot in some countries, some studies have modelled the hazard rate separately by gender (for example Carling, Holmlund and Vejsiu, 2001) or only for men (e.g. Bover, Arellano and Bentolila, 2002; Narendranathan and Stewart, 1993). Covariates capturing the job search environment are, for example, business cycle indicators, unemployment rate of a region and the rate of vacancies in a region.

In this study, benefit effects are estimated in three different versions as time-varying covariates: 1) as a replacement rate, 2) as a grouped replacement rate and 3) as a grouped amount of benefits. If a person started to receive UA after UIB period, this was also taken into account. Another time-varying covariate in the models is the monthly unemployment rate that should describe the labour market situation. The other covariates are included as in the

beginning of the unemployment spell: gender, age, education, main spoken language Estonian, previous occupation, disability, previous employment in public sector, previous employment abroad, reason for employment termination, county and tenure of the last job. Severance payment is not included as tenure and reason for employment termination also define the level of severance payment.

The model is estimated separately for 180-day and 270-day-benefit recipients, as it is likely that their labour market behaviour is different (also grouped hazard functions discussed in the previous section had different proportions for 180-day and 270-day-benefit recipients).

The estimated hazard ratios for benefit effects are presented in Table 2 (full results are presented in Appendix 2). There is unobservable heterogeneity present in all the models, meaning that the hazard ratios presented in the table hold at t_0 – or the beginning of the benefit period. As unobservable heterogeneity is modelled as a gamma distribution, the hazard ratios will tend towards one as *t* moves to infinity. So, the effect of the covariates vanishes with time (Gutierrez, 2002).

In general, the benefit covariates turned out to be significant in almost all the models. In the model where the time-varying replacement rate indicates the benefit level, UIB turns out to be significant in the 180-day-UIB model, but not in the 270-day-UIB model. In the 180-day-UIB model, the hazard ratio indicates that in the beginning of the spell, a replacement rate of 100% would lower the hazard rate to exit into employment almost 10 times compared to the situation where there are no benefits. In the model where the replacement rate was split into groups, the results show the usual rate of UIB in the beginning of the spell (around 50%) decreases exit rates about twice in the case of 180-day benefits and about four times in the case of 270-day benefits.

In both models where UIB enters as a grouped variable, the hazard ratios prove to be more stable for 270-day-UIB recipients. The hazard ratios for 270-day-UIB recipients are around 0.20–0.27 for

all different benefit levels compared to no benefit, while hazard ratios for 180-day-benefit recipients vary from 0.25 to 0.56. This means that 180-day-benefit recipients are more sensitive to benefit level than 270-day-benefit recipients.

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

	Covariate	Compared to	Hazard ratio	θ
180	Replacement rate		0.106***	0.351**
	0% < replacement rate <40%	Replacement rate = 0%	0.385***	0.751***
	40% <=replacement rate <50%		0.414***	
	50% <= replacement rate <60%		0.555**	
	60% <= replacement rate		0.274***	
	0 EEK < UIB daily rate <100 EEK	UB = 0 EEK	0.388***	0.722***
	100 EEK <= UIB daily rate <200 EEK		0.449***	
	200 EEK <= UIB daily rate <300 EEK		0.366***	
	300 EEK <= UIB daily rate		0.245***	
270	Replacement rate		1.163	0.294**
	0% < replacement rate <40%	Replacement rate = 0%	0.235**	0.257**
	40% <=replacement rate <50%		0.230**	
	50% <= replacement rate <60%		0.271*	
	60% <= replacement rate		0.355	
	0 EEK < UIB daily rate <100 EEK	UB = 0 EEK	0.235**	0.292**
	100 EEK <= UIB daily rate <200 EEK		0.239**	
	200 EEK <= UIB daily rate <300 EEK		0.210**	
	300 EEK <= UIB daily rate		0.199**	

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

When UIB enters in the duration model as a grouped daily rate of UIB, the results are similar to the grouped replacement rate[7]. A person who had previously earned a wage around the national average would fall in the second group of UIB rates (100–200 EEK a day). For this group the hazard rates are also twice as low as in the case of 180-day benefits and four times lower in the case of 270-day benefits. People both with lower and higher benefits have even lower hazard rates. The lowest hazard rate is in the group of highest benefits in both types of UIB.

[7] The minimum daily rate in 2007 was 32.9 EEK a day and maximum 383.36 EEK a day (1 EUR = 15.6466 EEK).

The results for the other covariates in the model of UIB daily rates are presented in Table 3 (hazard ratios for the other covariates are very similar in all three models). In both models men have significantly lower hazard rates (around 15%). Young people might exit earlier and older people exit significantly later (among 270-day-UIB recipients the hazard rate is even almost twice as low as in the age group 25-54). Unemployed who mainly speak Estonian have hazard rates to exit into employment 1.2–1.4 times higher. Disabled unemployed experience much lower hazard rates. As was already seen from the graphed hazard rates, people from counties with higher unemployment rates have lower hazard rates (Valga, Võru, Ida-Viru) and the county with the capital city (Harju) is not significantly different from the rest of the counties.

When it comes to previous occupations, plant and machine operators and assemblers have a significantly higher hazard to enter employment. This group of occupations includes jobs like car drivers, taxi drivers, bus drivers, sewing machine operators, food machine operators, etc. For former service and sales workers hazard rates are also relatively higher (though significant only in the 270-day-UIB model).

From all the different educational levels included in the model, master's and doctoral degrees benefit significantly more from exiting into employment. Among 270-day-benefit recipients most of the different forms of vocational education also prove to cause higher hazard rates.

Tenure covariates show that longer tenure in general means a lower hazard rate to exit into employment. An interesting result is that people whose last employment was somewhere abroad experience much lower hazard rates (four times lower when UIB is shorter and two times lower when longer). One reason for this is probably that people who have worked abroad would also rather try to find a job abroad again. But, if they do succeed in finding a job abroad, it is mostly not visible in the data as only Estonian tax data is used to detect employment.

Table 3. Estimation results of piecewise-constant proportional hazard models where UIB is modelled in daily rates

Covariate	Compared to	Hazard ratio 180	270
Male	Female	0.825***	0.860***
Age 16-24	Age 25-54	1.247*	1.039
Age 55+		0.787***	0.564***
Main language Estonian	Main language other	1.198**	1.356***
Disabled	Not disabled	0.388***	0.484***
County: Harju	11 other counties	1.036	1.018
County: Võru & Valga		0.853	0.556***
County: Ida-Viru		0.848	0.750***
Prev. job: managers	Technicians (& agriculturists & clerks)	1.119	1.134
Prev. job: professionals		0.810*	1.166
Prev. job: service and sales workers		1.058	1.287**
Prev. job: craft and related trades workers		0.878	1.111
Prev. job: plant and machine operators, assemblers		1.305**	1.345***
Prev. job: elementary occupations		0.931	1.176*
Elementary or basic education	General secondary education	0.873	1.122
Vocational education with basic education		0.996	1.145*
Vocational secondary education		1.079	1.137*
Professional secondary education		1.017	1.167*
Vocational higher education		1.177	1.234
Bachelor's studies		1.083	0.992
Master's or doctoral studies		1.631**	1.348**
Tenure 1-5 years	Tenure <1 year	0.742***	1.056
Tenure 5-10 years		0.561***	0.873
Tenure 10+ years		0.564***	0.697***
Prev. job in Estonian public sector	Prev. job in Estonian private sector	0.854	1.236*
Prev. job abroad		0.224***	0.489*
Reason of unempl.: unsuitability for the job	End of fixed-term contract	0.706**	0.704***
Reason of unempl.: long-term incapacity for work		0.561**	0.750
Reason of unempl.: unsatisfactory results of a probationary period		1.072	1.235
Reason of unempl.: bankruptcy		1.312	1.339*
Reason of unempl.: liquidation of the organisation		0.810	1.443***
Reason of unempl.: lay-off		0.951	1.081
National monthly unemployment rate (in percentage points)		0.903***	0.954*
θ (variance of unobservable heterogeneity)		0.722***	0.292**

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

People, who have been fired because they are unsuitable for the job or because of long-term incapacity for work, find it harder to find a new job than people who are unemployed because of other reasons. People who are unemployed due to the bankruptcy or liquidation of a firm, have significantly higher hazard ratios in the 270-day-UIB model. It is likely that people already know about the probable liquidation or bankruptcy quite some time in advance and might start looking for a new job before the unemployment spell.

Unemployment rate is included in the model as a time-varying covariate indicating the monthly Estonian unemployment rate (data from Eurostat). During the period under study, the unemployment rate was lowest in April 2008 (3.8%) and highest in December 2008 (8.0%). Unemployment rate turns out to significantly lower hazard rates, but relatively more for people on the shorter UIB. A rise in the unemployment rate of one percentage point lowers hazard rates by almost 10% for 180-day-UIB recipients, but a bit less than 5% for 270-day-UIB recipients.

The results for covariates indicating the interval of the job search period are presented in Appendix 2 and in Figure 4. The baseline hazard rate for 270-day-UIB recipients is relatively low during the first month, but rises gradually as it approaches 270 days, after which it drops sharply and stays low. The baseline hazard to leave unemployment for 180-day-UIB recipients is also highest just before the end of the UIB period (in the 170–180 day interval). However, as one third of 180-day-UIB recipients still get UA for the next 90 days, their hazard rate continues to stay up and also rises at the end of the UA period (250-270 days), and after that the hazard rate is much lower. In addition, in the case of 180-day-UIB recipients there is also a spike in the 100–110 day interval, straight after the drop in the amount of benefits.

It is visible in Figure 4 that unemployment benefits are major determinants of the hazard to leave unemployment to employment, because the baseline hazard changes significantly exactly when benefits expire. The behaviour of the baseline hazard for 180-day-UIB recipients proves that even low unemployment benefits can have an influence on exiting unemployment. Recipients of 180-day

UIB can continue to receive UA for the next 90 days, but this is usually several times lower than the previous benefit. Yet, the hazard stays high throughout these 90 days and drops sharply only after all unemployment benefits expire.

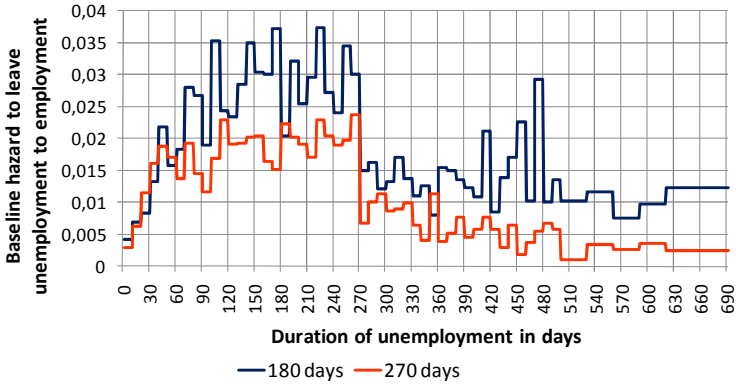

Figure 4. Estimation results for covariates of time intervals in piecewise-constant proportional hazard models where UIB is modelled as daily rates[8]

In addition, it is evident in Figure 4 that the amount of benefits affects job search efforts more in the case of shorter UIB periods. The baseline hazard rate for 180-day-UIB recipients spikes sharply just when the benefit replacement rate changes. For 270-day-UIB recipients there is no such spike and the baseline hazard seems to be almost unaffected by the change in the amount of benefits[9]. The baseline hazard rate for 180-day-UIB recipients also reflects the change in the amount of benefits after the UIB period, as the baseline hazard stops growing at that point (and rather encounters a minor fall during the UA period).

In conclusion, the hazard to leave unemployment for short-term UIB recipients is influenced significantly by the potential UIB

[8] Note that intervals are longer after 500 days.

[9] A smaller spike in the 110–120 interval could be caused by the change in replacement rates. Yet, it is somewhat delayed and not as sharp as for 180-day-UIB recipients.

period, the amount of benefits and changes in the amount of benefits. Unemployed eligible for longer unemployment insurance benefits are significantly influenced by potential benefit duration, but the amount of benefits and changes in it result in only a marginal difference in their behaviour.

5. DISCUSSION

Search theory predicts that an increase in the amount or maximum duration of unemployment benefits reduces the probability of exiting unemployment. In the current study conducted on the basis of Estonian data, both nonparametric as well as parametric estimations of the hazard to leave unemployment to employment show that unemployment benefits indeed have a strong and significant disincentive effect on hazard rates. Benefit effects prove to be even stronger than most of the other covariates. While unemployed eligible for shorter unemployment insurance benefits are highly sensitive to the amount, maximum duration and changes to the amount of benefits, unemployed eligible for longer unemployment insurance benefits are above all influenced by the maximum duration of the benefits.

It could also be seen that the hazard to leave unemployment rises throughout the benefit period and drops sharply straight after the end of the benefit period. However, it is likely that at least some part of the spike at benefit exhaustion might be caused by the shadow economy. Unemployed people might want to keep their benefit and start working without a formal contract during the benefit period.

At the end of 2011, it will be possible to be entitled to a 360-day unemployment insurance benefit in Estonia. The study shows that the baseline hazard to leave unemployment to employment is lower for unemployed entitled to longer unemployment insurance benefits and that a current average benefit decreases exit rates about twice for 180-day-benefit recipients and by four times for 270-day-benefit recipients. This means that Estonia may witness a slight rise in unemployment in 2012. However, the rise might not

be noticeable as a recovery from the crisis on the labour market is expected to be taking place at the same time.

The next major reform of the unemployment benefit system is planned to take place in Estonia in 2013. The reform envisages that voluntary unemployment will also be covered by unemployment insurance. This means that part of the unemployed currently entitled to unemployment allowance will be entitled to unemployment insurance benefit that will be lower than for other UIB recipients, but still higher than UA. As there is an extra criteria regarding tenure, these people will be mostly longer-term UIB recipients. At first this amendment in law was intended to be implemented in the middle of 2009 along with an amendment that would have also increased the UIB level for current UIB recipients. Yet, because of the economic crisis and a shortage of funds, one amendment was postponed until 2013 and the other abolished.

The current study shows that reforms that increase the benefit level might have more impact on unemployed receiving unemployment insurance benefit for the shorter period. The estimated hazard ratios for 270-day benefits compared to no benefit are around 0.25 for different benefit levels while for 180-day benefits they vary from 0.25 to 0.56. Therefore, an increase in the benefit level is expected to decrease exit rates more for unemployed receiving a shorter unemployment insurance benefit and the effect would be less hindering for the unemployed receiving longer benefit.

The period of job search under observation was 2007–2008, when Estonia entered into a recession and already witnessed a slight increase in unemployment. This means that the disincentive effect of unemployment benefits is strong even in a period of economic slowdown and rising unemployment. Yet, the question remains whether unemployment benefits also support job searches; in other words, whether people get better jobs because they can prolong the job search.

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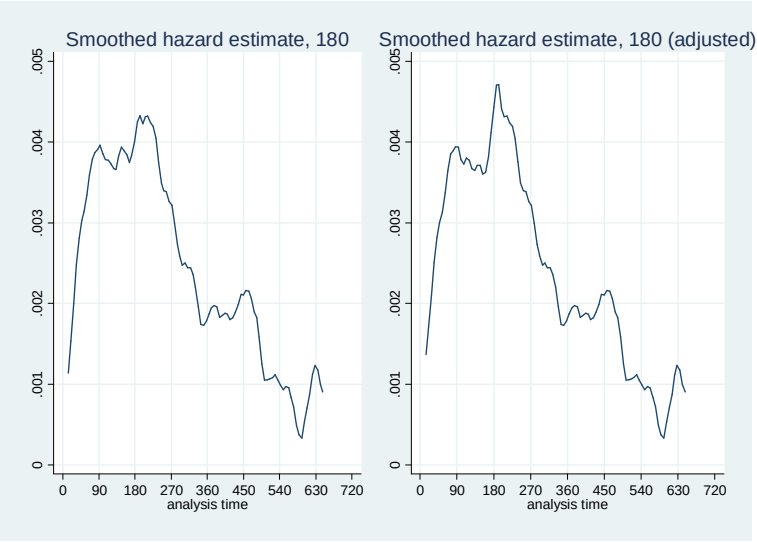
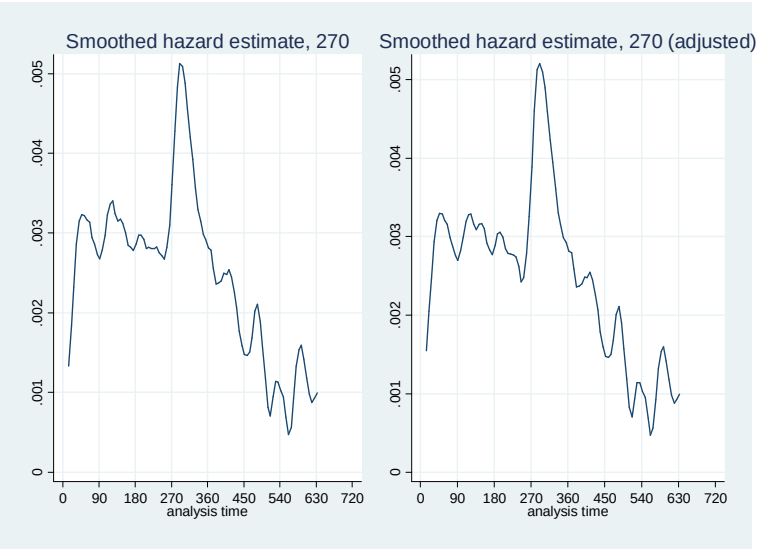
Appendix 1. Smoothed hazard rates for exiting into employment





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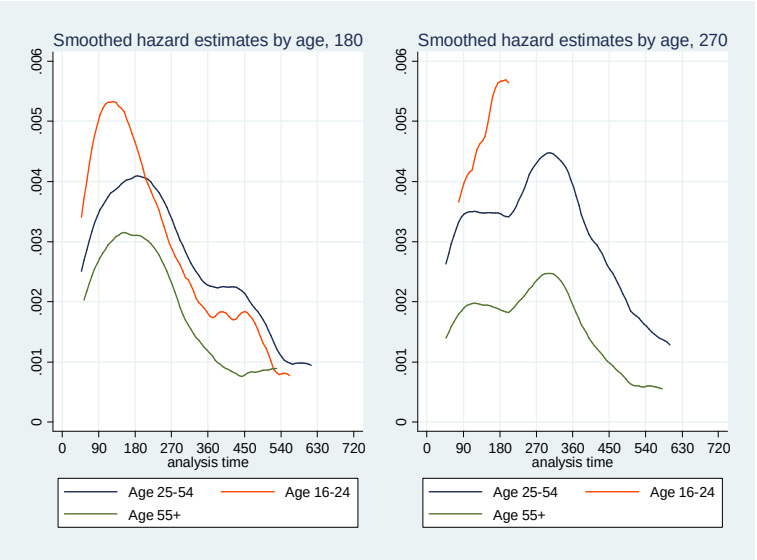

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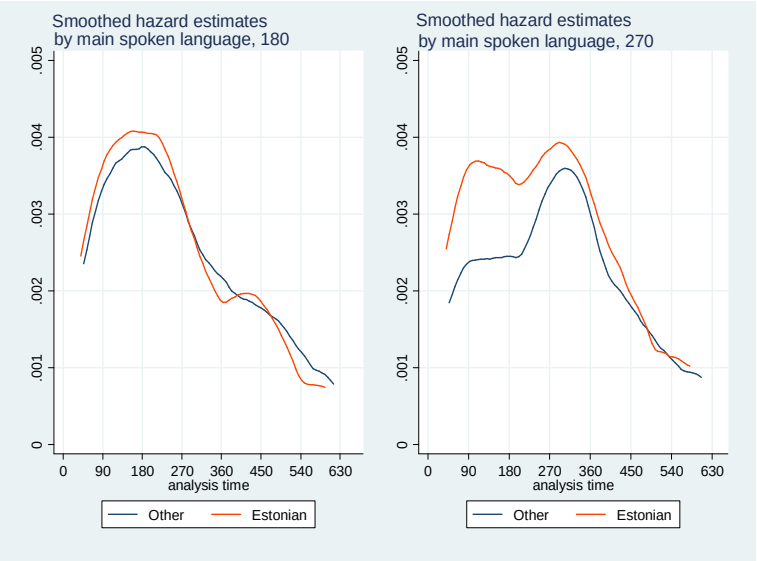

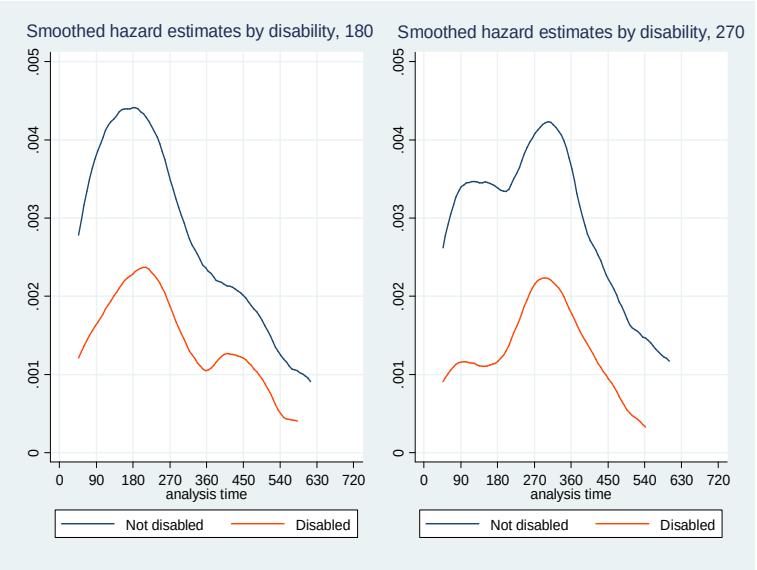

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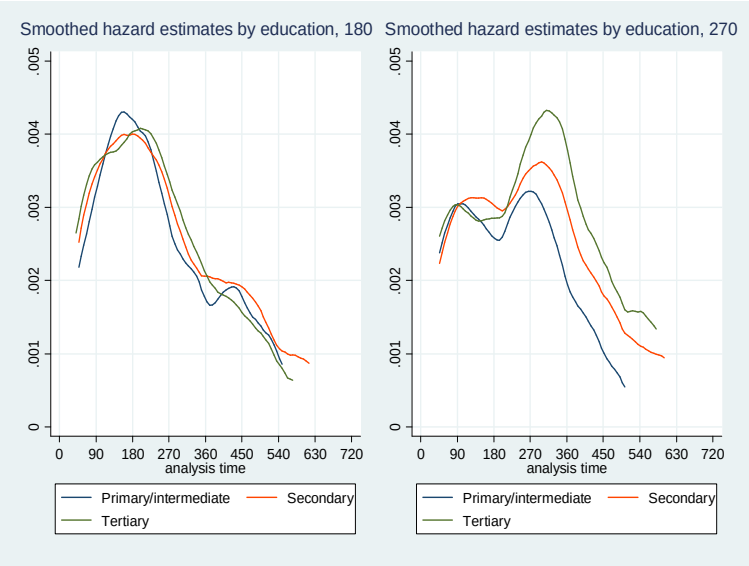

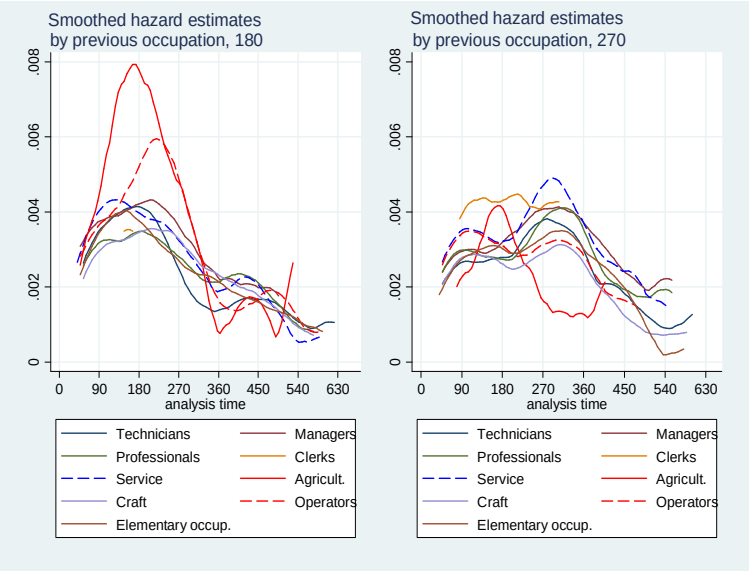

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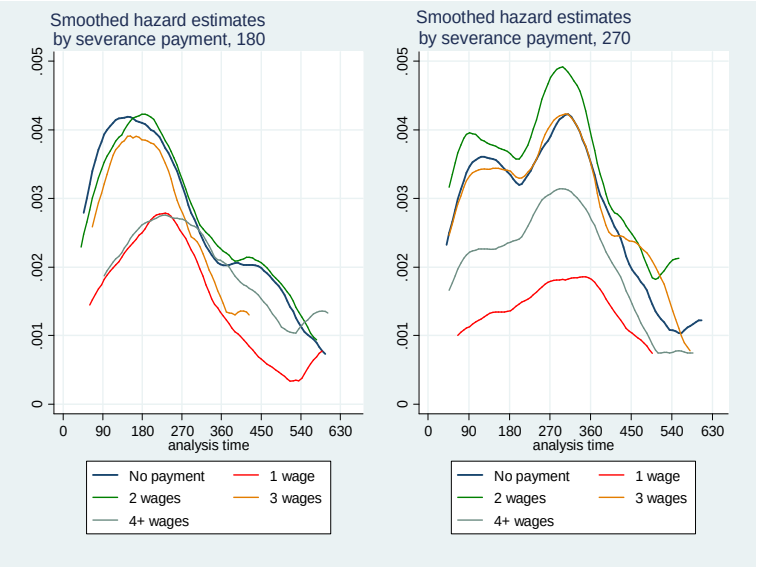

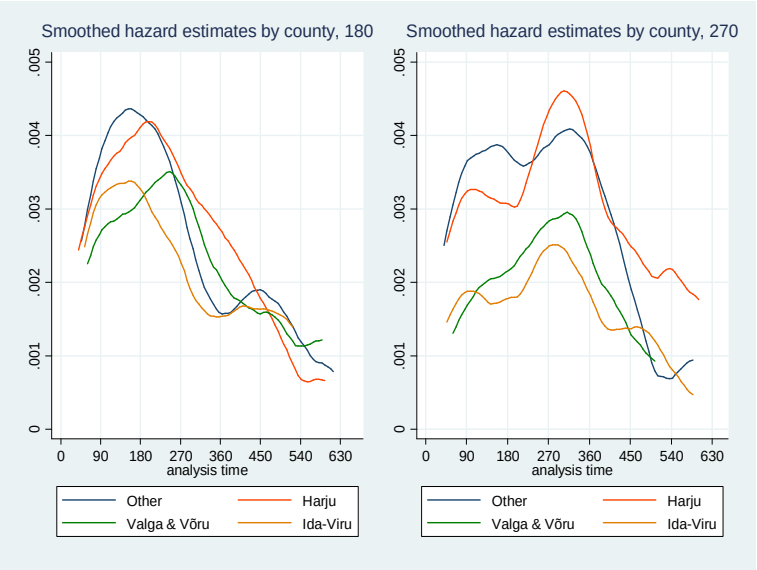

Appendix 2. Estimation results of piecewise-constant proportional hazard models where UIB is modelled as daily rates

Covariate	Compared to	UIB 180 days		UIB 270 days	
		Hazard ratio	P>z	Hazard ratio	P>z
0 EEK < UB rate <100 EEK	UB = 0 EEK	0.388	0.000	0.235	0.045
100 EEK <= UB rate <200 EEK		0.449	0.000	0.239	0.049
200 EEK <= UB rate <300 EEK		0.366	0.000	0.210	0.032
300 EEK <= UB rate		0.245	0.000	0.199	0.028
Male	Female	0.825	0.007	0.860	0.008
Age 16-24	Age 25-54	1.247	0.056	1.039	0.931
Age 55+		0.787	0.010	0.564	0.000
Elementary or basic educ.	General secondary education	0.873	0.208	1.122	0.255
Vocational educ. with basic educ.		0.996	0.966	1.145	0.076
Vocational secondary educ.		1.079	0.447	1.137	0.094
Professional secondary educ.		1.017	0.884	1.167	0.074
Vocational higher educ.		1.177	0.351	1.234	0.111
Bachelor's studies		1.083	0.512	0.992	0.927
Master's or doctoral studies		1.631	0.032	1.348	0.034
Main language Estonian	Other language	1.198	0.034	1.356	0.000
Prev. job: managers	Technicians (&agriculturists & clerks)	1.119	0.452	1.134	0.204
Prev. job: professionals		0.810	0.097	1.166	0.104
Prev. job: service and sales		1.058	0.637	1.287	0.012
Prev. job: craft and related trades		0.877	0.281	1.111	0.283
Prev. job: machine operators		1.305	0.042	1.345	0.004
Prev. job: elementary occup.		0.931	0.525	1.176	0.088
Disabled	Not disabled	0.388	0.000	0.484	0.000
Prev. job in Estonian public sector	Estonian private sector	0.854	0.522	1.236	0.075
Prev. job abroad		0.224	0.000	0.489	0.068
Reason of unempl.: unsuitability for the job	End of fixed-term contract	0.706	0.016	0.704	0.007
Reason of unempl.: unsatisfactory results of a probationary period		1.072	0.606	1.235	0.150
Reason of unempl.: bankruptcy		1.312	0.156	1.339	0.054
Reason of unempl.: liquidation of the organisation		0.810	0.200	1.443	0.003
Reason of unempl.: lay-off		0.951	0.550	1.081	0.299
Reason of unempl.: long-term incapacity for work		0.561	0.029	0.750	0.325
County: Harju	11 other counties	1.036	0.680	1.018	0.794
County: Võru & Valga		0.853	0.263	0.556	0.000
County: Ida-Viru		0.848	0.152	0.750	0.002
Tenure 1-5 years	Tenure <1 year	0.742	0.000	1.056	0.535
Tenure 5-10 years		0.561	0.004	0.873	0.130
Tenure 10+ years		0.564	0.009	0.697	0.000
Unemployment rate (%)		0.903	0.003	0.954	0.085

Appendix 2 (*continued*)

	UIB 180 days		UIB 270 days	
Time interval	Hazard rate	P>z	Hazard rate	P>z
day 1-10	0.004	0.000	0.003	0.000
day 11-20	0.007	0.000	0.006	0.000
day 21.30	0.008	0.000	0.011	0.000
day 31-40	0.013	0.000	0.016	0.000
day 41-50	0.022	0.000	0.019	0.000
day 51-60	0.016	0.000	0.017	0.000
day 61-70	0.018	0.000	0.014	0.000
day 71-80	0.028	0.000	0.019	0.000
day 81-90	0.027	0.000	0.015	0.000
day 91-100	0.019	0.000	0.012	0.000
day 101-110	0.035	0.000	0.017	0.000
day 111-120	0.024	0.000	0.023	0.000
day 121-130	0.023	0.000	0.019	0.000
day 131-140	0.029	0.000	0.019	0.000
day 141-150	0.035	0.000	0.020	0.000
day 151-160	0.030	0.000	0.020	0.000
day 161-170	0.030	0.000	0.016	0.000
day 171-180	0.037	0.000	0.015	0.000
day 181-190	0.020	0.000	0.022	0.000
day 191-200	0.032	0.000	0.020	0.000
day 201-210	0.025	0.000	0.019	0.000
day 211-220	0.030	0.000	0.017	0.000
day 221-230	0.037	0.000	0.023	0.000
day 231-240	0.027	0.000	0.020	0.000
day 241-250	0.024	0.000	0.019	0.000
day 251-260	0.035	0.000	0.020	0.000
day 261-270	0.030	0.000	0.024	0.000
day 271-280	0.015	0.000	0.007	0.000
day 281-290	0.016	0.000	0.010	0.000
day 291-300	0.012	0.000	0.011	0.000
day 301-310	0.013	0.000	0.009	0.000
day 311-320	0.017	0.000	0.009	0.000
day 321-330	0.014	0.000	0.010	0.000
day 331-340	0.011	0.000	0.006	0.000
day 341-350	0.013	0.000	0.004	0.000
day 351-360	0.008	0.000	0.011	0.000
day 361-370	0.016	0.000	0.004	0.000
day 371-380	0.015	0.000	0.005	0.000
day 381-390	0.014	0.000	0.008	0.000
day 391-400	0.012	0.000	0.005	0.000
day 401-410	0.011	0.000	0.006	0.000
day 411-420	0.021	0.000	0.008	0.000
day 421-430	0.009	0.000	0.006	0.000
day 431-440	0.014	0.000	0.003	0.000
day 441-450	0.017	0.000	0.006	0.000

Appendix 2 (*continued*)

	UIB 180 days		UIB 270 days	
Time interval	Hazard rate	P>z	Hazard rate	P>z
day 451-460	0.023	0.000	0.002	0.000
day 461-470	0.010	0.000	0.004	0.000
day 471-480	0.029	0.000	0.005	0.000
day 481-490	0.010	0.000	0.007	0.000
day 491-500	0.014	0.000	0.006	0.000
day 501-530	0.010	0.000	0.001	0.000
day 531-560	0.012	0.000	0.003	0.000
day 561-590	0.008	0.000	0.003	0.000
day 591-620	0.010	0.000	0.004	0.000
day 621-692	0.012	0.000	0.003	0.000
θ (variance of gamma shared frailty;				
Likelihood-ratio test of θ =0)	0.722	0.000	0.292	0.014
Wald test	20349.49	0.000	31157.41	0.000
Akaike IC	7502.701		8368.801	
No. of observations	69230		83103	
No. of subjects	2772		3196	
No. of failures	2074		2360	

KOKKUVÕTE

Töötuskindlustushüvitise mittestimuleeriv mõju töötusest väljumisele: maksimaalne hüvitiseperiood versus hüvitise suurus

Kõige levinumaks teooriaks töötushüvitiste mõju vaatlemiseks töötuse kestusele on otsimisteooria. Otsimisteooria kohaselt vähendavad nii suurem maksimaalne töötushüvitise maksmise periood kui kõrgem hüvitis töötusest väljumise tõenäosust. Lisaks tõuseb hõivesse liikumise määr hüvitiseperioodi lõpu lähenedes ja seetõttu toimub hõivesse liikumise riskimääras hüpe just enne hüvitiseperioodi lõppu. Kuigi empiiriliselt on hüvitise mõju püütud erinevate riikide andmetel hinnata, siis Ida-Euroopa andmetel on teema uurimine olnud väga tagasihoidlik. Teema on Eesti jaoks hetkel väga oluline, sest kavandatakse mitmeid muudatusi töötushüvitiste süsteemis.

Tulenevalt Eesti töötuskindlustussüsteemi uudsusest hakati alles 2007. aastal maksma lisaks 180-päevastele töötuskindlustus-hüvitistele ka 270-päevaseid hüvitisi. Seetõttu vaadeldakse käesolevas uurimuses hüvitisi, mis määrati 2007. aastal. Hüvitise saamist puudutavad andmed ja hüvitisesaajate karakteristikud on ühendatud Maksu- ja Tolliameti andmetega palgatulu kohta. Seega on tegemist küllaltki ainulaadsete andmetega, sest väga täpselt on vaadeldav töötuseperioodi lõpp, millal inimene tõepoolest leiab töö ja hakkab teenima palka.

Käesolevas uurimuses analüüsitakse töötushüvitiste mõju nii mitteparameetrilise kui parameetrilise meetodiga ning mõlema analüüsi tulemusel osutub, et töötushüvitistel on tõepoolest oluline mittestimuleeriv mõju töötusest hõivesse liikumisel. Hüvitise mõju töötuse kestusele osutub isegi olulisemaks kui enamik teisi tegureid.

Töötud, kellel on õigus lühemale töötuskindlustushüvitisele, on töötusest hõivesse liikumisel väga tundlikud nii hüvitise suuruse, maksimaalse perioodi kui muutuste suhtes hüvitise suuruses.

Töötud, kellel on õigus pikemale töötuskindlustushüvitisele, on eelkõige mõjutatud hüvitise maksimaalsest kestusest. Baasriskimäär liikuda hõivesse on läbivalt kõrgem nendel inimestel, kes saavad lühemat töötuskindlustushüvitist. Samuti ilmneb, et baasriskimäär liikuda töötusest hõivesse tõuseb mõlemal grupil kogu hüvitiseperioodi vältel ja langeb järsult peale hüvitise maksmise lõppemist. Samas võib mõningal määral sellise tõusu ja languse taga olla ka varimajandus. Inimene võib tahta säilitada hüvitist ja hakata tööle ilma formaalse töölepinguta ning sõlmida leping alles peale hüvitiseperioodi lõppu.

2011. aasta lõpus saab Eestis võimalikuks saada töötuskindlustushüvitist maksimaalselt 360 päeva. Käesolev uuring näitab, et baasriskimäär hõivesse liikuda on pikema hüvitiseperioodi puhul madalam ning keskmise hüvitise saamine vähendab hõivesse liikumist kahekordselt 180-päevase hüvitise puhul ning neljakordselt 270-päevase hüvitise puhul. Seega võib Eestis 2012. aastal töötus suureneda tänu 360-päevase hüvitise lisandumisele. Kuivõrd samal ajal oodatakse tööturu taastumist kriisist, ei pruugi töötuse tõus olla aga märgatav.

Järgmine suurem töötushüvitiste reform on plaanis Eestis 2013. aastal, mil vabatahtlik töötus kaetakse osaliselt töötuskindlustussüsteemiga. Seega osa inimesi, kes praeguste reeglite korral saaks töötutoetust, hakkaks saama töötuskindlustushüvitist, mis oleks kõrgem töötutoetusest, kuid madalam sunnitud töötuse korral makstavast töötuskindlustus-hüvitisest. Tulenevalt lisatingimusest tööstaaži pikkuse kohta kvalifitseeruvad need inimesed enamasti pikemale töötuskindlustushüvitisele.

Käesolev uuring näitab, et reformid, mis tõstavad hüvitise suurust, avaldavad rohkem mõju lühema hüvitiseperioodiga inimestele. Riskide suhe võrreldes hüvitise mittesaamisega kõigub erinevate hüvitise tasemete lõikes 270-päevase hüvitise puhul 0,25 ümbruses. 180-päevase hüvitise puhul on aga varieeruvus tunduvalt suurem – 0.25-0.56. Seega võib tõus hüvitise suuruses vähendada hõivesse liikumise määra rohkem lühema hüvitiseperioodi puhul ja vähem pikema perioodi puhul.

Vaatlusaluseks perioodiks uuringus on aastad 2007-2008, kui Eestis algas majanduslangus ning töötusemäär hakkas tõusma. See näitab, et töötushüvitiste mittestimuleeriv mõju on tugev isegi majanduslanguse ja tõusva töötusemäära korral.