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ANNE LAURINGSON

The impact of the generosity of unemployment benefits on Estonian labour market outcomes in a period of crisis

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LIST OF AUTHOR'S PUBLICATIONS AND CONFERENCE PRESENTATIONS

I Articles in international journals

1. Lauringson, A. "Disincentive Effects of Unemployment Insurance Benefits: Maximum Benefit Duration versus Benefit Level" – Baltic Journal of Economics, Vol. 11, No. 1, Spring 2011, pp. 25–50.

II Chapters in monographs

1. Lauringson, A. "Ametiühingute mõju ettevõtete tootlikkusele Eesti tekstiilisektori näitel" ("Unions' Impact on Enterprise Productivity on the Example of the Estonian Textile Sector") – Reports-papers of the XIII scientific and educational conference on economic policy "Estonia – an EU Member State" (Tartu-Värska, June 30 – July 2, 2005). Berlin, Tallinn: Berliner Wissenschafts-Verlag GmbH, Mattimar OÜ, pp. 377–387.

III Other research articles

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ABBREVIATIONS

ALMP – active labour market policies
ATE – (population) average treatment effect
ATT – average treatment effect on the treated
DID – difference-in-differences (estimator)
IV – (methods of) instrumental variables
PSM – propensity score matching
RDD – regression discontinuity design
UA – unemployment allowance
UB – unemployment benefits (unemployment insurance benefit and unemployment allowance)
UIB – unemployment insurance benefit

INTRODUCTION

Motivation for the research and the importance of the topic

The most recent global financial crisis had an impact on the labour market in all the countries of the European Union. Unemployment rates started to increase in most countries in the second half of 2008 and in a few countries like Ireland, Greece and Spain they still continued to increase throughout 2011. The problem of high unemployment rates made countries focus on their labour market policies and the provision of active and passive labour market measures. Most countries adopted some special crisis measures such as extending benefits, enlarging the provision of active measures or developing new active measures in an effort to stop the increase in unemployment, reduce the duration of unemployment, diminish the scarring effects of unemployment, and stop the loss of skills among the unemployed.

The Estonian labour market was affected by the crisis more than the labour markets of other countries in the European Union. By the first quarter of 2010 the unemployment rate had grown fivefold since the second quarter of 2008 from 4.0% to 19.8% (see Figure 1). Relatively high increases were also seen in the unemployment rates in the other two Baltic states during this period, with unemployment increasing four times in Lithuania and 3.3 times in Latvia, but the increases were much milder in other EU countries. However, the recovery in 2010–2011 was also faster in Estonia than in any other EU country. The extreme turbulence in the labour market makes Estonia an interesting case to study. From Estonian data it is possible to investigate the effects of labour market policies on labour market outcomes and the behaviour of the unemployed in an extremely difficult labour market situation. This thesis studies labour market outcomes at the micro level, particularly labour market status as in employment or not in employment, and wages[1].

One of the issues debated during the crisis has been the generosity of unemployment benefits, above all the question of whether benefits should be more generous during an economic downturn. The main theory that explains the effects of unemployment benefits on labour market outcomes is search theory, and its importance is reflected in the award of the Nobel Prize in 2010 to Peter A. Diamond, Dale T. Mortensen and Christopher A. Pissarides for developing search theory. One of the main conclusions of search theory is that more generous unemployment benefits increase the duration of unemployment and give rise to higher unemployment. This is the disincentive effect of unemployment benefits. However, extensions of search theory also predict positive effects on labour market outcomes. It can be shown that more generous systems can

[1] However, labour market outcomes also include other indicators such as the supply of working hours or labour productivity.

increase job quality once the unemployment spell is over[2]. In addition, it is not clear in the search theory context, how the behaviour of the unemployed and the effects of unemployment benefits change in different economic situations.

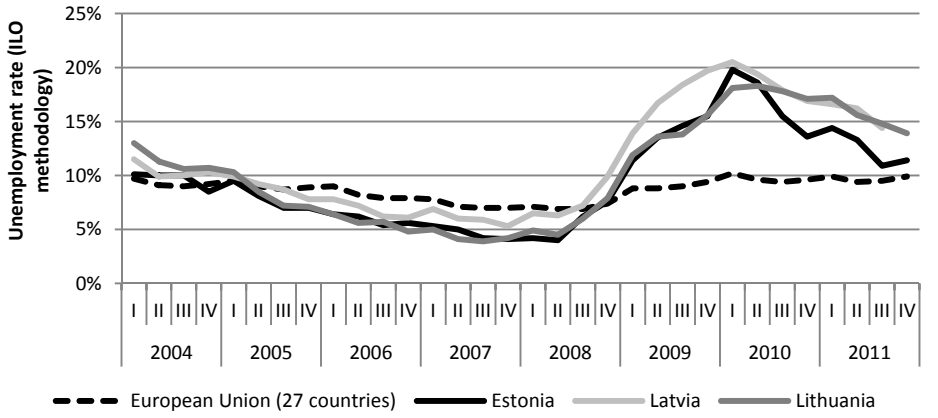

Figure 1. Labour market situation in Estonia compared to those in the other Baltic states and the European Union 2004–2011

Source: Eurostat

The most straightforward and most commonly empirically substantiated effect of unemployment benefits predicted by search theory is that an increase in the amount or duration of unemployment benefits lowers the probability of a person exiting unemployment (for example Meyer (1990), Katz and Meyer (1990), van Ours and Vodopivec (2006)). In addition, during the benefit period the job search intensity increases, the reservation wage declines and the probability of exiting unemployment increases, so there is a spike in the exit rate to employment at the end of the unemployment benefit period. However, an increase in the generosity of benefits can encourage the unemployed currently not receiving benefits to enter employment in order to be entitled to benefits in the future.

In the search model, a crisis in the economy means above all a lower job arrival rate. However, the effect of the crisis on the behaviour of the unemployed is somewhat ambiguous in this model. On the one hand, a lower job arrival rate means fewer chances for exiting unemployment and the exit rate declines. On the other hand, the unemployed become less selective among job offers, the reservation wage decreases and the exit rate to employment

[2] Referred to in the job search literature as post-unemployment job quality. This comprises the features of the accepted job that are relevant for the worker, such as wage, employment contract duration, and match between skills and tasks.

increases. Similarly, the effect of the worsened economic situation on the spike prior to the benefit exhaustion date is ambiguous.

The effects of unemployment benefits and the economic situation on unemployment duration are thoroughly discussed in job search literature. The general consensus is that unemployment benefits prolong the job search and that the economic situation has ambiguous effects. However, in recent years the interaction between these two factors has also been addressed. It can be argued that the benefit disincentive effect can vary over the business cycle. In the theoretical literature regarding the cyclicality of disincentive effects, benefits are mostly expected to have less distortionary effects during a crisis, though the answer to this question is still ambiguous (see for example Krueger and Meyer (2002), Jurajda and Tannery (2003), Landais *et al.* (2010), Kroft and Notowidigdo (2011)). However, the empirical research in this matter is also scarce and the few existing studies in this field find that the disincentive effect might be slightly lower during a recession (Bover *et al.* (*2002)*, Jurajda and Tannery (2003), Schmieder *et al.* (2010), Kroft and Notowidigdo (2011)), but there are no studies exploring whether the disincentive effect still exists in an extremely bad labour market.

In short, in the framework of search theory, unemployment benefits are expected to have mostly negative effects on the labour market as they increase unemployment duration, but these distortionary effects might be milder in a recession. However, extensions of search theory state that more generous unemployment benefits can also relax the restrictions on job search and by that increase the post-unemployment job quality in terms of higher wages, longer job duration, and better matching of job and skills. This means that unemployment benefits could support the job search rather than motivating people to stay in unemployment (Burdett (1979)). In theoretical literature, the beneficial effects of unemployment benefits on post-unemployment job quality are shown for example by Marimon and Zilibotti (1999) and Acemoglu and Shimer (2000).

While the disincentive effect of benefits has often been empirically substantiated, it is only in recent years that there has been more focus on the effect on post-unemployment job quality. Furthermore, the results of these studies are quite varied and only some of them confirm the positive effects on post-unemployment job quality. More positive effects have been found on post-unemployment employment duration (for example Belzil (2001), Centeno (2004), Tatsiramos (2009), Caliendo *et al.* (2009)) than on the post-unemployment wage (for example Gangl (2002), Gangl (2006), Fitzenberger and Wilke (2007)).

In conclusion, the labour market situation during recent years has brought more focus onto study of the effects of unemployment benefits on labour market outcomes. Though it has been confirmed that unemployment benefits extend unemployment duration, it is still both theoretically and empirically ambiguous as to whether this effect varies with business cycles. In addition, it

has not been empirically substantiated whether benefits could also increase post-unemployment job quality as the results so far are not unanimous. Hence these are the issues that this dissertation addresses.

During recent years some literature has emerged on sanctions and monitoring in the unemployment benefit system (for example Abbring *et al.* (2005), Lalive *et al.* (2005), McVicar (2008), Svarer (2011)). The studies on this issue tend to find that the monitoring of job search and the application of sanctions if the job search effort is insufficient tend to decrease the disincentive effect of unemployment benefits, though sanctions might also decrease post-unemployment job quality (Arni *et al.* (2009)). This shows that monitoring and sanctions can be important determinants of the effects of unemployment benefits on unemployment duration and post-unemployment job quality. However, the issues of monitoring and sanctioning are not dealt with empirically in this dissertation as monitoring and sanctions are used in Estonia at a very low level and there are no data that would allow an estimate of their effects on labour market outcomes. Nevertheless, the thesis sheds some light on this issue by providing a discussion of the effects of monitoring and sanctions estimated in the earlier studies in other countries.

This thesis focuses on the effects of unemployment benefits on labour market outcomes. However, when assessing the system of unemployment benefits, it has to be kept in mind that the impact of unemployment benefits on the entire economy is not limited to their impact on the labour market, but the purpose of unemployment benefits as a social security instrument that should smooth the fluctuations in a person's income and the consequences of this effect are beyond the scope of this thesis.

The scope of the thesis is depicted in Figure 2. The two main effects of passive labour market policies in the form of unemployment benefits on labour market outcomes proposed by the theory are studied. Firstly, the effect of prolonging unemployment duration is analysed and secondly, the effect of lifting post-unemployment job quality is studied. The first of these effects can be considered to have largely negative consequences and the second effect more positive consequences. As a result both the negative and positive effects on labour market outcomes emerging from the unemployment benefit system in Estonia are studied.

Active labour market measures can also affect the duration of unemployment and post-unemployment job quality. However, these effects work through somewhat different channels than those used by passive labour market measures, so active labour market measures are studied in this thesis only inasmuch as they are part of the system of passive labour market measures, meaning if they are implemented as a requirement for eligibility for unemployment benefits and basically working then like other eligibility criteria for benefits such as reporting of job search for monitoring. Empirically, active measures are included in some of the models only as controls for the corresponding effects of unemployment benefits.

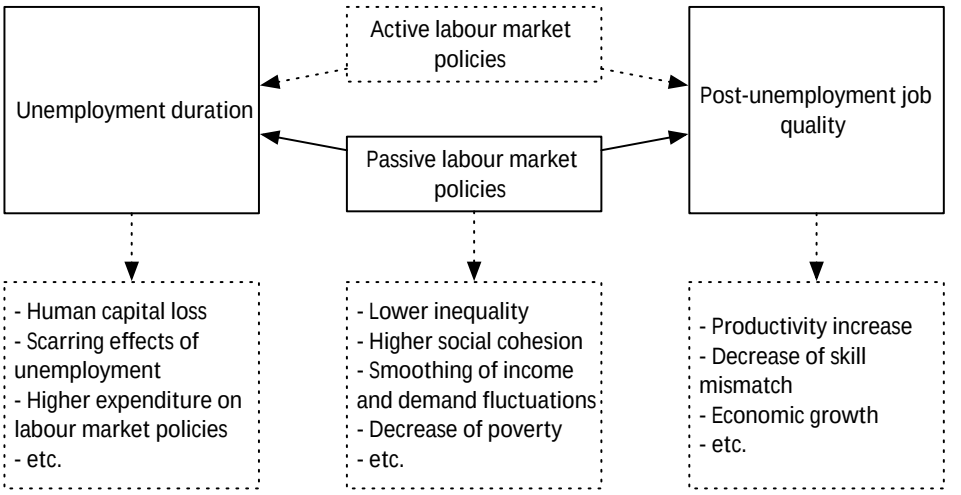

Figure 2. Scope of the thesis

Note: The solid line presents those aspects that are covered in this thesis and the dashed line those which are beyond the scope.
Source: author's figure

The aim, the research tasks and the hypotheses postulated

The aim of this thesis is to study the effects of the generosity of unemployment benefits on labour market outcomes during a period of deep recession in Estonia. Estonia witnessed a sharper increase in the unemployment rate than any other country in the European Union, and this makes it possible to study the benefit effects in an extreme economic situation. The crisis period is defined in this thesis as the period when the unemployment rate was rising continuously, from the third quarter of 2008 until the first quarter of 2010. In addition, studying the effects of benefit generosity in the system of unemployment benefits in Estonia allows suggestions to be made about the design of the system.

There are four main research tasks that must be completed to achieve the aim of this thesis. The first task is to provide a theoretical framework for the study. For this, an overview of search theory is presented with the focus on the effects of benefits on unemployment duration and post-unemployment job quality and the implications of this theory for business cycles. A discussion of the methods for studying benefit effects and an overview of earlier empirical results on benefit effects are also provided.

The second research task is to provide an overview of the Estonian unemployment benefit system. This involves describing the Estonian unemployment benefit system, its development over the years and the situation during the

period under study, earlier studies concerning passive labour market measures in Estonia, and the data available for the study.

The remaining two tasks encompass estimating the benefit effects. The first is to estimate the effects of unemployment benefits on unemployment duration both before and during the economic crisis. This makes it possible to compare the disincentive effects under different economic situations to see whether they are different. The last research task is to estimate the effect of benefit generosity on post-unemployment job quality during the crisis, and more specifically the effect on the post-unemployment wage and post-unemployment job duration.

Data and methods used

The thesis uses two main sources for its data, the database of the Estonian Unemployment Insurance Fund and the database of the Estonian Tax and Customs Board. The two databases are combined so that there are data from both databases for every observation. The first database provides information related to registered unemployment such as unemployment benefit receipts and participation in active labour market programmes and in addition, it contains data about previous employment and various socio-demographic data for the registered unemployed.

The labour market outcomes are studied using wage data from the Estonian Tax and Customs Board. Monthly data about wages and employers have been available for the analysis, so the real lengths of the unemployment period and the employment period, and wage level are very well definable. Overall, it is an unusually good dataset for studying the effects of unemployment benefits as it covers in great detail the length of unemployment spells and employment spells, wage levels, the receipt of unemployment benefits, and participation in active measures as well as a broad range of the personal characteristics of the registered unemployed.

The thesis focuses on the Estonian labour market during the last global economic downturn and hence the emphasis is on the labour market behaviour of the unemployed during the period when the unemployment rate grew rapidly in Estonia, from the third quarter of 2008 until the first quarter of 2010. The main group of people under study is those unemployed who started to receive unemployment benefits during the period from the third quarter of 2008 until the first quarter of 2009, which basically means those people who started their unemployment spell in the beginning of the crisis period. The entry to employment and the quality of the jobs accepted is studied until the first quarter of 2010 when the unemployment rate peaked. Though wage data for longer time periods are used for analysing post-unemployment job quality, only those people who accepted a job during the crisis period are studied.

In addition, the effect of unemployment benefits on unemployment duration is studied using data from the pre-crisis period enabling some conclusions to be

drawn on the magnitude of the disincentive effect during a crisis and a pre-crisis period. For the pre-crisis period, unemployment benefits granted in 2007 are studied. The wage data for those benefit recipients are combined up to the end of 2008. Only benefits granted in 2007 are used for the study of the pre-crisis period, because in earlier years there was no variation in the possible duration of unemployment insurance benefits and the maximum possible duration was 180 days, but in 2007 it became possible to be eligible for unemployment insurance benefit for 270 days.

The studies presented in the thesis focus above all on comparing unemployment insurance benefit recipients of 180 days and 270 days, though in some parts of the thesis information is also used about unemployment allowance recipients and the unemployed with a different possible unemployment insurance period due to a continuing benefit period from a previous unemployment spell. Only unemployment benefit recipients and especially unemployment insurance benefit recipients are compared, as these groups should otherwise be more similar and there should be lower probability for selection problems. The groups of unemployed without unemployment benefits differ a lot in observable variables from the benefit recipients. In addition, it is likely that they differ also in their unobservable variables. The unemployed without any unemployment benefits during the beginning of the registered unemployment period are only those people who have previously had only a very short employment period or who have been out of employment over a longer period. Comparison of unemployment allowance recipients with unemployment insurance benefit recipients can also be debatable as these are the unemployed who have either had a somewhat shorter previous employment period or whose previous employment was not terminated on the initiative of the employer.

As the analyses cover only benefit recipients, the conclusions drawn from the analyses regard above all the effects of the generosity of benefits. The overall effect of the unemployment benefit system may be different if recipients are compared to the unemployed with no benefit receipts, as the behaviour of benefit recipients can be affected by the benefit receipt beyond the benefit period. This limitation mainly concerns Chapter 4 where only recipients of unemployment insurance benefit of 180 days and 270 days are compared, meaning it is possible to look only at the effects that stem from the additional 90 days of unemployment insurance benefit.

Three main methods are used for studying the benefit effects: Kaplan-Meier survival estimates, the piecewise-constant proportional hazard model, and propensity score matching. In addition, a method similar to the regression discontinuity design is used. This means that the change in the labour market behaviour of the unemployed around the cut-off point of eligibility for a different possible benefit period is studied. The application of this method lowers the potential selection problem and the method is combined with the three main methods of Kaplan-Meier estimates, the piecewise-constant proportional hazard model and propensity score matching.

The effect of unemployment benefits on unemployment duration is explored using Kaplan-Meier estimates and the hazard rate model (Chapter 3). Kaplan-Meier estimates provide a first candid look at the behaviour of the unemployed. The piecewise-constant proportional hazard model allows the disincentive effect to be quantified in a flexible model where time-varying variables can be taken into account.

Two proxies for post-unemployment job quality are used in the thesis: the post-unemployment wage and post-unemployment job duration (Chapter 4). The main method for analysing the effect of unemployment benefits on the wage is propensity score matching, where people eligible for longer benefits are matched with people eligible for shorter benefits to estimate the average treatment effect on the treated, measured as the difference in wages between people on a longer benefit and statistically similar people eligible for a shorter benefit.

The analysis of post-unemployment job duration uses the Kaplan-Meier survival estimates and the piecewise-constant proportional hazard model as methods of duration analysis together with propensity score matching. As with the analysis of wage differences, propensity score matching is used to match people eligible for a longer benefit period with people eligible for a shorter benefit period to estimate the average treatment effects on the treated.

A method similar to regression discontinuity design is applied in sections using data from the crisis period (3.2, 4.1 and 4.2) so that the observations close to the cut-off point of the eligibility for the longer unemployment benefit period are studied in more detail. This method cannot be applied on the pre-crisis data as there are too few observations.

Though the use of administrative data in the thesis allows the employment and non-employment periods and wage levels to be defined very precisely, these data only contain information about the formal sector. This means it is not possible to estimate from this data whether the effect of unemployment benefits on labour market outcomes might be different were the shadow economy also considered.

In addition, the data set available does not include data about the job search intensity of the unemployed. This means it is possible to shed some light on the issue of changes in the reservation wage during the unemployment period and how selective the unemployed are with regard to job offers, but it is not in general possible to estimate how big a role is played by changes in the job search activity. Similarly, there are no data about job search monitoring that could be used for estimating its effects on labour market outcomes. Even though there are data about sanctions, it is not possible to estimate their effect either, as it is not possible to see in the data whether a termination of benefit was imposed before or after a person entered employment, or whether the person did not come to the public employment service because they had entered employment or they entered employment after the benefit was terminated.

Furthermore, the data allow study of the post-unemployment job quality only in terms of the accepted wage and the post-unemployment job duration, so

it is not possible to examine for example whether the accepted job is part-time or full-time or how well the job matches the skills of the person taking it. However, the post-unemployment job duration is generally considered to be a good indicator of job match quality.

A more comprehensive overview of the data used in the analysis is provided in Section 2.3. A discussion of the methods applicable for studying unemployment benefit effects is presented in Section 1.2.

The structure of the thesis

The structure of the thesis largely follows the research tasks raised to achieve the aim of the thesis. The first chapter provides the theoretical framework for the analysis. Firstly, it gives an overview of search theory with special emphasis on the effect of unemployment benefits on unemployment duration and post-unemployment job quality and the implications of search theory in the context of an economic downturn. Secondly, it presents an overview of the methods that can be used for the analysis of benefit effects, with an overview of duration analysis methods and micro-econometric methods for policy evaluation. Thirdly, it looks at the earlier empirical studies on the effects of unemployment benefits on unemployment duration and post-unemployment job quality. At the end of the first chapter, the hypotheses postulated in the thesis are presented.

The second chapter presents the Estonian unemployment benefit system, as the estimations of benefit effects in the following chapters are based on this system. This chapter describes the development of the system over the years and gives a more detailed overview of the system as it was during the period studied in the thesis. It also discusses the previous studies on the provision of passive labour market policies in Estonia. In addition, it describes the data used in the analyses presented in the next chapters.

Chapters three and four provide the estimation results for unemployment benefit effects on labour market outcomes. The third chapter first takes a brief look at the effect of unemployment benefits in the pre-crisis period, and later covers the same issue using the data from the crisis period. The fourth chapter investigates post-unemployment job quality during the crisis period through the effect of unemployment benefits on wages and on job duration.

The four chapters are followed by a conclusion where the results of the analyses of the effects of benefit generosity on labour market outcomes are discussed. In addition, some suggestions about the design of the system of unemployment benefits in Estonia are drawn in this part of the thesis.

1. THE THEORETICAL FRAMEWORK FOR STUDYING THE EFFECTS OF UNEMPLOYMENET BENEFITS

1.1. Search theory and its extensions

1.1.1. The impact of unemployment benefits on unemployment duration

In the theoretical literature concerning the effects of unemployment benefits on labour market outcomes, two main aspects are considered. Firstly, the effects of unemployment benefits on unemployment duration, and in a broader sense on the unemployment rate and labour supply, are considered. This aspect is discussed in this subsection. The other main effect considered is the effect on post-unemployment job quality, which is covered in the next subsection. The third subsection in this section studies the theory concerning these effects in the context of an economic downturn.

The simplest model in which unemployment benefits can be integrated, is the static labour-leisure model. In this model individuals have to decide between employment, or wage-earning, and unemployment, or leisure. It is assumed that individuals can get a job at any time at a fixed wage. The existence of unemployment benefits modifies the budget constraint by reducing opportunity cost of leisure. So, when benefits are subsidising leisure, unemployment becomes more attractive during the benefit period and hence prolongs the unemployment duration (Moffitt and Nicholson 1982).

The most common model for observing the impact of unemployment benefits on unemployment duration is the search model[3] (for a thorough overview see for example Mortensen (1986), Van den Berg (1990), Mortensen and Pissarides (1999), Cahuc and Zylberberg (2004)). This is a dynamic model in contrast with the labour-leisure model, as individuals cannot enter employment at any time but have to search for a job. Furthermore, the wage is not fixed and individuals only know the distribution of wages on the market. Individuals maximise the present value of utility over their lifetime. During employment, the utility consists of wages and during unemployment it consists of leisure and unemployment benefit. The minimum acceptable wage, which is the reservation wage for an individual, depends on how high the unemployment benefits are. It is assumed that an individual will accept any wage offer above his or her reservation wage. The probability of the individual receiving a wage offer depends on their search intensity, so the probability of exiting unemployment

[3] The earliest works in job search literature are usually considered to be those by Stigler (1961, 1962). However, the large supply of articles that can be regarded as search literature was produced in the 1970's, above all by Mortensen (e.g. 1970, 1977), Pissarides (e.g. 1976, 1979), and Burdett (e.g. 1978, 1979), and also many others.

equals the probability of receiving a wage offer times the probability of accepting it (the model itself is presented in more detail in subsection 1.1.3).

There are three main conclusions drawn from the search model:

1) An increase in the amount or maximum duration of unemployment benefits reduces the cost of a job refusal and hence the probability of exiting unemployment decreases, meaning that unemployment duration is lengthened when the generosity of unemployment benefits in terms of their amount or maximum duration increases. This effect is called the disincentive effect or the adverse incentive effect[4].
2) The entitlement effect or re-entitlement effect works in the opposite direction to the disincentive effect. An increase in the amount or maximum duration of unemployment benefits encourages those unemployed people who are currently not entitled to unemployment benefits to accept a job in order to become entitled to benefits in the future. Employment gains more value because of a higher expected benefit later on, and hence the exit rate into employment increases for those unemployed currently without benefits.
3) The exit rate into employment increases when benefit exhaustion approaches. As a result, there is a spike in the exit rate into employment prior to the end of the benefit period[5]. In the beginning of benefit period, the probability of still finding a job before the benefit is exhausted is quite high. During the unemployment benefit period the probability of not finding a job before the end of the unemployment benefit period increases, so during the period, individuals increase their job search intensity, while their reservation wage decreases and exit rate increases. After the benefit period, the exit rate should stay the same, as the search intensity and the job search environment should remain 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 then remain constant at a higher level. If income and leisure are substitutes, then it should fall and stabilise at a lower level (Meyer (1990)). Stabilisation at a higher level is usually assumed.

In addition to these three main conclusions, there are several extensions. For example Carling, Holmlund and Vejsiu (2001) combine the first two conclusions. If there is an increase in the amount of unemployment benefits, the reservation wage increases for those unemployed people who are in the beginning of their benefit period, but decreases for those whose benefit period is

[4] Alternatively, Chetty (2008) argues that unemployment benefits increase unemployment duration through a "liquidity effect" as well as "moral hazard". He shows that when the unemployed cannot smooth consumption perfectly, then search intensity is affected by a liquidity effect in addition to the disincentive effect.

[5] The spike at the end of benefit period can also be explained partly by optimised timing of job starting dates according to a model by Boone and van Ours (2009). This suggests that besides the behaviour of unemployed people, the nature of jobs also matters.

about to end. This means that the exit rate decreases for the first group of newly unemployed, and increases for the others whose benefit is almost exhausted. The value of current benefit increases is smaller for the second group, because they are almost in the same situation as the unemployed who are not entitled to any benefit.

There are also many extensions to the model itself that lead to different conclusions. Atkinson and Micklewright (1991) are highly critical of the basic search model. In their opinion the search model simplifies the world too much and its assumptions are too limiting. As the conclusions drawn from search theory are quite negative they think that the conclusion would be less negative if the theory were closer to the real world. For example, in addition to the impact on workers, that on employers should also be looked at in an equilibrium job search model. Furthermore, unemployment benefits and an individual's labour market behaviour can also affect the spouse's labour market behaviour, and this should also be taken into account. They believe that the assumptions of the theory mean that search theory describes an unemployment allowance rather than unemployment insurance benefit and hence the conclusions for unemployment insurance benefit from the basic search model overstate the negative effects.

In recent years, the search model has been developed and made more realistic by considering that the unemployed can receive unemployment insurance benefit as well as unemployment allowances, that unemployment benefit rates can change during an unemployment spell and that certain conditions must be met for a person to be entitled to a benefit (for example Ortega and Rioux (2008), Coles and Masters (2006), Albrecht and Vroman (2005), Fredriksson and Holmlund (2001)). Job search and matching equilibrium models have particularly been used for these extensions.

An example is the model by Albrecht and Vroman (2005), which takes a closer look at the entitlement effect. In this model, the rate of benefit is higher in the beginning of the benefit period and falls after a certain moment. They conclude that an increase in the higher rate lowers the reservation wage for those unemployed who are currently receiving the higher rate. If the benefit rate were constant, as in the original model, the reservation wage would increase because the value of being unemployed would increase. With time-varying benefit rates, a rise in the higher rate encourages the unemployed to re-entitle themselves to benefits, so their reservation wage falls and exit rate increases.

Some more recent extensions of the search model also consider monitoring of job search and sanctioning in the unemployment benefit system. Generally these models expect the disincentive effects of unemployment benefits to be smaller when monitoring and sanctions are used[6]. One of the earliest works on the monitoring of unemployment benefits by Tsbelis and Stephen (1994) argues

[6] A review of some theoretical and empirical studies on monitoring and sanctions is provided by Fredriksson and Holmlund (2006a).

that when benefits are monitored the size of the benefit does not incur a disincentive effect, but the potential duration of benefits still does. Fredriksson and Holmlund (2006b) show that monitoring in conjunction with sanctions restores search incentives more effectively than time limits on the duration of unemployment benefits or workfare. Furthermore, Boone, Fredriksson, Holmlund and van Ours (2007) find that monitoring can be an effective tool even if search efforts are not perfectly observable and irrespective of whether or not there are time limits for unemployment benefit payments. Boone and van Ours (2006) show that monitoring and sanctions in the unemployment benefit system can incur an *ex ante* effect from the threat of sanction and an *ex post* effect from a sanction that took place, and that both these effects increase the transition from unemployment to employment. However, van den Berg and van der Klaauw (2006) conclude from their model that monitoring might cause a shift from informal to formal job search and so monitoring might have no effect on the transition rate to employment.

To summarise the main effects of the system of unemployment benefits on unemployment duration according to search theory literature, the generosity of the system of unemployment benefits in terms of the level and potential length of benefits is expected to prolong unemployment duration for unemployment benefit recipients. However, this effect can be somewhat offset by other features of the unemployment benefit system such as monitoring of the job search and sanctions for insufficient efforts, which are basically the eligibility criteria for unemployment benefits. In addition, the system of unemployment benefits might encourage people without benefits to enter employment in order to become eligible for benefits in the future, so for them the prospect of potential unemployment benefits might shorten the spell of unemployment.

1.1.2. The impact of unemployment benefits on post-unemployment job quality

Search theory predicts that an increase in the amount or in the maximum duration of unemployment benefit reduces the probability of an individual leaving unemployment into employment through the disincentive effect. In addition, extensions to the theory that assume a finite unemployment benefit receipt period expect that the hazard of leaving unemployment rises when the end of the potential benefit period approaches. So in general, the conclusions drawn from search theory concerning unemployment benefits are rather negative as more generous benefits are assumed to increase unemployment duration. However, a positive impact can be found on post-unemployment job quality.

In contrast to the static labour-leisure model where it is not possible to say anything about how well jobs are matched (Addison and Blackburn (2000)), the dynamic job search model implies that benefits could increase post-unemployment job quality. Unemployment benefit lowers the opportunity cost of job

search and thus relaxes the restrictions on searching. An unemployed risk-averse person can lengthen their job search to find a better matched job, increasing their utility in the long-run. This implies that unemployment benefits might support the job search rather than motivating people to remain unemployed (Burdett (1979)). A better matched job can mean a higher wage, a longer job duration and a better match for the person's skills. Marimon and Zilibotti (1999) show in an equilibrium search-matching model that unemployment benefits help the unemployed to find jobs that match their skills better and that their employment is longer lasting because of this. In their model, unemployment benefits encourage the unemployed to wait for jobs that suit them better. Acemoglu and Shimer (2000) show in their model that unemployment benefits encourage risk-averse people to search for higher productivity jobs and firms to create these jobs, meaning that productivity gains arise from more generous unemployment benefit systems. In an economy without unemployment benefits, workers apply for low productivity jobs that are easier to get in order to avoid the risk of becoming unemployed. In this case, the composition of jobs in the economy that results would be inefficient. The beneficial effect of unemployment benefits on labour productivity and welfare through the change in the composition of jobs is also shown by Acemoglu (2001).

Empirically, the relationships between unemployment benefits and job quality can be more complex to test. With regards to employment duration it could be expected that unemployment benefits lead to more productive and better matches and that better matches last longer. However, because of unemployment benefits, job seekers may also take jobs that incur a higher risk of job instability, meaning potentially bad matches that lead to shorter employment duration (Centeno and Novo (2006)). In addition, the relationship between unemployment benefits and post-unemployment job duration can be affected by adverse selection arising from unobserved individual characteristics which might produce spurious estimation results showing negative correlation between unemployment duration and post-unemployment job duration (Belzil (2001)). Similarly, the problem of adverse selection could also affect estimations of the relationships between unemployment benefits and the post-unemployment wage.

The post-unemployment wage should be raised higher by unemployment benefits as job seekers can search for work for longer and have more resources with which to search, meaning they can make more search effort. However, although the reservation wage declines during the benefit period because of approaching benefit exhaustion, it can also decline because of the expectation that the offer wage distribution might deteriorate over time (van den Berg (1990)) and hence post-unemployment wages should be *ceteris paribus* in negative correlation with the actual duration of unemployment (Fitzenberger and Wilke (2007)). A deterioration in the offer wage distribution and the arrival rate of offers can be expected because of stigmatisation and human capital depreciation effects (Addison and Blackburn (2000)). Thus it can be concluded that

the impact of unemployment benefits on the post-unemployment wage also depends on how quickly the offer wage distribution deteriorates.

To summarise the potential effects of the system of unemployment benefits on post-unemployment job quality, a more generous level and potential period of benefits should help the unemployed to find and accept jobs that are of higher quality for them, with a rise in the quality of matches between jobs and workers. However, the eligibility criteria in the system of unemployment benefits might lower post-unemployment job quality, especially if these criteria are too harsh. Sanctions in the benefit system usually mean a cut in the benefit level for some period, a suspension of benefits for a certain period or a premature termination of benefit payments. In this way sanctions directly influence income during unemployment, lower the reservation wage and restrict the function of benefits as subsidies for job search, so the unemployed might leave unemployment quicker, but at the cost of accepting job offers with lower matching quality.

The effects of unemployment benefits on labour market outcomes for unemployment benefit recipients are summarised in Figure 3. The system of unemployment benefits comprises in the figure all the possible features of unemployment benefits, such as the level of benefits, the potential duration of benefits and the eligibility criteria for benefits. A more generous unemployment benefit system would mean that it is easier to become eligible for benefits, if for example there are milder criteria for previous employment duration or milder criteria for the reason of termination of previous employment contract, but would also mean that it is easier to stay on benefits if there is a lower level of job search monitoring and sanctioning, and lower level of activation. A more generous system also means shorter waiting periods, higher unemployment benefit levels and longer potential benefit periods, so the higher the coverage rate of the unemployed with unemployment benefits and the higher the amounts of benefits paid, the more generous the system is.

More generous unemployment benefits are expected to decrease job search activity during the benefit period. To some extent this may be offset by job search monitoring, but overall the job search activity is still expected to be somewhat lower if there are unemployment benefits. Lower job search activity also means lower job offer arrival rates and longer unemployment duration.

At the same time, unemployment benefits are expected to increase the reservation wage so that the acceptance probability of job offers decreases and the unemployment duration increases. This effect may also be lessened somewhat by the eligibility criteria in the unemployment benefit system, as the criteria for a suitable job offer can be fixed in the regulations so that a rejection of certain job offers would incur a benefit sanction. Suitable job offers can be described for example by wage level, geographical distance or occupational difference. However, while the rejection of job offers and unemployment duration can be lowered in this way, these regulations might also decrease post-unemployment job quality.

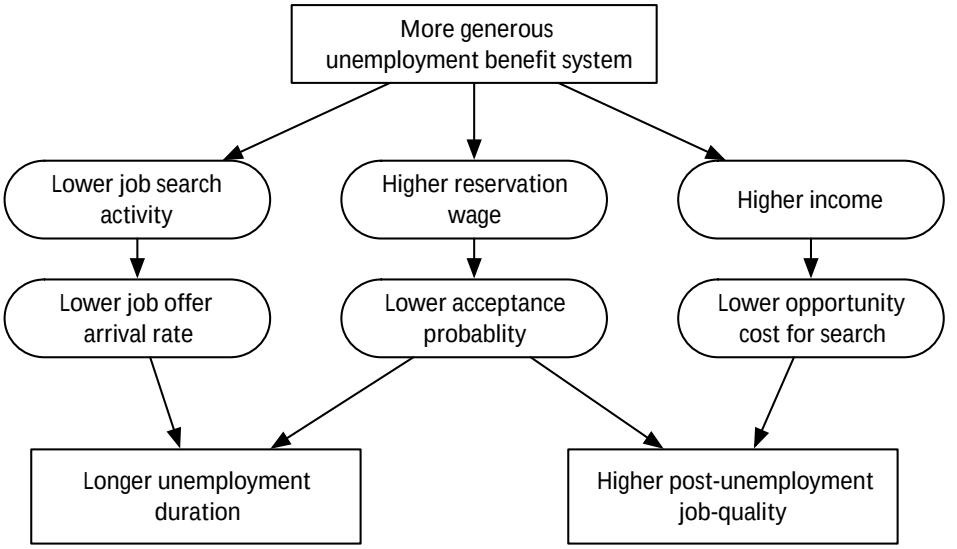

Figure 3. The main effects of the system of unemployment benefits on labour market outcomes

Source: author's figure

A higher reservation wage means basically that the unemployed can be more selective with regards to job offers and accept only those offers that they consider to suit them better, for example by matching their skills better or incurring higher productivity and wages. Finding a suitable job offer might take more time and prolong the unemployment spell, but at the end of the day productivity gains might arise in the economy. Limiting unemployment benefits and defining "a suitable job offer" in the regulations for unemployment benefits restricts the option of selecting job offers and decreases post-unemployment job quality.

The effect of the higher reservation wage is very similar to the way that unemployment benefits can operate as a job search subsidy. As unemployment benefits provide income during the job search, the opportunity cost of the job search decreases. This basically means that it costs less for the unemployed to reject a less well-matched job and continue the search for a better match. Unemployment benefits give more time for the unemployed to find a better matched job, so they can help the unemployed to find the right job and increase their post-unemployment job quality.

In addition, it can be argued that as unemployment benefits increase income during unemployment, it is possible for an unemployed person to allocate more resources to the job search. With no income during unemployment, some job search channels might not be available to the unemployed and job search activity might not be as productive. More funds allocated to job search lead to higher job offer arrival rates and if the job search channels are better targeted,

more suitable job offers might arrive. In this way unemployment benefits might also lead to higher post-unemployment quality and even shorten the unemployment spell.

1.1.3. The search model and the economic downturn

The basic search model[7] is a stationary model that describes the behaviour of unemployed people in a dynamic setting. In this model, job offers follow a Poisson process and arrive at rate γ. These job offers are drawn randomly from a wage offer distribution with the distribution function *F(w)*. When a job offer arrives, the unemployed person has to decide whether to reject this offer and continue the job search or to accept the offer. In the basic model the accepted full-time jobs keep the same wage forever. It is assumed in the model that unemployed people know the job arrival rate and the wage offer distributions, but they do not know in advance when exactly the next job offer will arrive and what its wage level will be. In the initial stationary model, unemployed people receive unemployment benefits b during the whole period of unemployment (van den Berg (1990) and (2001)).

An unemployed person maximises the expected present value of income over an infinite horizon, taking into account the subjective rate of discount δ. So in the stationary framework there are three constant exogenous variables $(\gamma, F(w), b)$ and one constant parameter (δ), which are independent of unemployment duration or any events taking place during the unemployment spell. Due to stationarity and infinite horizon assumptions, the expected present value of search when the optimal search strategy R is followed does not depend on elapsed unemployment duration t. Hence the optimal strategy is constant during the unemployment period and there is a unique solution to the Bellman equation for R (van den Berg (2001)):

1) $$\delta R = b + \gamma E_w max\left\{0, \frac{w}{\delta} - R\right\}.$$

Consequently, a received job offer is accepted if the wage associated with it exceeds δR (i.e. $\delta R < w$), so the optimal strategy can be described as reservation wage $w^* = \delta R$. A job offer is accepted if the wage exceeds the reservation wage, where the reservation wage is stated as follows (van den Berg (1990)):

2) $$w^* = b + \frac{\gamma}{\delta}\int_{w^*}^{\infty}(w - w^*)dF(w).$$

[7] The search model is extensively discussed by Mortensen (1986), nonstationarity by van den Berg (1990), and the search model with matching by Rogerson, Shimer and Wright (2005).

The hazard rate for exiting unemployment into employment λ equals then the probability of a person receiving a job offer times the probability of them accepting it (van den Berg (2001)):

3) $$\lambda = \gamma \bar{F}(w^*),$$

where $\bar{F}(w^*) = 1 - F(w^*)$.

In this model a crisis in the labour market would mean above all a very low arrival rate γ. Mortensen (1986) shows that an increase in the job arrival rate increases the reservation wage but the sign and magnitude of the effect on the hazard of leaving unemployment and on unemployment duration are ambiguous. The direct effect of a higher job arrival rate on the hazard rate is positive as follows directly from equation 3. However, as the reservation wage also becomes higher, an unemployed person becomes more selective when faced with more job offers and there is a negative indirect effect on the hazard of leaving unemployment. This means that in a crisis, the lower job arrival rate lowers the reservation wage, but the effect on the escape rate from unemployment is again ambiguous. The net effect of a higher or lower job arrival rate is the sum of the positive or negative direct effect and the negative or positive indirect effect (Mortensen 1986):

4) $$\frac{\partial \lambda}{\partial \gamma} = \bar{F}(w^*) - \gamma F'(w^*) \frac{\partial w^*}{\partial \gamma},$$

where $\frac{\partial w^*}{\partial \gamma} = \int_{w^*}^{\infty} [w - w^*] dF(w) / [\delta - \lambda] > 0.$

Though it is intuitive that a higher job arrival rate would mean shorter unemployment duration and vice versa, the conditions that would permit this in the search model are not too obvious. Sufficient conditions for wage offer distributions are developed in, for example, Burdett and Ondrich (1985) and even more generally with a larger set of possible distributions in van den Berg (1994).

However, a more realistic approach to a crisis means that variables also change in time, above all the arrival rate of job offers, and so nonstationarity is needed to introduce changes in exogenous variables. In addition, a nonstationary search model can take into account that unemployment benefits usually depend on the length of unemployment duration, that policy changes can occur to change the length or size of the benefit, or that the job arrival rate and the wage offer distribution can deteriorate over the unemployment spell. Hence the optimal strategy is not generally constant over time in a nonstationary model. The reservation wage and hazard functions in nonstationarity without anticipation effects become (van den Berg (2001)):

5) $$w^*(t) = b(t) + \frac{\gamma(t)}{\delta(t)} \int_{w^*(t)}^{\infty} \big(w - w^*(t)\big) dF(w|t),$$

where $F(w|t)$ is wage offer distribution at time *t*.

6) $$\lambda(t) = \gamma(t) \bar{F}(w^*(t)|t),$$

where $\bar{F}(w|t) = 1 - F(w|t)$.

In relation to the economic situation, the equations 5 and 6 describe a situation where a sudden macroeconomic shock takes place. A change in the labour market, particularly a change in the job arrival rate but also one in the wage offer distribution, is not anticipated by the unemployed people, but it is not always realistic to assume no anticipation effects. For example, when unemployment is rising and the job arrival rate is declining, people might rather anticipate that there will also be a declining job arrival rate in the future. The nonstationary search model with anticipation is extensively discussed by Van den Berg (1990). This model assumes that unemployed people have perfect foresight and hence anticipate correctly changes in the values of $\gamma, F(w)$ and b in time[8]. In this case, there is a unique continuous solution to the Bellman equation for the expected present value of search when the optimal search strategy is followed when unemployment duration equals *t*:

7) $$\delta R(t) = \frac{dR(t)}{dt} + b(t) + \gamma(t) E_{w|t} max \left\{0, \frac{w}{\delta} - R(t)\right\}.$$

Characterising the optimal strategy through reservation wage function (as $w^* = \delta R$):

8) $$\frac{dw^*(t)}{dt} = \delta w^*(t) - \delta b(t) - \gamma(t) \int_{w^*(t)}^{\infty} \big(w - w^*(t)\big) dF(w|t).$$

The hazard of leaving unemployment in nonstationarity with anticipation:

9) $$\lambda(t) = \gamma(t) \bar{F}(w^*(t)|t).$$

Van den Berg (1990) shows that in this model an anticipated decline in *b*, γ or the mean or variance of *F* will make the value of search in the present smaller than without the anticipated decline. This means that the reservation wage decreases as the anticipated declines in the exogenous variables come closer. Hence when the start or the deepening of a crisis 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.

Van den Berg (1990) provides sufficient conditions in terms of the exogenous variables to show that any anticipated shift in the exogenous variables in

[8] 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.

time that increases the expected discounted lifetime income makes unemployed people more selective about job offers. It can be shown that the reverse effect applies if there is a downward shift and that before the anticipated downward shift in the job arrival rate, the reservation wage starts declining as people become less selective. When the job arrival rate reaches its lower level and it is anticipated that the rate will stay constant, the reservation wage also stays constant at a lower level, if other exogenous variables stay constant.

Though most of the search literature concentrates on the individual search problem and job offer acceptance decision, it is also possible to model the generation of the job arrival rate. The versions of the search model presented so far in this subsection deal with the job arrival rate as an exogenous variable. However, it is possible to handle the job arrival rate as an endogenous variable as it depends on job search intensity, or how much time and effort an unemployed person puts into job search. The earlier works incorporating job search intensity usually also incorporate on-the-job search (for example Mortensen (1977), Mortensen (1986)).

Cahuc and Zylberberg (2004) include search intensity in the model without on-the-job search. The job offer arrival rate is an increasing function of job search effort *e* as a greater effort should incur more offers, though the marginal returns of search tend to shrink. A parameter *a* describes the labour market situation and the individual's characteristics such as sex and age independent of the job search. The job offer arrival rate depends on search intensity as follows:

10) $$\gamma = \alpha\, \gamma(e).$$

The cost of job search *c* is an increasing function of job search effort with decreasing marginal cost. If the rate of job losses (*q)* is also included in the model, the reservation wage is (Cahuc and Zylberberg (2004)):

11) $$w^* = b - c(e) + \frac{\alpha\gamma(e)}{\delta+q}\int_{w^*}^{\infty}(w - w^*)dF(w).$$

The optimal effort described through reservation wage is:

12) $$w^* = b + \frac{\gamma(e)}{\gamma'(e)}c'(e) - c(e).$$

It can be shown that a better economic environment not only increases the reservation wage, but also increases the effort put into the job search. When the labour market is doing worse, an unemployed person decreases their reservation wage and lowers their job search intensity. Cahuc and Zylberberg (2004) also show that a decrease in the unemployment benefit increases the job search effort while lowering the reservation wage. However, a simultaneous decrease in unemployment benefit and worsening of the economic situation have an ambiguous effect on the optimal job search intensity.

Other popular ways of looking at the job arrival rate or wage distribution as endogenous include using equilibrium search or matching models (for example Burdett and Mortensen (1998), Coles (2001), Burdett and Coles (2003)), or

what is known as the Diamond-Mortensen-Pissarides model (for example 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 only explain the economy in a steady state (see for example Shimer (2004), Shimer (2005), Mortensen and Nagypál (2007), Pissarides (2009) for the discussion).

According to Shimer (2004), generally in these models the unemployed person bases their decision on the job search intensity on: 1) the marginal increase in the probability of getting a job due to higher search intensity; 2) the increase in the expected present value of the income from becoming employed; and 3) the marginal cost of search effort. When the economy is doing worse, the marginal benefit of search intensity might fall because both the likelihood of becoming employed with the current job search intensity and the expected present value of income from a job are likely to decrease. Aggregate labour market data should reflect lower job search intensity in a decrease in labour market participation, an increase in people who would like to work but are discouraged and not actively seeking a job, or just a decrease in the search intensity of the unemployed still actively seeking a job. Shimer (2004) argues that this is not the case in the empirical data as 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 mechanisms other 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.

In job search literature, the effects on unemployment duration stemming both from unemployment benefits and from the economic environment are discussed quite thoroughly. Although the total effect of the economic situation is ambiguous, benefits are expected to increase unemployment duration regardless of the job search environment, as more generous benefits increase the reservation wage and lower the job search intensity. However, in recent years the question of variance in the benefit disincentive effect over the business cycle, or the interaction between unemployment benefits and the economic situation, has also been addressed. Krueger and Meyer (2002) note that it is likely that the disincentive effect is different in different economic environments, as there might be less of an efficiency loss from reduced job search effort during an economic slowdown. 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, the unemployed might be more hesitant to reject job offers during a recession in the fear that they will not find a job before their benefits cease. In a

slightly less recent paper Ljungqvist and Sargent (1998) develop a general equilibrium search model in which their calibrations show that unemployment benefits have more distortionary effects in more turbulent times, with the main driver for this being the instantaneous loss of skills caused by layoffs.

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 the labour supply or search effort during an economic slowdown, reducing duration elasticity. This basically means that during times when there are low levels of available vacancies, the unemployed themselves cannot much affect the job finding probability and hence the distortionary effects of benefits on the search effort are lower. However, during a recession, the unemployed place higher value on an increase in the benefit level as they expect to receive benefits for a longer period and so duration elasticity increases. From this, Kroft and Notowidigdo suggest that the cyclicality of the disincentive effect is theoretically ambiguous. Landais, Michaillat and Saez (2010) consider 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, which also accounts for the equilibrium adjustment in labour market tightness. They suggest that micro-elasticity is acyclical and stays constant during recessions and booms, while macro-elasticity decreases during periods of high unemployment[9].

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

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

1.2. Methods for studying the effects of unemployment benefits

1.2.1. Duration analysis

With regards to studying the effects of unemployment benefits on unemployment duration, almost all the available studies use some models of duration analysis, the most popular being Kaplan-Meier survival estimates, the Cox model and the piecewise-constant proportional hazard model. In addition, duration models can be very similarly used for analysing post-unemployment employment duration. This subsection discusses how duration analysis can be used for studying unemployment duration.

Stemming from the search model, the focus in duration analysis is on the exit rate for people leaving unemployment into employment, or the hazard rate framework (this framework is discussed extensively by, for example, Lancaster (1992), van den Berg (2001), Wooldridge (2002)[10]). The hazard rate is defined as the probability of leaving unemployment at time t on the condition that the individual has not left unemployment before time t:

13) $$\lambda(t) = \lim_{\Delta t \to 0} \frac{\Pr(t \leq T < t+\Delta t | T \geq t)}{\Delta t}.$$

The stochastic variable T is the duration of unemployment, realisation of which is denoted by t. The hazard function $\lambda(t)$ is duration dependent if its value varies over t. If $\lambda(t)$ is increasing, there is positive duration dependence, if it is decreasing, then there is negative duration dependence. Positive duration dependence means that the probability of exiting unemployment increases the longer a person has been unemployed.

The cumulative distribution function of T is denoted by F, meaning that $F(t) = Pr(T \leq t)$, where $F(0) = 0$. Subtracting the cumulative distribution function from one gives the survivor function of T:

14) $$\bar{F}(t) = 1 - F(t).$$

The survivor function gives the probability of staying unemployed past time t. The probability density function of T is denoted by f. The hazard function can also be defined from the survivor function and the probability density function:

15) $$\lambda(t) = \frac{f(t)}{1-F(t)} = \frac{f(t)}{\bar{F}(t)}.$$

The duration of unemployment and the hazard rate are usually expected to depend on some set of covariates. When estimating the impact of unemployment insurance benefits, the model has also to contain some variable describing the benefit, such as the amount of benefits, the replacement rate of benefits, or

[10] The methodology provided by Wooldridge (2002) is followed particularly in this subsection.

the net replacement rate of benefits. In addition, the hazard rate is usually also assumed to depend on some characteristics of the individual and characteristics of the job search environment. The more commonly used covariates describing individual characteristics are age, gender, citizenship, education, membership of a minority group, marital status, younger or older children, work experience or tenure, previous wage, region, previous occupation and field of activity. Some studies have also tried to capture the effect of income other than the unemployment insurance benefit, such as income from capital, income of spouse, or ownership of real estate. In addition, earlier labour market behaviour can sometimes be included – whether the previous job was temporary or not, whether an individual was recently registered as unemployed, the reason for leaving the previous job, whether the previous job was full-time or not, or whether an individual is a member of a trade union or not. As the labour market behaviour of men and women can differ considerably in some countries, some studies have modelled the hazard rate separately by gender (for example Carling, Holmlund and Vejsiu (2001)). For the same reason, some studies have looked at only males' labour market behaviour (for example Bover, Arellano and Bentolila (2002), Narendranathan and Stewart (1993)).

Covariates capturing the job search environment may be business cycle indicators, the unemployment rate of a region or the rate of vacancies of a region. It is also common to add dummy variables for the periods of entering unemployment to capture seasonal differences in duration distribution. Several studies have tried to take into account the calendar effects (for example Røed, Jensen, Thoursie (2008), Røed and Zhang (2003)).

Adding the time-invariant covariates' vector x in the model, the conditional hazard function is:

16) $$\lambda(\mathrm{t};\mathrm{x}) = \lim_{\Delta \mathrm{t} \to 0} \frac{\Pr\,(\mathrm{t} \le \mathrm{T} < t + \Delta t | \mathrm{T} \ge \mathrm{t}, \mathrm{x})}{\Delta \mathrm{t}}.$$

An important group of models that model hazard rate conditional on time-invariant covariates is the class of proportional hazard models (Wooldridge (2002)):

17) $$\lambda(t;x) = k(x)\lambda_0(\mathrm{t}),$$

where $k(x)$ is a non-negative function of covariates and $\lambda_0(t) > 0$ is the baseline hazard. The baseline hazard is assumed to be the same for all the individuals in the population. The individual hazard differs proportionately and is described by covariates included in the function $k(x)$. The most common method is to use the exponential function, $k(x) = exp\,(x\beta)$:

18) $$\log \lambda(\mathrm{t};\mathrm{x}) = \mathrm{x}\beta + \log \lambda_0(\mathrm{t}),$$

where β is a vector of parameters to be estimated (Wooldridge (2002)). For estimating the impact of unemployment insurance benefits, the model with only

time-invariant covariates is usually not sufficient. The model that is usually called a proportional hazard with time-varying covariates does not help either:

19) $$\lambda\big(t; x(t)\big) = k\big(x(t)\big)\lambda_0(t).$$

In this model the covariates vary over time as some function of time, but this is usually not the case with unemployment insurance benefits. One way to get around this problem is to use the data as grouped data. Sometimes, when the unemployment spells are measured in weeks or months, is the data are in essence already grouped into discrete intervals. Grouped data can be analysed as sequential summarised information on whether an individual stays unemployed or exits to employment in every interval as a binary outcome. This dataset can be looked at as panel data where cross-section observations include a vector of binary outcomes on exiting and the explaining covariates. A model that is popular because of its flexibility and that is applied on grouped data and can incorporate time-varying covariates is a piecewise-constant proportional hazard model (Wooldridge (2002)):

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

where *m* indicates interval *(m = 1,...,M)* as time has been split into intervals *[0, a_1), [a_1, a_2)... [a_{M-1}, a_M), [a_M, ∞)*, where a_m are known constants and in the last interval all the observations are censored[11] at a_M, with none of the durations longer than a_M. ρ is a vector of unknown parameters in the hazard function. $k(x_m, \beta) > 0$ is usually again an exponential function. In the piecewise-constant proportional hazard model, the hazard rate for exiting unemployment can be different in each interval, but it is assumed to be constant during an interval. The time-varying covariates can also be different for each interval, but constant during an interval. The parameters to be estimated in this model are β and λ_m where vector λ_m is the baseline hazard in intervals, *m = 1,..., M*.

When covariates are not included in the piecewise-constant proportional hazard model then the maximum likelihood estimation of λ_m leads to the Kaplan-Meier estimator[12]. The Kaplan-Meier method is a popular non-parametric approach. If n_m is a number of observations with duration of at least T_m (a risk set), h_m is a number of observations with duration of exactly T_m and there are no censored observations before n_m, then the estimation of hazard rate is (Wooldridge (2002)):

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

[12] Developed by Kaplan and Meier (1958).

21) $$\hat{\lambda}(T_m) = \frac{h_m}{n_m}.$$

One other method for estimating β in the proportional hazard model is to use the Cox partial likelihood method (Cox 1972). The Cox model is a semi-parametric method that estimates β, but leaves the baseline hazard $\lambda_0(t)$ unspecified. Appealing points of the Cox method are that the parameters of covariates can be estimated very generally and that it is possible to include time-varying covariates in the model. This method can be applied above all on ungrouped flow data.

In addition, there are models that can be elaborated for multiple-spell data (see for example van den Berg (2001)). In this case the data have to cover a longer period so that several unemployment spells per person occur. There are also models that can incorporate more than only one outcome, with exit to inactivity as well as exit to employment for example, so this model, called the competing risks model, allows exit from the initial state to several different alternative states (see for example Han and Hausman (1990)).

With regards to duration analysis in this dissertation, the hazard rate for leaving unemployment into employment is looked at with both non-parametric and parametric methods. The Kaplan-Meier non-parametric method is used and piecewise-constant proportional hazard models are estimated. The piecewise-constant proportional hazard model is chosen due to its flexibility and ability to take into account time-varying variables such as unemployment benefits and the labour market situation. For the same reasons, these models are also used for estimating post-unemployment employment duration, among other methods.

A relevant issue in duration analysis is the possibility of unobserved heterogeneity or frailty occurring in the model. Introducing unobservable heterogeneity in the model helps a more general model to be obtained. Unobserved heterogeneity is introduced in the hazard function as an unobservable multiplicative effect. When unobserved heterogeneity is included, the piecewise-constant proportional hazard model with time-varying covariates (equation 20) becomes (Wooldridge (2002)):

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

where unobserved heterogeneity ϑ is a random positive quantity. For the purposes of model identifiability, ϑ is often assumed to have mean 1 and variance θ. When a chosen distribution function of unobservable heterogeneity corresponds to these assumptions, then the hazard function with unobservable heterogeneity reduces to a hazard function without unobservable heterogeneity when θ approaches 0 (Gutierrez (2002)). In this thesis individual specific unobservable heterogeneity is also added to estimate a more general model when piecewise-constant proportional hazard models are applied.

The method for measuring the unemployment spell has proven to be very important for the estimation of 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 only concern the unemployment insurance benefit period, it is not possible to estimate the exit rate at the end of benefit period, because the exit rate is then 100% anyway. If the data concern the period of registered unemployment, they might not tell the whole truth either because people might de-register themselves when the benefit period is over, although nothing changes in their status as unemployed. If the unemployment benefit period and registered unemployment spell are used, there are usually precise administrative data available, 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 using administrative data do not (Card *et al.* (2007)). But even if survey data are used, the results may be affected by how the period of unemployment is defined – for example whether the ILO definition is followed[13] or it is considered enough that individuals themselves consider that they are unemployed (Atkinson, Micklewright, (1991)). In the studies presented in this dissertation, the data used are better in this respect. Although they are administrative data, it is possible to detect the whole unemployment spell from them (the issues of data in this dissertation are discussed more thoroughly in Section 2.3).

The results are also different if the exit rate alone is studied or if a distinction is made between whether the exit is to employment or somewhere else such as to retirement or to studies. With the data used in the studies in this dissertation, it is clearly visible whether the exit is really to employment. What kind of employment the exit is into might be also important, whether it is temporary or not, full-time or part-time, self-employment or another form. Atkinson and Micklewright (1991) distinguish for example between "regular jobs" and "marginal jobs". A "regular job" ought to be full-time, have the expectation of continued employment, be covered by statutory employment protection and be part of the legal economy. A "marginal job" fails to meet at least one of these criteria. The need to look separately at "regular jobs" and "marginal jobs" comes about because the labour market behaviour associated with these types of employment is likely be different later on.

Portugal and Addison (2008) distinguish between as many as six different destinations of exit. In addition to inactivity they identify five different types of employment – open-ended employment, fixed-term contracts, part-time work, government-provided jobs and self-employment. Using Portuguese data they find that different groups behave differently when looking for a job. For

[13] The most frequently used definition of unemployment in international statistics. A person is considered to be unemployed according to this methodology if the person is not employed, is actively seeking work and is ready to begin working.

example, the unemployed who leave to a part-time job exhibit a very high disincentive effect when compared to those who exit to public employment. Part-time employment is often used as a last resort. They argue that unemployment benefits do not provide support in finding stable employment.

Differences in the results of studies of the impact of unemployment benefits can also stem from the fact that several analyses use data from a political reform that has changed the amount or potential duration of unemployment insurance benefit for certain groups of unemployed (for example 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 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 studies covered in this dissertation, there was no reform of the Estonian unemployment insurance benefit system during the period of the study and hence political bias cannot occur in the estimations.

As employers in some countries tend to exploit the unemployment insurance system for temporary lay-offs, it might also be necessary to look separately at exits to the same employer. A person who is hoping to be re-employed by the same employer after a period 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 USA (Katz (1986)) and Canada (Belzil (2001)), and also in some European countries like Austria (Card *et al.* (2007)), Sweden (Jansson, (2002)) and Denmark (Jensen and Nielsen, (2003)). It is not very likely that the unemployment insurance benefit system in Estonia is used for temporary lay-offs, at least not for seasonal lay-offs. In order to be entitled to unemployment insurance benefit, a person has to have been employed for at least 12 months during the previous 36 months and when unemployment insurance benefit is once granted, the person has to start accumulating the necessary 12 contributions anew (a more thorough overview of the Estonian unemployment benefit system is presented in Subsection 2.1.3). This means that using the unemployment insurance benefit system for seasonal lay-offs requires careful planning by the employer over a period of two or three years and even then the employee might be left in some periods without any income.

An important feature of Eastern European countries is a relatively larger share of the shadow economy (Schneider and Buehn (2009), Putniņš and Sauka (2011)). People might start working without a formal contract during the benefit period and make their employment legal only when benefits lapse. In this case 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 at the beginning of the transition period, it might still have an impact on the results.

Another feature particularly common to Estonia is that many people work abroad in Finland while still remaining residents of Estonia. However, this is

not likely to cause a spike at the end of the benefit period. It is not very likely that large numbers of the unemployed accept a job offer abroad during the unemployment benefit period and at the end of benefit period quit this job and accept a job offer in Estonia, though this behaviour could indeed cause a spike in the exit rate out of unemployment in the end of the benefit period if Estonian tax data is used for the analysis. If an unemployed person accepts a job offer abroad and keeps it for some time, their exit to employment is simply not visible in the Estonian tax data regardless of whether they manage to remain registered as unemployed in Estonia.

1.2.2. Micro-econometric methods of policy evaluation

Besides the effect of unemployment benefits on unemployment duration, the effect of benefits on post-unemployment labour market outcomes is also analysed in this thesis. This effect can be studied using the tools designed for policy evaluation. Various empirical strategies can be used to evaluate a policy, such as passive or active labour market measures. Depending on the context and the available data, the literature offers a broad range of evaluation strategies. Useful overviews of different methods are provided by, for example, Blundell and Costa Dias (2009), Angrist and Pischke (2009), Imbens and Wooldridge (2008), Heckman and Vytlacil (2007a, 2007b), Caliendo (2006), Smith (2004) and Angrist and Krueger (1999). This thesis analyses the effects of unemployment benefits and so this subsection focuses on those methods that can be applied particularly in the analysis of passive labour market policies.

The focal issue of policy evaluation is whether the treatment of a policy affects a person in the outcome variable being studied. The outcome variables for labour market programmes usually concern employment and earnings after a treatment compared to how things would be if the treatment had not been received. As it is never possible in real life to see the outcome for the same individual following treatment and non-treatment, a fundamental evaluation problem arises (Caliendo (2006)). Different evaluation strategies try to find a plausible comparison group or control group in different ways in order to overcome this problem.

Generally, the best strategy for dealing with the fundamental evaluation problem is to use experimental evaluation, also known as randomised controlled experiments or social experiments. The experimental approach is based on the random assignment of people into the treatment and control groups, meaning experimental evaluation can eliminate the selection bias[14] from the mean-impact estimates and avoid the problems of identification of causal effects. However, there are still several problems associated with experimental evaluation like the

[14] The problem of non-random selection into treatment, see Heckman, Ichimura, Smith, and Todd (1998).

problem of non-compliance or partial compliance[15], the problem of dropouts[16], substitution bias[17], experimental effects or the Hawthorne effect[18], randomisation bias[19], and others. The advantages and disadvantages of experimental evaluation are discussed by, among others, Heckman and Smith (1995), Berk (2005) and Stock and Watson (2006). So although a well-implemented randomised controlled experiment is usually considered the gold standard for estimating policy effects, it is still far from being a perfect estimation. When labour market programmes in Europe are estimated, a problem with randomised experiments is that the data are usually not available as it is expensive to carry out randomised experiments and they raise ethical issues.

As experimental data with which to evaluate labour market policies are quite rare, a suitable method using non-experimental data needs to be considered. In recent years it has been admitted that there is no single universal strategy for any non-experimental data. Depending on the data at hand, whether cross-section or longitudinal, different methods can be proposed that invoke different identifying assumptions in handling selection bias. An estimator will produce consistent estimates only if the assumptions hold (Smith (2004)).

There are two groups of estimators for handling selection bias (Caliendo (2006)): 1) estimators assuming that selection is based on observable characteristics[20]; 2) estimators assuming that selection is based on both observable and unobservable characteristics. The more popular ones in the first group are matching and linear regression analysis, while the before-after estimator, the difference-in-differences estimator, the instrumental variable approach and the (Heckman) selection model[21] belong to the second group. The assumption that selection is based on observables means that selection to treatment is assumed to be determined by observable characteristics, but the selection to treatment does not depend on outcomes in the absence of treatment. Selection based on unobservables means that unobservable characteristics are also used to determine selection to treatment (Smith 2004).

With selection on observables it is sufficient for solving the selection bias problem to condition on the variables that determine selection to treatment. Though linear regression analysis is the most popular strategy when selection on observables is assumed, matching has several advantages over the linear regression approach. Above all, matching methods avoid any functional form restrictions, as the basic idea of matching is to find those persons among non-

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15 See Bijwaard and Ridder (2005).
16 See Heckman, Smith and Taber (1998).
17 See Heckman, Hohmann, Smith and Khoo (2000).
18 See Parsons (1974).
19 See Heckman and Smith (1995).
20 Selection on observables is also sometimes referred to as unconfoundedness, conditional independence or ignorable treatment assignment assumption.
21 A model closely related to instrumental variable strategy, see Heckman (1979) and Puhani (2000).

participants who are similar or identical to the participants in treatment in all relevant pre-treatment variables (Caliendo (2006)). In addition, in contrast to regression, matching methods focus on the support problem that arises when there are some treated observations in the data that do not have similar untreated observations (Smith (2004)). Matching should also be preferred over regression because regression analysis is not as well able to handle treatment effect heterogeneity (Caliendo (2006)). However, matching and regression do not necessarily have to be seen as competing strategies as they can also be combined in evaluation (see Imbens and Wooldridge (2008)). In consequence, matching models have gained more popularity in recent years, especially for evaluating labour market policies.

When selection is assumed to be determined by unobservables too, the simplest strategy is to use the before-after estimator. Though the before-after estimator is in essence very simple, comparing the outcomes for an individual before and after treatment, it does not take into account changes in the outcome because of other factors, such as the economic situation. For this reason, a more popular method is the difference-in-differences (DID) approach, which compares the before-after change of the treated with the before-after change of the non-treated, thus differencing out any common trends (Smith (2004)). However, the problem of the DID estimator is that it requires that without any treatment the average outcomes for the treatment and control group should follow parallel paths in time (Abadie (2005))[22]. Different ways of overcoming this problem have been proposed for the DID estimator, for example in Blundell and Costa Dias (2009), Athey and Imbens (2006), Abadie (2005) and Blundell *et al.* (2004). The DID estimator can be also combined with matching by calculating difference-in-differences for matched individuals.

Another widespread strategy for selection on unobservables is the method of instrumental variables (IV). This method relies on finding a variable or instrument that determines the selection to treatment but does not affect the outcome. This variable is then excluded from the outcome equation but included in the assignment rule. In general, the IV estimator should identify the treatment effect without the bias incurred by non-randomised selection (Blundell and Costa Dias (2009)). The biggest concern with the IV method is to find a good instrument that is not correlated with the omitted variables and is not only weakly correlated with the endogenous regressor(s) (see for example Angrist and Krueger (2001), Staiger and Stock (1997) and Bound, Jaeger and Baker (1995)). Another problem with IV arises in heterogeneous treatment effect models, where the impact parameter can be different across individuals in unobservable ways (see Blundell and Costa Dias (2009)).

[22] With both the before-after estimator and the DID estimator there can be a problem called Ashenfelter's dip (found by Ashenfelter (1978), see also Heckman and Smith (1999)). Ashenfelter's dip means a situation where the treated individuals experienced a brief shock in their outcomes before participation. Unlike a permanent dip, a transitory dip can bias the estimates by overestimating the effect of treatment.

The regression discontinuity design (RDD) is sometimes viewed as a specific case of IV strategy or matching, though in many ways it actually resembles a randomised experiment. It was first introduced by Thistlethwaite and Campbell (1960), but has been increasingly used in the policy evaluation literature during the last decade. Extensive appraisals of the RDD are given by Lee and Lemieux (2010), Imbens and Lemieux (2008), Van der Klaauw (2008) and Hahn *et al.* (2001) among others. The RDD is a quasi-experimental design in which assignment to treatment is determined discontinuously on some observable covariates and the cut-off point is known. A sharp regression discontinuity and fuzzy regression discontinuity are distinguished according to whether the treatment status is deterministic or stochastic function at the cut-off point (see Hahn *et al.* (2001)). It is crucial for the RDD that individuals cannot precisely manipulate the assignment variable, so the variation in treatment near the cut-off point is randomised as in a randomised experiment and the RDD can be analysed and tested like randomised experiments[23] (Lee and Lemieux (2010)). However, in contrast to data from randomised experiments, assignment in a RDD is not random and the treatment group differs systematically from the control group (van der Klaauw (2008)). The RDD has the advantage that, unlike the strategies of selection on observables or selection on unobservables, in the RDD the researcher does not have to take a strong standpoint on which variables to include in the analysis as the RDD predicts that the observable variables are irrelevant and unnecessary for identification, though they are useful for testing the underlying assumption as in Lee and Lemieux (2010).

The choice between the different methods for non-experimental data should firstly depend on the nature of the institutions that determine selection into treatment, as this determines any selection bias and the plausibility of a specific strategy. Secondly, the researcher has to contemplate the available data as, for example, matching does not make sense without rich data, the IV method makes no sense without a valid instrument, and longitudinal methods cannot be applied on cross-section data. (Smith (2004)).

In the current thesis a matching estimator is used to evaluate the impact of unemployment benefits on post-unemployment job quality (Chapter 4). As already noted in this subsection, matching has several advantages over regression and can be used when selection over observables is assumed and a rich dataset is available. In Section 4.1 the effect of unemployment benefits on the post-unemployment wage is estimated. In that section the matching estimator is the main method used for the analysis. However, it is combined with a DID estimator so that the assumption of selection on observables would not have to hold so strictly. The analysis does not compare the difference in the post-unemployment wage between the treatment and the control groups, but rather the difference between the control and the treatment groups in the difference of the wage before and after the unemployment spell.

[23] See validity tests for RDD such as Lee (2008) and McCrary (2008).

The matching estimator is also used in Section 4.2 as one of the methods for analysing post-unemployment employment duration. In addition, a method similar to RDD is used for analysing post-unemployment employment duration and also for analysing unemployment duration (in Section 3.2). In these sections, the behaviour of the unemployed is studied around the cut-off point of the eligibility criterion for the longer potential unemployment insurance benefit. However, the differences are studied in a non-parametric way. The advantage of this method is that it resembles a randomised experiment in several aspects and it does not require a strong standpoint as to whether the selection to treatment is on observables or unobservables. Additionally, post-unemployment job duration and unemployment duration are analysed in this thesis by the duration models that were discussed in the previous section (Subsection 1.2.1).

From among the methods of policy evaluation discussed in this subsection, the matching estimator is the main method used in this study. Extensive overviews of the theory and implementation of matching methods are provided by Blundell and Costa Dias (2009), Caliendo and Kopeinig (2008), Caliendo (2006) and Imbens (2004) among others, and of bias correction in matching by Abadie and Imbens (2011). For matching on a higher number of observable characteristics, matching on some balancing scores for the functions of relevant observables tends to be more used than matching on covariates or cell matching. Especially popular in the literature on the estimation of labour market programmes is the use of the propensity score as a balancing score, or propensity score matching (see overviews specifically about the propensity score matching in, for example, Abadie and Imbens (2009), Bryson, Dorsett and Purdon (2002), Dehejia and Wahba (2002)). As a relatively high number of observables are used in the analyses in this thesis, it has been decided to apply propensity score matching here.

The propensity score was proposed by Rosenbaum and Rubin (1983), who define it as the conditional probability of assignment to the treatment given a vector of observed pre-treatment variables. Propensity score matching (PSM) is then a semi-parametric two-step estimation, where in the first step the propensity scores are parametrically estimated and in the second step a non-parametric comparison of these propensity scores is conducted. In the usual binary treatment case of treatment versus non-treatment, the propensity scores are usually estimated by either probit or logit models. In the second step, for matching individuals with these scores, there are very many alternative algorithms, such as nearest neighbour matching with single or multiple neighbours with or without replacement, caliper matching, radius matching, kernel matching, and local linear matching; see for example Caliendo and Kopeinig (2008). The choice between different algorithms is generally a trade-off between bias and variance, though asymptotically these strategies should produce the same estimation results. For empirical comparisons of the different algorithms and discussions on the performance of propensity score matching in

general see for example Smith and Todd (2005), Dehejia (2005), Frölich (2004), Smith and Todd (2001).

In the policy evaluation literature, the two most commonly estimated parameters are the population average treatment effect (ATE) and the average treatment effect on the treated (ATT). ATE is the average difference in expected outcome between treated and non-treated individuals. While ATE is relevant for random assignment to treatment, ATT is more relevant if a policy is targeted more specifically at some particular groups in society. Because of this, it can be argued that ATT is more relevant to policy makers as it excludes the effect on those individuals for whom the policy is not intended.[24] If PSM is used, ATT is the mean difference in outcomes over the common support region[25] and weighted by the propensity score, and can be formulated as follows (Caliendo and Kopeinig (2008)):

$$23) \qquad ATT_{PSM} = E_{P(X)|\mathrm{D}=1}\{E[Y(1)|\mathrm{D}=1,\mathrm{P(X)}] - E[Y(0)|\mathrm{D}=0,\mathrm{P(X)}]\},$$

where Y(1) – outcome in the situation of treatment
Y(0) – outcome in the situation of no treatment
D – treatment assignment (equals 1 in case of treatment received and 0 otherwise)
X – observed pre-treatment covariates

Though PSM is widely used in the policy evaluation literature, there are some concerns that a researcher has to bear in mind. According to Blundell and Costa Dias (2009) the main weakness of PSM is connected to the data availability and the difficulties in choosing the right set of covariates for matching. Matching needs richer data than the "traditional" approaches and a failure to find the appropriate variables can end in biased results. Dehejia (2005) also stresses the importance of examining the sensitivity of the estimated effects to small changes in the specification of the propensity score[26]. As long as these concerns are kept in mind, PSM can be a powerful tool for evaluating a policy.

In conclusion, though there is a wide range of possible policy evaluation methods available, there is no perfect estimation method, especially if there is

[24] Other commonly used parameters are average treatment effect on non-treated, marginal average treatment effect and local average treatment effect. See Smith (2004) and Blundell and Costa Dias (2009) for a discussion of these parameters and Imbens (2004) for different versions of ATEs.

[25] With PSM, only those observations in the treatment and control groups that have an overlap in terms of pre-treatment variables are compared (see Dehejia and Wahba (1999)). The fact that only comparable observations are analysed in matching is also considered to be one of the reasons for preferring matching over regression analysis (as noted earlier in this subsection).

[26] There are also some more formal tests that have been developed for assessing whether the assumption of selection on observables holds, meaning sensitivity due to unobserved heterogeneity such as Rosenbaum Bounds, see DiPrete and Gangl (2004) and Becker and Caliendo (2007).

no way to conduct a random experiment. The main problem of policy evaluation methods is how to mitigate the possible selection problem, so the choice between the methods depends on the selection to treatment and also on the available data.

1.3. Empirical evidence for benefit effects

1.3.1. Previous research on the impact of unemployment benefits on unemployment duration

This subsection aims to give an overview of the earlier empirical studies conducted into the effects of unemployment benefits on unemployment duration. These are studies that test the predictions of search theory that unemployment benefits above all increase unemployment duration through the disincentive effect, though there are also a few studies that explore the entitlement effect and the effects of monitoring, sanctioning and activation on the disincentive effect.

In empirical work, the entitlement effect is not so easy to define or estimate, and hence studies into this effect are quite rare. One of the very few works that tries to estimate this effect quantitatively is by Ortega and Rioux (2008). An increase in the inflow to unemployment due to unemployment benefits is also shown by Tuit and van Ours (2010), Winter-Ebmer (2003) and Andersen and Meyer (1997).

In consequence, most of the empirical studies on the relationship between unemployment benefits and the level of unemployment focus on analysing the effects of unemployment benefits on the labour market behaviour of unemployment benefit recipients. The disincentive effect has been tested quite often and in most cases the results confirm the theory[27], mostly using US and UK data; in Continental Europe the results vary rather more. A spike at benefit exhaustion is also often found, for example by Meyer (1990) and Katz and Meyer (1990), though the results are less consistent than for the overall disincentive effect.

A widely disseminated paper using US data is by Meyer (1990), where the emphasis is on the last weeks of a potential benefit period. Meyer finds a strong negative effect of unemployment insurance benefits on exiting unemployment, and also finds that the exit rate increases significantly just prior to benefit exhaustion. Narendranathan and Stewart (1993) use UK data and show that the disincentive effect decreases during the unemployment spell quite quickly and hence does not have any significant impact for long-term unemployment.

Several studies have been conducted on Northern European unemployment insurance systems. Analysing Norwegian data, Røed and Zhang (2003) find that even the slightest rise in the size of the unemployment benefit decreases the exit

[27] A very thorough review of earlier research on unemployment benefits is provided by Devine and Kiefer (1991).

rate from unemployment irrespective of the business cycle, and that the exit rate increases significantly during the last months prior to when benefits lapse. Bratberg and Vaage (2000) also look at Norwegian data and exploit a change in the unemployment insurance benefit system that extended the maximum benefit period. Though this reform had in total a negative impact on the exit rate into employment, neither before nor after the reform do they find any increase in the exit rate before benefit exhaustion. Carling, Holmlund and Vejsiu (2001) use Swedish data and find that a decrease in the unemployment benefit replacement rate significantly increases the exit rate into employment. Røed, Jensen and Thoursie (2008) compare Swedish and Norwegian unemployment insurance systems and conclude that the shorter potential benefit period in Sweden causes a much higher exit rate into employment. Fredriksson and Söderström (2008) conclude similarly from Swedish data that unemployment benefit generosity does indeed contribute to higher regional unemployment.

There are also many interesting works using Central and Southern European data. Bover, Arellano and Bentolila (2002) conclude from Spanish data that the disincentive effect is even greater than the impact of business cycle. Lalive, van Ours and Zweimüller (2006) use Austrian data to show that both an increase in the unemployment benefit replacement rate and in its maximum duration prolong unemployment duration. Card *et al.* (2007) discover from Austrian data that a spike at benefit exhaustion is much bigger for those leaving registered unemployment than for those exiting into employment.

In recent years the research work on the disincentive effects of unemployment benefits has increased considerably. Partly this is because the crisis period has focused more attention on the problems of high unemployment, but at the same time some countries have extended their potential unemployment benefit during the crisis, enabling researchers to study differences in the effects of extended and non-extended unemployment benefits, for which US data have been used in notably more studies. Most of the recent studies find that more generous unemployment benefits do indeed increase unemployment (see Grubb (2011), Fujita (2011), Lalive *et al.* (2011)), but there are also exceptions. Howell and Azizoglu (2011) do not find disincentive effects in the US data and argue that the extensions of unemployment benefits might in fact increase long-term unemployment by maintaining the level of labour market participation. Dahl (2011) finds from US data only a modest behavioural response to benefit extensions and argues that it is just as difficult for the long-term unemployed to enter employment and that for them unemployment benefits serve as an important source of income maintenance.

There is also a recent meta-analysis of cross-country studies on the effect of unemployment benefits on the unemployment level by Kim (2011). The aim of the analysis is to find out why the results of different studies might be different, as there are some studies that indicate that more generous unemployment benefits increase unemployment, but there are also studies that do not find this effect or even show a negative relationship between unemployment benefit

generosity and the level of unemployment. The results of the meta-analysis indicate that there is in fact a positive relationship between unemployment benefit generosity and the level of unemployment and that there might be some biasing factors that let some studies observe an insignificant relationship or a negative relationship.

Only a few studies 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 by van Ours and Vodopivec (2006) for Slovenian data. They find that a shortening of the potential benefit period increases the exit rate into employment, but also increases exits to active labour market programmes. They also show a sharp increase in the exit rate into employment during the last month of the benefit period.

This all means that the disincentive effect is often empirically substantiated. However, it is more questionable whether the disincentive effect varies over business cycles as the research into this is quite limited. In search theory, unemployment benefits are rather expected to have a less distortionary effect on unemployment duration during a recession, though this ultimately remains an empirical question. Yet, as the empirical research into this is scarce and only a very few empirical studies have tried 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 from 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) using US data and Schmieder *et al.* (2010) using German data also find a decline in the disincentive effect during a recession, although a somewhat more modest one. Kroft and Notowidigdo (2011) find from 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 using Spanish data. Their results also indicate that the disincentive effects of benefits might be milder in a recession. So taken together 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 if there is extremely high unemployment in the economy.

Another issue of the disincentive effect that has only gained more attention in recent years is whether monitoring and sanctions could lower the disincentive effect. The positive effects of monitoring and sanctions in the unemployment benefit system on people exiting unemployment to work are found for example by Abbring *et al.* (2005), Lalive *et al.* (2005), McVicar (2008), and Svarer (2011). Similar positive effects of monitoring and sanctions are also found on

welfare recipients by van den Berg *et al.* (2004), Boockmann *et al.* (2009) and van der Klaauw and van Ours (2010). Micklewright and Nagy (2005) and Gorter and Kalb (1996) find that monitoring of the job search only shortens the unemployment spell for some groups of the unemployed. Müller and Steiner (2008) find that sanctions are more effective the earlier on in the unemployment spell they are imposed. Boone, Sadrieh and van Ours (2009) show that unemployment benefits cause both *ex ante* effects through the threat of sanctions and *ex post* effects when sanctions have already been imposed. In addition, *ex ante* effects prove to be even stronger than *ex post* effects. In conclusion, the literature on this matter tends to indicate that monitoring and sanctions could decrease the disincentive effect, that this effect is greater earlier in the unemployment spell and that the threat of sanctions could even have a bigger impact than the sanctions themselves.

Some recent studies have shown that active labour market measures can incur similar *ex ante* effects to sanctions. Studies by, for example, Black *et al.* (2003), Geerdsen (2006), Geerdsen and Holm (2007) and Toomet (2008) prove that the threat of compulsory participation in an active measure might increase the exit from unemployment to employment prior to participation. Gaure *et al.* (2008) estimate using Norwegian data that the effect of active measures on offsetting the moral hazard problems in the unemployment benefit system is of even more importance than the effect of active measures that increase participants' human capital.

However, van den Berg and van der Klaauw (2006) do not find from Dutch data that counselling and monitoring could have an effect on the transition to employment as monitoring can instead cause a shift from informal job search to formal job search. Monitoring may be more effective for individuals with worse prospects of finding employment as they might have less scope for substitution. Furthermore, Manning (2009) analysed a reform in the UK that tightened the job search requirements for benefit recipients and found that the reform did not bring about higher job search efforts or transition to employment. Van den Berg and Vikström (2009) argue that the effect of monitoring can also vary depending on what is monitored and sanctioned. For example if monitoring focuses on job offer acceptance/rejection, people decrease their job search intensity in order not to receive a job offer that might be only partly suitable, so that they either have to reject it and get sanctioned or accept it even though it does not really match them. In this way, monitoring of job search effort may incur better results for increasing the exit rate to employment.

1.3.2. Previous research on the impact of unemployment benefits on post-unemployment job quality

This subsection gives a brief discussion of the previous studies on the effects of unemployment benefits on post-unemployment job quality. There are few studies that look at job quality after the unemployment insurance benefit period and usually the post-unemployment wage or employment duration are considered. In addition, there are a few studies that analyse how monitoring and sanctioning affect the effect of unemployment benefits on post-unemployment job quality.

The evidence for the effect on the post-unemployment wage is so far quite mixed. Gangl (2002) estimates the impact of unemployment benefits on unemployment duration and post-unemployment wages simultaneously, using German and US data. He finds support for both effects in both countries and finds that the disincentive effect is slightly higher in the USA and the effect on job quality is more positive in Germany. He concludes that at the cost of a slight increase in unemployment duration, unemployment benefits contribute substantially to post-unemployment job quality.

Another study by Gangl (2006) using US and European data shows that the scarring effects on post-unemployment earnings are mitigated by generous unemployment benefits. Addison and Blackburn (2000) also use US data to distinguish the effect on post-unemployment wages but they do not find any strong evidence as the positive effect is only revealed when the unemployed entitled to benefits are compared to the unemployed without benefits, and even then this effect is very small. Fitzenberger and Wilke (2007) find from German data that unemployment benefits are of only little importance for the duration of search unemployment and for post-unemployment wages. No discernible effects of unemployment benefits on the post-unemployment wage are found from Austrian data by Lalive (2007). Gaure *et al*. (2008) argue using Norwegian data that the extension in the job search period due to unemployment benefits is not a waste of time as the benefits do indeed help the unemployed to find better paying jobs and also increase the probability that a job will be found after the unemployment spell. Centeno and Novo (2011) study Portuguese data and find that more generous unemployment benefits do not have a significant effect on re-employment wages. There is some evidence of higher unemployment benefits incurring higher post-unemployment wages, but longer unemployment spells have also been found in a less recent but relatively well-known study by Ehrenberg and Oaxaca (1976).

There have been relatively more studies about post-unemployment employment duration, or job duration, in the recent literature than about wages and the results are more unanimous. It is also sometimes argued that job duration could be a better proxy for job match quality. This argument stems from the models of job turnover that treat job match as an experience-good as opposed to a search-good. Job match is treated as a pure experience-good by, for example,

Jovanovic (1979), who elaborates a model of job separations and argues that an employee's productivity in a particular job is not known beforehand and will be revealed only during the employment period. He shows that employees stay in these jobs in which their productivity comes to be known to be relatively high and employees select themselves out of jobs in which their productivity is lower. The model also predicts that the probability of an employee leaving a job is a decreasing function of tenure, meaning that a mismatch between an employee and the job will probably be revealed earlier rather than later.

Belzil (2001) finds from Canadian data that the exit rate increases significantly during the last five weeks before benefit exhaustion, but the jobs accepted during these five weeks are of shorter duration. An increase in the potential benefit duration prolongs both unemployment and post-unemployment job duration, though the effect on unemployment duration is greater, meaning that the disincentive effect exceeds the effect on post-unemployment job quality. Tatsiramos (2009) finds from European data that besides the commonly found effect of benefits increasing unemployment spells, there is also an indirect effect of benefits increasing post-unemployment employment spells, which is more pronounced in countries that have more generous benefit systems. Caliendo, Tatsiramos and Uhlendorff (2009) find from German data evidence of a significant positive effect of longer potential unemployment benefit duration on unemployment and employment duration.

Centeno (2004) shows with US data that more generous unemployment benefits incur longer job tenure and that this effect is even more amplified during economic busts. He argues that the job match quality is anyway quite good during better economic times as people are willing to change their jobs only if it increases their job quality. During a recession there are many unemployed people and a low rate of job offers, so more bad matches are made[28]. It follows that unemployment benefits can relax this situation somewhat as people do not have to take the first job offer that comes along, so unemployment benefits are particularly important in times of crisis for improving job match quality and dampening the cyclicality in match quality. This is also one of the very few papers that actually studies post-unemployment job quality under different economic situations.

Another paper that studies the impact of unemployment benefits on post-unemployment job quality is by Schmieder *et al.* (2010) and they analyse several different aspects of job quality. However, from their German data they do not find strong effects of extended unemployment insurance benefit durations on any measures of post-unemployment job quality through wages, wage growth, longer-term employment outcomes or other indicators, and these results are similar in different economic situations. Another slightly later study by the same researchers using the same data (Schmieder *et al.* (2012)) even concludes

[28] The higher level of mismatching during recessions is also showed by Bowlus (1995). This study indicates that the level of mismatching is primarily captured in starting wages.

that longer potential benefit durations incur a small but statistically significant negative effect on job quality through lower wages, less stable jobs, and higher probability of movement geographically or between occupations and industries. They argue that as unemployment benefits also incur longer unemployment spells, they also incur worse job outcomes through skill depreciation or stigmatisation.

There are some other studies that address the issues of post-unemployment wages and employment duration at the same time. Centeno and Novo (2006) show that unemployment benefits increase both the expected starting wage and job tenure. In addition, they find evidence that more generous benefits reduce the thickness of the lower tail of match quality through lower wages and shorter job tenure, and increase the matching quality available to all the unemployed. Gangl (2004a) shows from US and German data that though unemployment benefits prolong the job search period, they also improve the post-unemployment job quality and help people to avoid wage losses, occupational mobility and subsequent employment instability.

Research on post-unemployment job quality using Eastern European data is even more scarce than research on unemployment benefit effects on unemployment. As already mentioned, van Ours and Vodopivec (2006) show a disincentive effect and a spike at the end of the benefit period using Slovenian data. In their other study using the same data (van Ours and Vodopivec (2008)), they do not find positive effects from unemployment benefits on the post-unemployment wage or the quality of post-unemployment jobs in any other respect.

It is often observed that monitoring and sanctions in the unemployment benefit system might increase the transition from unemployment to employment (see Subsection 1.3.1). However, benefit sanctions can also decrease post-unemployment job quality. Arni, Lalive and van Ours (2009) also find that both warnings of and the imposition of sanctions increase the exit to employment, but also increase the exit out of the labour force. In addition, warnings might not have any effect on post-unemployment employment duration, but they do lower the post-unemployment wage. Real benefit sanctions lessen the post-unemployment job quality both by lowering the post-unemployment wage and by decreasing the post-unemployment employment duration. A study by van den Berg and Vikström (2009) also finds not only that the imposition of punitive sanctions incurs lower ensuing job quality in terms of hourly wage and number of hours worked, but also that it makes the unemployed move more often to a lower occupational level. In this way sanctions can lower post-unemployment job quality and lead to human capital losses.

2. AN OVERVIEW OF THE ESTONIAN UNEMPLOYMENT BENEFIT SYSTEM AND DATA USED IN THE ANALYSES

2.1. Overview of the Estonian unemployment benefit system

2.1.1. The development of the system of labour market policies in Estonia

This section looks at the development of the provision of labour market measures in Estonia. It focuses particularly on passive measures in the form of unemployment benefits to sketch out the background for the following chapters where analyses of the effects of unemployment benefits on labour market outcomes are presented.

In the beginning of the independence period following Soviet rule there was practically no unemployment in Estonia (see Figure 4). During the initial years of the transition period the economy went through extensive structural changes, so employment dropped and unemployment and inactivity rose gradually[29]. During these adjustments production became more efficient and capital-intensive fields developed fast (Rõõm and Viilmann (2003)), while employment dropped a lot in agriculture and also in industry, and so although economic growth was restored, unemployment continued its gradual rise.

During 1995–1997 the unemployment rate had stabilised at around 10% and a large part of the unemployment during these years was estimated to be structural caused by a mismatch of skills or regions. However, in 1998–1999 Estonia was hit by the Russian crisis and went through yet another structural change. The unemployment rate rose to an even higher level and though economic growth was restored relatively quickly, it took years before the unemployment rate saw a more significant decline. The reason for this was that the economic growth was largely boosted by foreign direct investments, which again favoured higher labour productivity and growth in capital-intensive sectors. The more rapidly declining industries continued to be agriculture, forestry and fishing.

[29] The developments in the labour market during the first decade of re-independence period are reviewed in, for example, Rõõm and Viilmann (2003), Eamets (2001) and Eamets (2000).

Figure 4. Developments in the economy after Estonia regained its independence and forecast for 2012–2015

Sources: Statistics Estonia, United Nations Statistics Division, Economic forecast of the Ministry of Finance (2011)

By 2005–2006, the real economic growth rate in Estonia had risen to around 10% a year and the economy was showing signs of overheating. The unemployment rate continued to fall and labour shortages emerged in some fields of economic activity. A major role in the overheating was played by the bubble in the real estate market and the first signs of the bursting of the bubble appeared in 2007 when economic growth started to slow down and registered unemployment started to increase slowly, though overall unemployment calculated with the ILO methodology was still declining. The economy started to shrink in 2008 and the problems in the Estonian economy were accelerated by the financial crisis in the global economy that emerged in the middle of 2008. The crisis turned out to be much deeper than the Russian crisis had been a decade earlier. The fall in GDP was much harsher and unemployment increased much faster. The Estonian economy suffered more during the crisis than most other economies in the European Union, and only the Latvian and Lithuanian economies contracted more in 2009. The increase in unemployment was even sharper than in the other member states of the EU as Estonian unemployment started to increase from a relatively low level. The adjustments in the economy were not made only through employment and working hours, but unlike in many other countries also through the nominal wage[30].

[30] For a thorough analysis of the downward nominal wage rigidity in Estonia during the crisis see Dabušinskas and Rõõm (2011).

However, the recovery from this crisis was also relatively fast in Estonia. In 2010–2011 there was positive economic growth and unemployment fell quite sharply. The economic forecasts for the next few years expect continuing recovery, though at a somewhat slower pace than in 2010–2011. During the crisis the fall in employment was biggest in the construction sector, and also in industry, such as metalworking and machinery. During the recovery, these sectors have also grown back the most, though they still employ fewer people than before the crisis. Overall the statistics do not provide much evidence that the economy has managed to restructure a lot following the recent crisis.

As employment fell more in construction and to an extent also in industry during the most recent crisis, unemployment grew more among men and young people. As these sectors had recovered to some extent by the beginning of 2012, the shares of women and older people among the unemployed are growing. Non-Estonians also suffered more due to the crisis. The unemployment rate for non-Estonians has always been somewhat higher than the unemployment rate for Estonians due to the structural changes following the recovery of independence when the unemployment rate grew more in those regions where there was a higher population of non-Estonians, but probably also because of their lack of Estonian language skills and low geographical mobility. Similarly, there is a wage gap between Estonians and non-Estonians. Toomet and Leping (2008) argue that the reasons for the wage gap also lie in different ethnicity-specific returns to education and establishment-level segregation, as the school system used to be segregated. Toomet (2011) also argues that non-Estonians experience lower income due to segregation and discrimination. He shows that the income premium for non-Estonians from English language skills is greater than that from knowledge of Estonian.

Although there were basically no unemployed people in the period immediately following the return to independence, unemployment and the need for social security for the unemployed emerged quickly within a few years. The first conditions for registering the unemployed and providing them with labour market measures were created as early as 1990, so even before the formal declaration of the recovery of independence for Estonia. The first such laws regulated registered unemployment and set up the public employment service called the Estonian Labour Market Board, and the early system of unemployment benefits was created in 1991[31]. The initial system of unemployment benefits consisted only of an unemployment allowance and was regulated by a Government decree until the end of 1994. The unemployment allowance was a fairly low flat rate benefit that depended on the current minimum wage and was financed through the state budget. To be eligible for the allowance a person had to have been in employment for at least 180 days during the previous 12 months and the maximum duration of payment was 180 days (Kuddo *et al.* (2002)). During this

[31] An overview of the unemployment benefit system in Estonia for 1991-2002 is provided by Kuddo *et al.* (2002), and for 2003-2004 by Leetmaa *et al.* (2004).

period, the provision of active labour market policies was regulated by the same decree (Leetmaa and Võrk (2004)).

The first time that labour market policies were regulated by an act was in 1995 when the Social Protection of the Unemployed Act (Töötu sotsiaalse kaitse seadus, 1994) was passed. A major change introduced by this act was the option of extending the potential period of unemployment allowance by 90 days if a person had not found a job during the previous 180 days[32]. In addition, the act introduced a waiting period of 60 days for those unemployed whose working contract had been terminated at the initiative of the employee or because of the employee's breach of contract, and also to those unemployed who had been in the education system before registering as unemployed[33]. What is more, this act laid down the possibility of sanctions being imposed on unemployment allowance recipients if a suitable job offer or participation in an active measure was rejected. However, the choice of active labour market measures that this law implemented beyond information distribution and a job mediation service was very limited, offering only labour market training, a business start-up subsidy, a wage subsidy and public work. The unemployed had to apply for the measures themselves and were not pushed or forced to participate by the public employment service. In general, during this period the criteria for registering as unemployed were quite strict and the provision of active and passive labour market policies was rather limited.

A major amendment in the legal framework took place in 2000 when the Social Protection of the Unemployed Act was amended (Töötu sotsiaalse kaitse seadus, 2000) and the Employment Service Act was passed (Tööturuteenuste seadus, 2000). The most important change in the laws was the redefinition of the registered unemployed so that the eligibility criteria for registering became milder. This meant, at least in theory, that more people were able to register themselves as unemployed and have access to active measures. The range of active measures was expanded by the introduction of career counselling. In addition, the monitoring of job search was relaxed somewhat as a person registered as unemployed was required to visit the public employment service at least once within thirty days instead of once every fifteen days or ten working days as was required previously.

The reform in 2000 changed unemployment benefits by extending the potential period of unemployment benefit to 270 days while keeping the possible extensions of unemployment allowance in the system. In addition, the waiting period of 60 days was abolished for the unemployed whose employment contract was terminated at the initiative of the employee. This amendment was intended to protect those unemployed who in reality were forced to quit their job by the employer (Kuddo *et al.* (2002)).

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[32] Possible extensions of the unemployment allowance were also foreseen for people close to retirement age (up to 180 days), pregnant women (up to 70 days) and parents of at least 3 children (up to 90 days).

[33] The potential period of unemployment allowance for those groups was only 120 days.

The next major change in the Estonian unemployment benefit system took place in 2001 when the bases for the system of unemployment insurance benefit were created. The Unemployment Insurance Act (Töötuskindlustuse seadus, 2001) was passed at the end of 2001, the gathering of the funds for the insurance system started in 2002 and the first unemployment insurance benefits were paid in 2003. Up to 2003, the unemployment benefit system in Estonia had consisted of only a relatively low means-tested unemployment allowance. Eamets (2001) argues that the very low level of unemployment benefits was one of the reasons why the unemployment rate was relatively low during the first decade after Estonia regained independence. Kuddo *et al.* (2002) state that during this period the system of unemployment allowance was a fairly insignificant labour market policy due to the low level of the allowance and also due to the lack of activating measures in the system.

A new organisation, the Estonian Unemployment Insurance Fund, was established to administer the system of unemployment insurance. In addition to unemployment insurance benefit, the system also comprised benefits upon the collective termination of employment contracts and benefits upon the insolvency of the employer. The Estonian Labour Market Board continued to be responsible for registering the unemployed, implementing the active labour market policy and administering the unemployment allowance. The Labour Market Board was governed by the Ministry of Social Affairs, which is also responsible for labour market policy in Estonia. The Unemployment Insurance Fund was established as an independent public body with a tripartite management with two members from the trade unions, two members from the employers and two members from the Government.

While the expenditures of the Labour Market Board used to be covered by the state budget, a new tax was introduced to cover the responsibilities of the Unemployment Insurance Fund. The unemployment insurance benefits were covered by the unemployment insurance premium paid by the employees and the benefits for collective lay-offs and insolvency of the employer were covered by the insurance premium paid by the employers. During the initial years of the system the insurance premium for employees was set at 0.5% of their gross wage and that for employers at 1%.

The unemployment insurance benefits were set to be dependent on the previous wage at 50% during the first 100 days and 40% later on, in general an amount several times higher than the unemployment allowance at the time. The potential duration of unemployment insurance benefits was set to be either 180 days, 270 days or 360 days depending on whether the length of the previous record of unemployment insurance premium payments was less than five years, five to ten years or more than ten years. The unemployment insurance benefits were brought in to cover involuntary unemployment and also required a previous working record of 12 months during the previous 36 months. The unemployment allowance system remained the secondary system of unemployment benefits to cover voluntary unemployment and the unemployed with

shorter employment records, and also provided an additional 90 days of unemployment allowance to those unemployed who were eligible for unemployment insurance benefit for only 180 days. As the new unemployment insurance benefits were more generous than the unemployment allowances, the sanctions in the unemployment insurance system were stricter. The first failure to meet the eligibility criteria incurred immediate termination of the insurance benefit while the first failure under the unemployment allowance scheme incurred a suspension of payments and only the second failure incurred termination.

After the introduction of unemployment insurance benefit, the next major change in the provision of labour market policies came in 2006 when the Labour Market Services and Benefits Act was passed (Tööturuteenuste ja –toetuste seadus, 2005) to replace the Social Protection of the Unemployed Act and the Employment Service Act. The act was especially important for active labour market policies as it introduced several new measures: work practice, coaching for working life and four measures meant for the disabled unemployed covering the adaptation of premises and equipment, working with special aids and equipment, working with a support person and communication support in interviews. In addition, the concept of the individual action plan was introduced into the Estonian legal framework. This plan was supposed to help an unemployed person to get back to employment by planning the necessary steps from the individual needs. The changes in the system of unemployment benefits were minor, so for example people previously in the education system were not eligible for 270-day unemployment allowance after a waiting period of 60 days, meaning the potential period was no longer cut by 60 days. In addition, the only possible extension of unemployment allowance remaining in the system was an extension up to the pension age as other previous extensions were abolished.

In 2007, the major amendment in the legal system regarding the unemployed was that all people registered as unemployed were covered by health insurance, even those without unemployment benefits. This was a somewhat controversial change as on the one hand the public employment service was now able to reach out to those people who might have otherwise remained inactive on the labour market, but on the other hand, this change potentially increased the clients of the public employment service by adding those people who were not interested in employment and activation, but only in health insurance.

The requirements for unemployment insurance benefit were also relaxed somewhat in 2007. When the system of unemployment insurance benefits was created, it was expected that the majority of the unemployed would be entitled to unemployment insurance benefit and the system of unemployment allowance would only have a supporting role for unemployment insurance. However, the share of the registered unemployed eligible for unemployment insurance benefit stayed relatively low over the years at around 20%, so in 2007 the requirement for previous insurance contributions was changed from 12 months during the previous 24 months to 12 months during the previous 36 months. This meant that a person who had previously been out of employment for up to two years

during the last three years might still be eligible for unemployment insurance benefit. However, even this change did not increase the share of unemployment insurance benefit recipients significantly. This was probably because most of the unemployed still had even shorter previous employment records or were those whose employment contract was terminated on a voluntary basis by mutual agreement or the employee's initiative.

The requirements for higher potential benefit duration were also changed in 2007 to take into account that people might have breaks in their contribution payments even if they continue to be employed due to a long illness, vacations, an employer paying the salary for two months in one month, and similar issues. The requirement of contributions for 270-day benefit was changed from 5 years to 56 months and for 360-day benefit from 10 years to 111 months. In addition, the system of unemployment insurance benefits in Estonia was old enough by 2007 that some people had started to become in fact eligible for the 270-day unemployment insurance benefit.

As the rate of unemployment benefit even in the new system of unemployment insurance benefits was still relatively low compared to that in other countries in the European Union and basically at the minimum level allowed by the European Social Charter, more heated discussions about flexicurity issues in Estonia emerged in 2007 and 2008. The Ministry of Social Affairs revealed a draft for a new Employment Contracts Act in January 2008 that was supposed to lead to changes in the Unemployment Insurance Act as well. After long discussions between the social partners a tripartite agreement to change the system of labour market policies in Estonia was reached. The new law was supposed to make employment relations more flexible. This included a cut in severance payment of one month's salary. In addition, the responsibility for paying the severance payment was supposed to be transferred largely to the Unemployment Insurance Fund for up to three months of salary and renamed as the insurance benefit upon lay-offs so that private sector employers would always pay a severance payment of one month's salary following redundancy regardless of the tenure of the employee.

Alongside the increase in flexibility, it was also planned to increase social security. The agreement included a rise in the replacement rate of the unemployment insurance benefit to 70% during the first 100 days and 50% later on and an increase in the coverage of unemployment insurance benefit by extending it to those unemployed whose employment contract was terminated on a voluntary basis through mutual agreement or the employee's initiative. However, to limit the possible moral hazard, the criteria for the voluntarily unemployed to be eligible for benefits were due to become stricter, demanding a longer employment record, and the replacement rate lower at 40% during the whole benefit period. It was also agreed that the unemployment allowance and the minimum level of unemployment insurance benefit should not be lower than half the minimum wage during the preceding year. To lessen the restrictive effects of severance pay on job search, it was agreed to enforce a waiting period

for unemployment insurance benefit for those people who were eligible for insurance benefit upon redundancy of 30 days for those who get one month's salary, 60 days for two months of salary and 90 days for three months of salary. In addition, there were some further minor changes in the system[34]. Under this agreement the new Employment Contracts Act (Töölepingu seadus, 2008) and the necessary changes in the Unemployment Insurance Act were passed at the end of 2008 and were supposed to be implemented in the middle of 2009.

As well as the agreed flexicurity package there was an agreement between the social partners that the responsibilities of the Labour Market Board should be taken over by the Unemployment Insurance Fund and that the Labour Market Board would be liquidated. The objective of this takeover was to merge the management of active and passive labour market policies to improve access to labour market measures and improve their quality and effectiveness. In addition, this reform was intended to involve the social partners in designing the labour market policy. The parties expected that the reform would help to focus the activities of the public employment service more on helping people back to work, increase the resources for labour market policies, help the resources be used more flexibly, and increase the administrative capacity and the analytical abilities for developing labour market policies.

In May 2009, the Unemployment Insurance Fund indeed became responsible for implementing passive labour market policies as well as active ones[35]. However, the flexicurity package was only partly adopted. The agreements on increasing labour market flexibility were enforced fully, but some amendments on social security were abolished and some postponed only shortly before they were planned to come into force. The rise in the replacement of unemployment insurance benefits was abolished and the increase in the coverage of unemployment insurance benefits for the voluntarily unemployed and the rise in the unemployment allowance were postponed until 2013. At the beginning of 2012, the Government also proposed to abolish the extension of unemployment insurance for the voluntarily unemployed altogether.

So the flexicurity package that was finally implemented in fact lowered the level of social security. Only the very minor amendments to increase the level of unemployment insurance benefits were implemented, giving a higher

[34] For example, there was an amendment that people who had been on pregnancy leave, maternity leave, adoptive parents leave or parental leave during the previous 36 months could have their benefits period extended by the time spent on leave. This amendment was meant to increase social security for people who had been recently out of the labour force with small children.

[35] In May 2009 there was also a minor amendment in the law concerning those unemployment allowance recipients whose employment contract was terminated due to the employee's breach of contract. Before, there was a waiting period for the unemployment allowance for them of 60 days and their potential benefit period was 210 days. In order not to punish them twice in the system, the waiting period was abolished, but the potential benefit period became even shorter than that for other unemployment allowance recipients (210 days).

minimum level of unemployment insurance benefits and more relaxed criteria for insurance contributions for those previously on pregnancy, maternity and parental leave. At the same time, the level of severance payment was cut, the notification period for redundancies was shortened and the waiting period for unemployment insurance benefits was brought in for those eligible for insurance benefit upon lay-offs from the Unemployment Insurance Fund[36].

The agreed flexicurity package was not fully implemented due to the very rapidly evolving economic crisis. The Government abolished the increase in the unemployment allowance because otherwise it would have increased even more the expenditures of the state budget, and due to the crisis there had been a significant increase in spending on the unemployment allowance already. The amendments that concerned unemployment insurance benefits were abolished because there was a threat that even the reserves of the Unemployment Insurance Fund would not be sufficient in times of crisis to increase spending to an even higher level and because of this, the unemployment insurance premium was also increased twice in 2009. A rise in the unemployment insurance premium had also been foreseen in the initial agreement between the social partners as it was forecast that the expenditures of the system would increase; however, the economic outlook during the time of agreement was not as bad as the reality turned out to be in 2009.

When the unemployment insurance premium was increased in August 2009 to 4.2% of the gross wage, with 2.8% for employees and 1.4% for employers, the revenues of the Unemployment Insurance Fund started again to exceed its expenditures. As the economy recovered remarkably between then and the beginning of 2012, the difference between the revenues and expenditures has also increased over time and the reserves of the Unemployment Insurance Fund have grown. However, the Government is not discussing at this point in time whether it is possible to return to the initial tripartite agreement and whether it could be possible to introduce the amendments that would increase social security. Instead, amendments are being discussed that would abolish those amendments that were initially postponed as well. In addition, there have been amendments and proposals for how to spend the accumulated reserves on targets other than unemployment insurance. This all gives some food for thought as to how big a role the economic crisis had in the decision not to implement the flexicurity package in full and how much the economic crisis provided the government an excuse not to implement those amendments that were demanded by the social partners rather than the government.

[36] In addition, in the legal framework, the waiting period is not set to be dependent on the receipt of insurance benefit upon lay-off, but it is dependent on the tenure of previous employment and the reason for the termination of contract. So the waiting period is set for those whose employer should apply for the benefit upon lay-off. However, there have been cases when the employer has not applied for this benefit, but due to the regulation the waiting period for the unemployment insurance benefit has still been imposed.

One major change regarding the expenditures of the reserves of unemployment insurance is that as of 2012 these reserves are also used for active labour market policies. During the initial years of the system of labour market policies in Estonia, active labour market policies were financed through the state budget and to a smaller extent also through different projects of the European Union. Since 2008, the majority of active labour market policies started to be provided through a programme financed by the European Social Fund called Increasing the Supply of Qualified Labour 2007–2013. This kind of financing created the conditions for provision of a wider range of active measures beyond those stated in law and a widening of the groups of people eligible for active measures beyond the registered unemployed to include people such as those at risk of losing their job. In 2008 measures like psychological counselling and social rehabilitation started to be provided. Since May 2009 when the Unemployment Insurance Fund took over the responsibility for providing active measures, the range of measures has widened even more and by the beginning of 2012 a very wide range of different measures besides those set out in the Labour Market Services and Benefits Act were part of the package, including job clubs, voluntary work, work trials, debt counselling, community work, individual job placement, care allowance, addiction counselling, individual solutions, mentoring for business start-up recipients, reaction to collective redundancies, mobile counselling etc. In 2012 only a marginal amount of the active measures are financed through the European Social Fund and the majority of the measures are financed by the reserves of the unemployment insurance. In 2012, this wide range of measures is outlined in a decree by the government (Tööhõiveprogramm 2012–2013, 2011). Overall it is evident that the Labour Market Services and Benefits Act no longer satisfies the needs of the labour market and it should be thoroughly amended.

Since May 2009 when the Unemployment Insurance Fund started to provide all the labour market policies, not only has the range of active measures been widened, but the design of the measures and the principles of provision have also been changed significantly. Most importantly, the provision of measures has been changed from being based on "wishes" to being based on "individual needs". The crucial point in the system is that it should specify which services the individual unemployed person needs to get back to employment. The focus of the public employment service was turned towards helping people back to work and hence cooperation with employers was prioritised. Strong emphasis was put on activation, job search counselling and job mediation and an IT system was developed that was able to perform automatic matching of the unemployed and vacancies, pre-selection of candidates and other recruitment support.

It can be concluded that the expectations from the social partners regarding the changeover were relatively quickly fulfilled despite the deep crisis in the labour market. During the changeover, Estonia suffered the sharpest increase in unemployment in the European Union, but since the beginning of 2010, the

Estonian labour market has recovered more quickly than the others (see also Figure 1 in the introductory part of the thesis). As the bigger changes in the principles of service provision were also implemented in the Unemployment Insurance Fund in the beginning of 2010, it can be argued that the reform in the labour market policy might indeed have had a significant positive impact on the Estonian labour market.

2.1.2. The system of labour market policies in Estonia in international comparison

The recent developments in labour market policies in Estonia are depicted in Figure 5. It shows that the expenditures on active labour market policies have indeed increased many times over since 2009. During the years of crisis both the number of people unemployed and the expenditures on active measures increased as there were more people who needed help from the public employment service. However, the figure also shows that the reform of the labour market institutions helped to bring more resources to active measures because while the number of unemployed fell sharply in 2011, the expenditures on active measures increased somewhat. A rise in the budget is foreseen for 2012 too. In 2013 the budget ought to fall slightly, though spending per registered unemployed person is supposed to continue rising. It proves that the paradigm of labour market policy changed during the last reform and that active measures have gained much more importance.

Appendix 1 provides a comparison of spending on active labour market measures with spending in the other countries in the EU. For years Estonia was the EU member that spends the least on active labour market policies as a share of GDP and 2009 was the first year when this was no longer the case. However, spending on active measures in Estonia still lags far behind the average in the EU. Similar conclusions can be drawn from Appendixes 2 and 3, which represent the average spending on active measures per person wanting to work and participants in active measures per 100 people wanting to work. Estonia also provided the lowest level of active labour market measures before 2009 for these indicators. Although, Estonia is no longer in last place since 2009, it still gives a low level of active measures in comparison to the EU average.

Appendix 4 shows that on top of the increased spending on active labour market measures, the package of measures has changed a lot in other ways. For years, the provision of active labour market policies in Estonia consisted almost exclusively of career counselling and training. Since the reform, the package of active measures has been designed to meet better the needs of the unemployed. During the crisis, there were many unemployed with fresh working experience and a higher qualification, so the main concern was the lack of jobs rather than a lack of qualifications. For this reason, work with employers and services like job mediation, job search counselling, tailor-made training and wage subsidy

were prioritised. During the recovery in the labour market as the number of unemployed shrinks, the share of the long-term unemployed is increasing. These are people who might have individual and mixed obstacles to entry into employment. Different measures focused on these very individual needs are prioritised such as individual job placement, addiction counselling and debt counselling, together with work practice and work-related training.

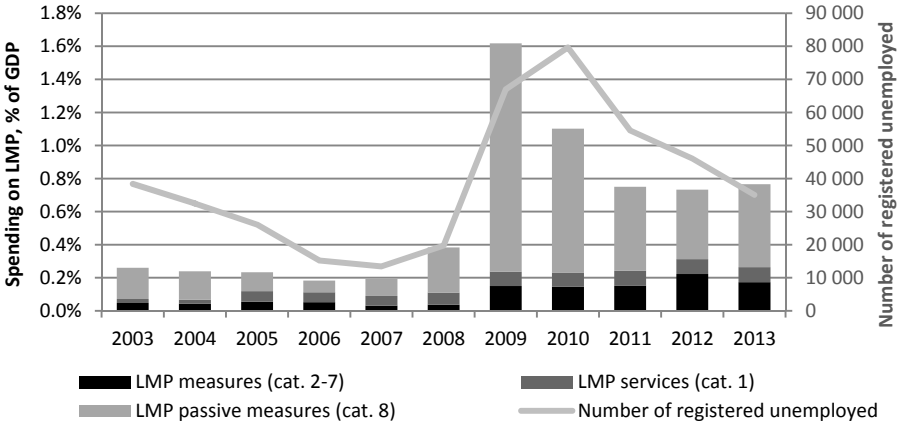

Figure 5. Spending on labour market policy by the public employment service in Estonia 2003–2013

Note: 2012 and 2013 figures from budget and forecast, earlier years real expenditures.
Categories for labour market policy interventions as in Eurostat (Labour market policy database. Methodology, 2006). LMP services cover all services and activities for jobseekers. LMP measures cover interventions that provide temporary support for groups that are disadvantaged in the labour market and which aim to activate the unemployed, helping people move from involuntary inactivity into employment, or maintaining the jobs of people threatened by unemployment. LMP supports cover financial assistance that aims to compensate individuals for loss of wage or salary and support them during their job search or that facilitates early retirement. There are no passive measures in Estonia belonging to category 9 of LMP supports for early retirement intervention.
Source: Estonian Unemployment Insurance Fund

Figure 5 shows that spending on passive labour market policies has been higher than spending on active policies in most years. Spending on unemployment benefits sky-rocketed in 2009 as there was a vast inflow to unemployment because of the crisis. As they had only recently been in employment, most of the newly unemployed also qualified for unemployment benefits, and as the inflow has shrunk, the spending has also decreased. However, in 2013 the expenditures should increase somewhat due to the amendments in laws increasing the level of the unemployment allowance and increasing the coverage of unemployment insurance, though it is likely that at least the latter amendment may be abolished before implementation.

The developments in the system of unemployment benefits with regards to the level of benefits is presented in Figure 6. When the system of unemployment benefits was introduced in Estonia, it consisted only of the unemployment allowance. As it was set at 80% of the minimum wage, it was not very much lower than the minimum wage or the average wage, but during the years since then both the average wage and the minimum wage have grown quite solidly while the level of the unemployment allowance has lagged far behind. In 2005 and 2006 the level of the unemployment allowance reached only 15% of the minimum wage. During the last few years it has been around 23% of the minimum wage and only about 8% of the average wage.

The average level of unemployment insurance benefit has been close to the minimum wage, even somewhat exceeding it during the first hundred days of unemployment. In consequence, the level of social security has proven to be significantly higher since unemployment insurance benefits were introduced than it was during the years before. The financial condition of the unemployed was worst during the few years before unemployment insurance was brought in, as then the difference between the wage and price level and potential unemployment benefits was the highest.

As the average level of unemployment insurance benefits tends to be around the minimum wage, it can be argued that these benefits might incur some disincentive effects and prolong the unemployment duration but as the level of the unemployment allowance is extremely low, the disincentive effects of the unemployment allowance should be much milder. At the same time, it is also very likely that the level of unemployment allowance is too low to actually help the unemployed to look for work, so while it might not distort the labour market much, it might not fulfil its purpose either by not providing social security nor subsidising job search.

Figure 6 also depicts the level of subsistence benefits. While subsistence benefit is not part of the system of unemployment benefits, it is the level of social security that some long-term unemployed may be eligible for. As it has always been at a very similar level to the unemployment allowance, the same conclusions apply. It probably provided social security and might have had some distortionary effects on the labour supply during the initial years after the return of independence.

Some idea of the harshness of the eligibility criteria for unemployment benefits in Estonia is provided in Figure 7. The figure shows that it has always been the case that around half of the registered unemployed do not have any unemployment benefits. The coverage by unemployment benefits increases during recessions and spikes are visible in 1999 and 2009 as there are movements to unemployment from employment and the people with fresh employment experience tend to be eligible for unemployment benefits. As the inflow to unemployment slowly decreases, the share of benefit recipients declines. Those people who entered unemployment during the crisis and have not yet managed to find a new job as employment has not recovered to the pre-crisis level, have by then

exhausted their benefit period, meaning that during the recovery period in the economy the level of social security for the unemployed quickly declines.

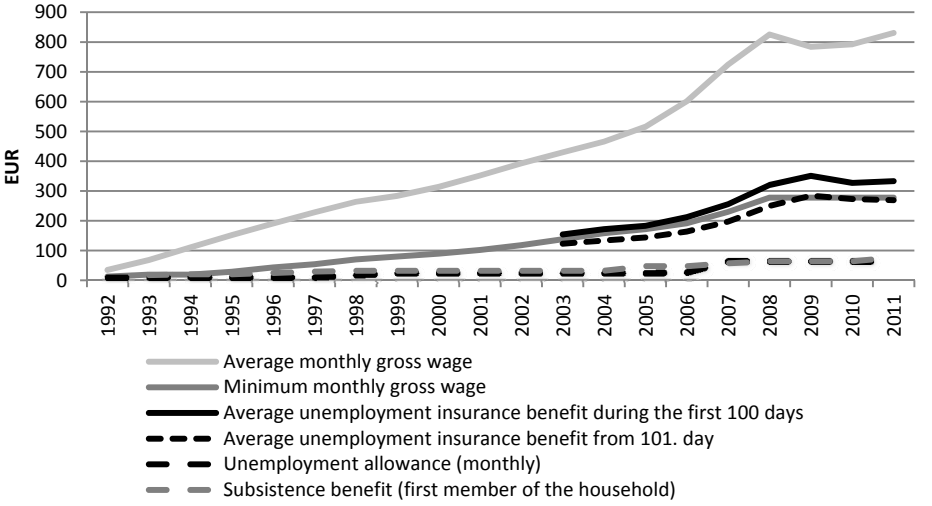

Figure 6. The level of unemployment benefits in Estonia after the return of independence

Note: In some years the level of the minimum wage, unemployment allowance or subsistence benefit changed during the year. In these cases this rate is depicted that applied for most of the year.
Source: Unemployment Insurance Fund, Statistics Estonia, Kuddo *et al.* (2002), Eamets (2001), Rõõm (2003a)

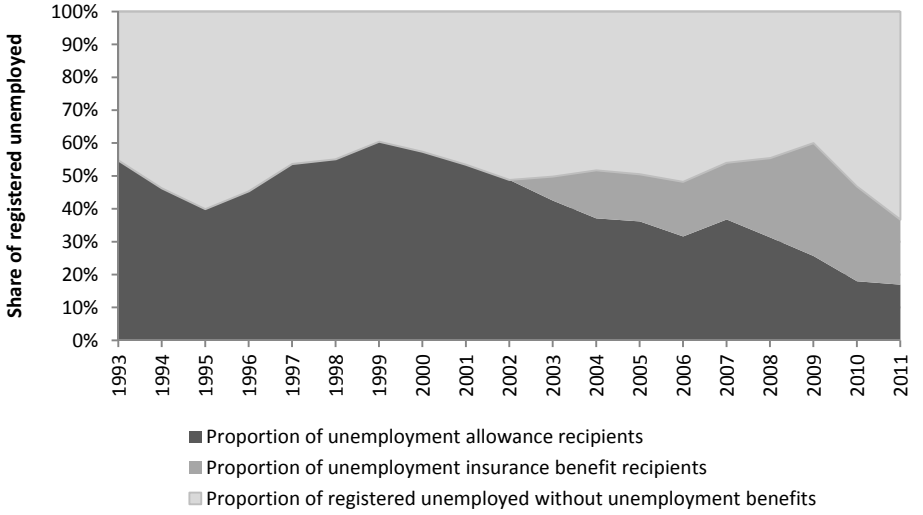

Figure 7. Proportion of the registered unemployed receiving unemployment benefits in Estonia 1993–2011

Source: Estonian Unemployment Insurance Fund

The proportion of benefit recipients declined to its lowest level since the introduction of unemployment benefits in Estonia in 2011. The last crisis had a larger effect on the Estonian labour market than the crisis in the end of nineties as the decrease in employment was larger. Though the recovery in employment has also been quicker, the number of employed people in 2011 is still far behind the number in 2008. This means that many people have by then exhausted their benefit and might still not have found employment in a very short time afterwards, for which reason the proportion of registered unemployed without any subsidy for job search increases.

The decrease was especially deep in the share of unemployment insurance benefit recipients and their proportion still continues to decline at the beginning of 2012. The proportion of unemployment allowance recipients started to rise slowly in the second half of 2011. There is a rising share of unemployment insurance benefit applicants who are not eligible for unemployment insurance benefit because their previous employment was too short, but who are often still eligible for unemployment allowance. It shows that there are many people who have managed to exit unemployment into employment, but who have moved back to unemployment after a shorter period of within one year. This suggests the stricter criteria for eligibility for unemployment insurance benefit have also contributed to a decrease in the level of social security during the period of recovery. Because of the criteria regarding the previous record of unemployment insurance contributions, there are many people who have only recently been in employment and have become involuntarily unemployed, but receive only very low unemployment benefit that might not subsidise their job search.

Figure 7 also depicts the changes in the system of unemployment benefits through the years described earlier in this section. The reform of 1995 that introduced the possibility of extending the unemployment allowance and also set a waiting period for some allowance recipients seems to have at least temporarily decreased the share of the registered unemployed eligible for unemployment allowance. The amendments in 2000 extended the potential benefit period, abolished the waiting period for the voluntarily unemployed, and relaxed the criteria for registering as unemployed. The impact of these changes seems to have occurred with a lag in 2001 as the economy was recovering by then and the number of unemployed was decreasing while the number of registered unemployed and unemployment allowance recipients increased. As the increase in the number of registered unemployed was bigger, the share of benefit recipients among the registered unemployed still decreased, so the amendments had a slightly greater impact on registered unemployment than on the number of unemployment benefit recipients.

The introduction of unemployment insurance benefits in 2003 had the effect that some unemployed people became eligible for unemployment insurance benefit instead of the low unemployment allowance. Along with benefit level, the coverage of unemployment benefits also increased. During this time, employment increased and the number of unemployed and registered un-

employed fell. However, the ratio of registered unemployed to unemployment benefits increased slightly. As unemployment insurance benefit and unemployment allowance have different criteria for eligibility, some people who are not eligible for unemployment allowance might be eligible for unemployment insurance benefit.

The longer potential unemployment insurance benefit due to the maturity of the system in 2007 might have had some impact on the coverage rate in 2008 rather than 2007. Similarly, the potential duration of unemployment insurance benefit for 360 days probably did not have a significant effect in 2011, but might influence the coverage rate in 2012. Firstly, on both of these occasions there were at first relatively few people who were eligible for the maximum potential period as they would have to have been in employment without any breaks since the beginning of 2002. Secondly, the new 270-day-benefit recipients had to be in unemployment for over 180 days before their impact could have become visible in comparison to the 180-day-benefit recipients and to the 360-day-benefit recipients after 270 days.

Figures 8 and 9 give some idea about the generosity of the Estonian unemployment benefit system compared to those of the other countries in the European Union[37]. Figure 8 pictures the coverage of unemployment benefits as a share of unemployment benefit recipients among all people wanting to work by countries. During the boom period, in 2006, only four countries had even lower unemployment benefit coverage than Estonia, and these were Lithuania, Bulgaria, Poland and Slovakia[38]. In 2009 inflow both to unemployment and to unemployment benefits increased in most of the countries and hence the coverage increased in most countries as well. As inflow to unemployment was higher in Estonia than in other countries, the coverage of unemployment benefits became closer to the average coverage in the European Union. In 2006 the coverage of unemployment benefits in Estonia was only a third of the average coverage in the European Union, in 2009 it was almost two thirds. The increase in the coverage might also have been caused in some part by the emergence of 270-day unemployment insurance benefits from 2007 and the marginal increase in the coverage rate that also came in 2007. In conclusion, the figure shows that the system of unemployment benefits in Estonia provides coverage far behind the EU average both in times of booms and in recessions. The coverage is especially low during better economic times. The situation is probably impro-

[37] Some comparisons of the unemployment benefit system in Estonia with other countries before or during the initial years of implementation of unemployment insurance benefits are provided by Behar (2009), Trumm (2006), Leetmaa *et al.* (2004), Eamets and Masso (2004), Paas *et al.* (2004), Vodopivec *et al.* (2003), Rõõm (2003a), Paas *et al.* (2003), Eamets (2001) and others. A somewhat more recent international comparison is presented by Võrk *et al.* (2010). A very recent and thorough comparison about the strictness of eligibility criteria for unemployment benefits in OECD and EU countries (including Estonia) is provided by Venn (2012).

[38] If all passive labour market policies are considered, including category 9: early retirement schemes, then only Bulgaria had lower coverage in 2006.

ving somewhat as the system matures, as since March 2011 360-day unemployment insurance benefits have also been granted.

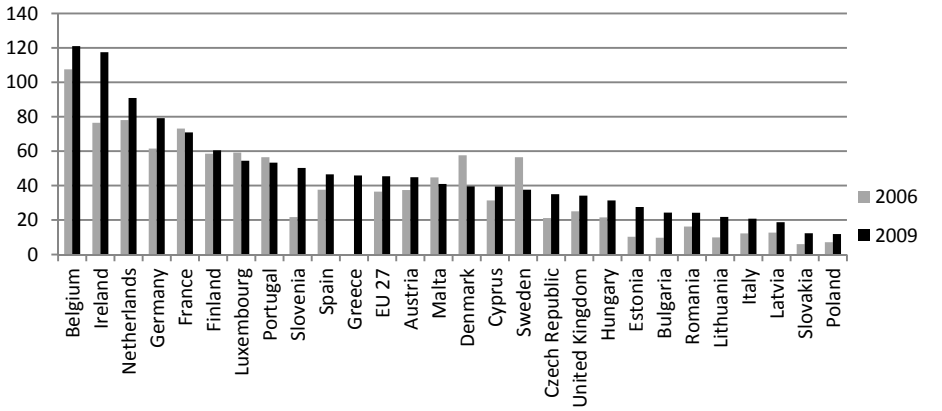

Figure 8. Number of unemployment benefit recipients per 100 persons wanting to work 2006 and 2009

Note: category 8 from the classification of labour market policies considered. The data for Greece in 2006 are not available. Persons wanting to work include the unemployed according to the ILO definition and the labour reserve of inactive persons wanting to work or the discouraged unemployed.
Source: Eurostat

Figure 9 presents the average spending on unemployment benefits per person wanting to work and combines information about the coverage of benefits with information about the level of benefits. In 2006, only Bulgaria spent less per person wanting to work than Estonia. By 2009, Estonia's spending had grown significantly and had increased closer to the average expenditure in the European Union. In 2006, Estonia's average expenditure was about 6% of the average in the EU. By 2009, the expenditure had grown to 47% of the EU average. Though some part of the increase is probably due to the introduction of 270-day unemployment insurance benefits, a bigger role was played by the more severe labour market conditions in Estonia. The overall level of social security provided by the system of unemployment benefits is still far behind the EU average and this difference is more marked during better economic times. The introduction of 360-day unemployment insurance benefits, the rise in the level of unemployment allowance and the possible coverage of the voluntarily unemployed with unemployment insurance benefits will probably bring Estonia closer to the average level of unemployment benefit generosity in the European Union.

The level of the coverage rate and expenditure on unemployment benefits are on the one hand dependent on the generosity of the level and duration of benefits. The generosity of benefits can be compared between countries by the net replacement rate of benefits during the initial phase of unemployment and

for the long-term unemployed. These data are provided in the OECD database for benefits and wages for 2001–2009. Estonia is by these indicators among the countries with the least generous unemployment benefit systems in the OECD and the EU.

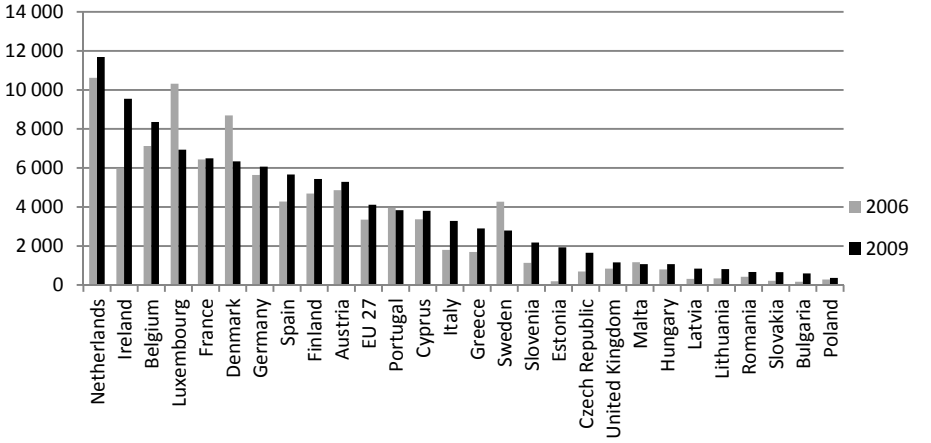

Figure 9. Spending on unemployment benefits in PPP units per person wanting to work 2006 and 2009

Note: category 8 from the classification of labour market policies considered. Persons wanting to work include the unemployed according to the ILO definition and the labour reserve of inactive persons wanting to work i.e. the discouraged unemployed.
Source: Eurostat

On the other hand, the coverage and expenditures also depend on the strictness of the eligibility criteria for unemployment benefits. Eligibility criteria include the criteria for benefit granting such as previous employment and the criteria for the continuing receipt of benefit such as proven job search or compulsory participation in active labour market policies. A thorough analysis of these criteria in 36 OECD and EU countries in 2011 is provided by Venn (2012), who constructs an indicator out of four different sub-indicators[39] using the legislation and regulations in each country to compare the eligibility criteria between the countries. Estonia turns out to be one of the countries with stricter entitlement and job-search monitoring conditions. Job search and availability requirements in Estonia are around the average level. However, the overall weighted indicator of eligibility criteria puts Estonia among the countries with strict regulations, so the eligibility criteria in Estonia are also a reason why the coverage of and

[39] 1) entitlement conditions: minimum employment/contribution record and sanctions for voluntary unemployment; 2) job-search and availability requirements: availability during ALMP participation, demands on occupational mobility, demands on geographical mobility and other valid reasons for refusing job offers; 3) monitoring: proof of job search; 4) sanctions: sanctions for refusing job offers or ALMP participation and sanctions for repeated refusal of job offers or ALMP participation.

spending on unemployment benefits have been rather low. However, this indicator takes into account formal regulations and not how these regulations are implemented, so for example, Estonia's sanctions for a person refusing a suitable job offer are in the regulations rather strict, but in practice these sanctions are very rarely imposed, according to the statistics of the Unemployment Insurance Fund.

This section has shown that during the period after independence was regained, there has been a huge development in Estonia with regards to the provision of labour market measures. Important steps have been taken in only a few recent years when the provision of active and passive policies were put under the administration of one single organisation, which has let the provision of active labour market policies develop especially. The major step with regards to passive labour market policies was the introduction of unemployment insurance benefit. The generosity of the system of unemployment benefits continues to increase with the maturity of the system and will do so again if the amendments due to be implemented in 2013 are applied in reality. However, while the provision of labour market measures has increased in Estonia, the other countries in the European Union, especially the older member states, are instead cutting their spending on labour market policies, particularly on passive labour market policies, but also in recent years on labour market services. Regardless of these movements in the opposite direction to other countries, the difference in the level of labour market policy provision between Estonia and the EU average has not changed much. Estonia is still among the countries that spend the least on both active and passive labour market policies.

Nevertheless, the level of spending cannot be a goal in itself. High expenditures do not always incur low unemployment and high employment, as seen in Spain, nor do low expenditures always incur low employment and high unemployment, as shown by the United Kingdom. So it also matters a lot what the design of the measures is, how they are implemented, and what the other labour market institutions like are. This means that the effects of labour market policies on labour market outcomes can be different in different countries even if the level of provision is similar.

2.1.3. The Estonian unemployment benefit system during the period under study

While Subsection 2.1.1 discussed the changes in the provision of labour market measures over the past twenty years, this subsection focuses on the regulation of unemployment benefits during the time period that is used for the analyses of the effects of unemployment benefits on labour market outcomes presented in the following chapters. These analyses study unemployment benefits granted from the earliest in 2007 to the latest in March 2009. During this period the regulation of unemployment benefits was essentially the same in terms of

entitlement rules, potential periods, replacement rates, administrative organisations and so forth. The sample from the crisis period, meaning benefits granted from July 2008 until March 2009, saw some change in institutions during the unemployment period as the unemployment spells are studied up to the first quarter of 2010, but in May 2009 the Unemployment Insurance Fund took over the responsibilities of the Labour Market Board and in July 2009 the new Employment Contracts Act came into force. However, these changes did not much change the regulation of unemployment benefits for those unemployed who had already started to receive benefits earlier[40].

There were somewhat larger changes in the provision of active measures, though in 2009 the only change was a rise in the funding allocated for active measures, as unemployment was rising rapidly. During 2009, the design of active measures was also thoroughly analysed, but the new and redesigned measures and the principles for active measures were only implemented in 2010. An increase in job-search monitoring and activation also started to happen after the period under study.

However, as there were more funds allocated to active measures, there were also more participants in active measures in the sample from the period of crisis, so the periods before, during and after the participation are also included in the duration models for studying the effect of unemployment benefits on unemployment duration. In the study of the effect of unemployment benefits on post-unemployment job quality, those people receiving active measures are excluded from the study so that only the pure effect stemming from unemployment benefits is studied[41].

During the period studied, and still today, there are two main acts in the Estonian legal system setting the grounds for unemployment benefits. The Unemployment Insurance Act (Töötuskindlustuse seadus, 2001) lays down the rules for unemployment insurance benefits. The unemployment allowance and matters related to registered unemployment and active labour market measures are laid out in the Labour Market Services and Benefits Act (Tööturuteenuste ja -toetuste seadus, 2005).

Unemployment allowance (UA) is a flat, and quite 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 engaged in certain other activities for at least 180 days during the previous 12 months. The activities that are considered equal to work and that give eligibility for UA are study in an educational institution, compulsory national conscript service, and time during which the spousal allowance is paid to the non-working spouse accompanying an official working in a foreign mission of the Republic of Estonia. Eligibility for UA is also granted to the

[40] The only change in the regulation concerning this sample was that the minimum level of unemployment insurance benefit was increased and this increase is also taken into account in the study.

[41] In this respect the interaction effects of passive and active measures are not studied in the thesis. However, this could be a topic for future research.

unemployed who were raising a disabled child of up to 18 years of age or a child under 8 years of age, the unemployed who were receiving in-patient treatment, those who were caring for a sick, disabled or elderly person, the permanently incapacitated for work and the unemployed who had been in prison or a house of detention. In addition, other incomes are taken into account in the eligibility criteria for UA, although some types of benefits are excluded[42]. UA is granted if other types of income are lower than the level of UA.

A person who fulfils the job search criteria can usually get this allowance for up to 270 days. Extensions to the allowance apply when a person has less than 180 days to go until reaching retirement age. The usual waiting period for UA is seven days, but if the person was engaged in full-time studies before applying for benefits or their employment contract was ended following a breach of contract, a waiting period of 60 days applied during the period under study. Following an employees' breach of contract the maximum UA period was 210 days.

Unemployment insurance benefits (UIB) are financed from 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, differently from UA, only involuntary unemployment is covered, meaning that the employer initiated the termination of the working contract. If a person has made contributions for 12 months, the potential UIB period is 180 days. In order to be entitled to receive UIB for 270 days, a person has to have made contributions for 56 months, but due to the youth of the Estonian UIB system, this has only been possible since 2007. Benefit for 360 days has been available only since March 2011, as this requires 111 months of contributions and so this potential benefit period is not studied in the thesis. The waiting period for UIB was always seven days during the studied period.

A person who was granted UIB for 180 days and is still registered as unemployed after this period can still apply for UA for the remaining 90 days and can get an extension until retirement for 180 days on the same grounds as all other benefit recipients. UA is not granted automatically after the UIB period and a person must apply for this. The eligibility for UA is then checked and as the rules for eligibility are different for UA and UIB, a 180-day-UIB recipient is generally eligible for 90-day-UA, but not always.

Every time a person is granted a benefit, they have to start from zero to accumulate the insurance contributions, or the necessary employment record for UA, for the next unemployment period. However, if an unemployment benefit recipient accepts a job offer but becomes unemployed again within a year of being granted the benefit, they can continue receiving the benefit for the

[42] Grants and transport and accommodation benefits during the participation in active measures, remuneration for public work, subsistence benefits, family benefits, social benefits for disabled persons, maintenance allowance, and benefits received from the voluntary unemployment fund.

remaining days of the potential benefit period. This applies to both types of benefit and should encourage the unemployed to accept job offers even if there is a risk that the employment might turn out to be short-lived, perhaps because of difficult economic circumstances. UA recipients could even start receiving UIB if they accumulate the necessary unemployment insurance record through short-term working and then become unemployed involuntarily.

During the benefit period both UIB and UA recipients have to fulfil the activity criteria, and during the period under study this meant above all regularly meeting consultants at the Labour Market Board, or at the Unemployment Insurance Fund from May 2009. Failing to meet the activity criteria could lead to sanctions. The activity criteria are stricter for UIB recipients than for UA recipients and a failure to meet the activity criteria for the first time means termination of UIB payments for UIB recipients, but suspension of UA payments for UA recipients. If a UA recipient refuses a suitable job or an activity in the individual action plan, the suspension is for 10 days. After the first no-show, the suspension is imposed from the last meeting with the consultant until the next show-up. UA is terminated after a second failure to meet the activity criteria. The third failure to meet the activity criteria incurs de-registration as unemployed, although during the period under study, a person was allowed to register again the next day.

An overview of the different sanctions imposed on unemployment benefit recipients in the years 2006–2011 is given in Table 1. The data show that a vast majority of sanctions applied for failure to meet the consultant at the public employment service. A refusal to follow the individual action plan, including refusal to participate in an active measure, is of much smaller importance and only became a somewhat higher proportion of sanctions in 2011 when the Unemployment Insurance Fund became responsible for activating the registered unemployed. However, 2011 is already entirely out of the observable time period for this thesis. During the years of crisis there were practically no sanctions for refusing a suitable job offer, and so it appears that in the Estonian system the use of sanctions is quite low and sanctions are mostly imposed only for no-shows. The level of sanctions was particularly low during the time period studied in this thesis.

From January 2007 until June 2009, the minimum UIB equalled the UA flat rate. Since July 2009 the minimum rate of UIB has been half the minimum wage during the preceding year, so in practice about twice the UA[43]. However, 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. Earnings in the previous 12 employed months are taken into account as an average of the nine employed months preceding the last three employed months. When a person's average wage is calculated for UIB, the maximum limit is three times the national

[43] The same amendment was supposed to be implemented for UA, but it was postponed until 2013.

average wage. This means that 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. Personal income tax applies generally on UIB, but not on UA, as UA is lower than the minimum taxable amount.

Table 1. Number of sanctions imposed on unemployment benefit recipients 2006–2011

Sanction / Year	2006	2007	2008	2009	2010	2011
Unemployment insurance benefit – premature termination of payments						
No-show for the first time	250	137	153	1080	1527	846
Refusal of an activity in the individual action plan or a job offer for the first time	6	2	1	0	0	0
Refusal of an active labour market measure for the first time	2	8	6	24	28	66
Total	**258**	**147**	**160**	**1104**	**1555**	**912**
Share of UIB recipients sanctioned	2.9%	1.8%	1.0%	1.9%	2.5%	2.8%
Unemployment allowance – suspension of payments						
No-show for the first time	461	271	208	402	429	461
Refusal of a job offer for the first time	27	23	1	1	18	2
Refusal of an activity in the individual action plan for the first time	146	195	77	76	138	411
Total	**760**	**565**	**348**	**638**	**1709**	**1556**
Share of UA recipients sanctioned	3.8%	3.2%	1.5%	1.4%	3.8%	5.1%
Unemployment allowance – premature termination of payments						
No-show for the second time	97	0	29	54	19	16
Refusal of a job offer for the second time	6	7	0	0	0	0
Refusal of an activity in the individual action plan for the second time	13	12	4	5	2	20
Total	**116**	**19**	**33**	**59**	**21**	**36**
Share of UA recipients sanctioned	0.6%	0.1%	0.1%	0.1%	0.0%	0.1%

The classification of benefit recipients in the information system of the Unemployment Insurance Fund for sanctions is somewhat different for UIB and UA recipients. For UIB it is possible to distinguish whether a person refused to participate in an active labour market measure but for UA this sanction belongs to the group "Refusing an activity in the individual action plan". For UA it is possible to distinguish whether a person turned down a job offer.
Source: Estonian Unemployment Insurance Fund, author's calculations

When the UIB and UA periods are exhausted, a person is not eligible for any unemployment benefits. They can however apply for subsistence benefit from the local government. Subsistence benefits are low and means-tested benefits that depend on the income of all the members of a household[44]. There are no time limits for subsistence benefit, though it has to be applied for every month anew.

In conclusion, almost all benefit recipients are covered by unemployment benefits for at least 270 days, but the coverage is higher for 270-day-UIB recipients, and nowadays for 360-day-UIB recipients. For 180-day-UIB recipients the coverage drops significantly after 180 days. For UA recipients the coverage with monetary benefits is very low throughout the benefit period.

2.2. Previous studies concerning passive labour market policies in Estonia

There are a few studies that examine the Estonian labour market during the last global economic downturn, but the system of unemployment benefits is dealt with only very briefly in these studies. There are some less recent studies that also try to estimate the effects of unemployment and other benefits on labour supply, but these studies tend to use data from the period when the system of unemployment benefits differed a lot from the current system in Estonia before the introduction of unemployment insurance benefits. Furthermore, there are no studies available in Estonia dealing with the effects of unemployment benefits on post-unemployment job quality.

There are a few recent studies that, like this thesis, use the Estonian data to explore the labour market in extremely bad circumstances. A study by Meriküll (2011) investigates mobility in the Estonian labour market throughout the previous boom-bust cycle by analysing worker flows, unemployment duration, employment and job-to-job spells. The estimation results indicate that during the crisis labour market mobility was high due to high levels of movement from employment to unemployment and higher geographical mobility. However, there was less mobility during the crisis with regards to job-to-job movement, or movements between industries and occupations. She finds very strong support for the argument that hiring rates in Estonia are pro-cyclical and separation rates counter-cyclical. The probability of exiting unemployment for employment declined more and the probability of exiting employment for unemployment increased more for people with low education and for non-Estonians. Unemployment duration analysis has not been able to estimate the unemployment benefit effects in this study due to data limitations. However, the patterns of

[44] During the period under study, the maximum possible subsistence benefit for a single-member household was close to the level of UA. Households with more members had lower maximum rates.

unemployment duration at the beginning of the last decade and during the end years of it turn out to be quite different and she argues that the implementation of the system of unemployment insurance benefits could indeed have changed the labour market behaviour of the unemployed as unemployment benefits might have increased unemployment duration. Meriküll does not find any statistically significant evidence that the new Employment Contract Act that came into force in July 2009 had an impact on unemployment or employment duration.

Another recent study on the impacts of the global economic crisis on the Estonian labour market and also on the Latvian and Lithuanian labour markets is by Masso and Krillo (2011). They study the adjustments in the labour market in response to the crisis and the impact of the crisis on different labour market segments. They also note that the reduction in employment took place above all because of high flows from employment to unemployment and only marginally due to lower hiring rates. In addition to the adjustment in employment, wage adjustments, principally cuts, also occurred and more flexible work arrangements emerged. They observe that labour market conditions worsened more for males, young people and non-natives, similarly to Meirküll (2011). However, they do not assess the role of unemployment benefits on the labour market adjustments.

More recent papers on the system of social security in Estonia, including unemployment benefits, assess for example the efficiency of the organisation of the system of social security in Estonia (Veldre *et al.* (2011)) and the possibilities for sustainable financing of the Estonian social security system (Aaviksoo *et al.* (2011)). Studies on the effects of unemployment benefits on labour market outcomes tend to be somewhat less recent. There are a few papers that analyse the effects of benefits on labour supply and unemployment duration, but there appear to be no studies so far on Estonian data analysing the effects of unemployment benefits on post-unemployment job quality.

There are several analyses that study the potential effects of different benefits by calculating such indicators as marginal effective tax rates, unemployment traps and low-wage traps for different types of household (Võrk *et al* (2010), Võrk and Paulus (2006), Kallaste *et al.* (2005), Kuddo *et al.* (2002)). All these studies indicate that even though there are relatively low unemployment benefits available during the period, labour supply might still be somewhat restricted among people whose potential wage is not much above the minimum wage.

A research report by Võrk *et al* (2010) studies the role of the flexicurity concept in the system of social security in Estonia. For this they also analyse the potential effects of the benefit system, including unemployment insurance benefits, on the incentives to work for different types of household in Estonia during 2000–2009. They conclude that the system of social security restricts the labour supply relatively less than in many other countries in the European Union as the level of benefits is low. However, the system supports the tran-

sition to full-time jobs and not to part-time jobs as the payment of unemployment benefits and subsistence benefits is fully terminated even if only a part-time job is accepted. They also propose that the unemployment trap increased significantly in 2003 when the system of unemployment insurance was implemented[45].

A study by Võrk and Paulus (2006) analyses the effects of the system of taxes and social benefits on the incentives for labour supply in Estonia using data from the Household Budget Survey for 2000–2004. With regards to social benefits they analyse the effects of subsistence benefits, unemployment benefits, parental benefits and pensions. They note that during those years the distortionary effect of unemployment benefits on the labour supply was low in international comparison due to the relatively low level of benefits. Potential periods of unemployment benefits were kept short to cover the risk of unemployment only temporarily and were not designed to secure income for the long-term unemployed. This suggests that unemployment benefits might have had more of an effect on the short-term labour supply. As the potential periods of unemployment benefits increased in 2007 and 2011 due to the maturity of the unemployment insurance system, the effect of unemployment benefits might currently be somewhat greater. However, more detailed simulations on different policies are only conducted in this study on subsistence benefits, but not on unemployment benefits. Subsistence benefits might rather hinder labour supply for the long-term unemployed.

One slightly earlier study on the impact of different benefits on labour supply in Estonia is by Kuddo *et al.* (2002). They analyse the potential effect of unemployment allowances, unemployment insurance benefits, severance payments, subsistence benefits and parental benefits on different types of household using data from the Household Budget Survey for 2000. They conclude for unemployment benefits that the labour supply might be restricted for people whose potential wage is close to the minimum wage. They also conduct an econometric analysis to study the effects of parental benefits and subsistence benefits on the labour supply. They argue that the effect of unemployment allowances on the behaviour of people is similar to the effect of subsistence benefits, though only temporary, and thus they do not include unemployment allowance in their model. However, the results show that subsistence benefits do not have any significant impact on the labour supply for women nor men, suggesting that potentially unemployment allowances do not have any impact either. Parental benefits restrict the labour supply for women but not for men. Nevertheless, they propose that a statistically significant effect of subsistence benefits, and of unemployment allowances, could be exposed if it were only the wage of potential low wage earners that was studied.

[45] Similar conclusions can be drawn from the research report by Kallaste *et al.* (2005) who study the potential effects of different benefits separately for 2002 and 2003 using a similar methodology, also taking unemployment insurance benefits into account in 2003.

There are only a few studies that try to analyse the job search behaviour of the unemployed. Rõõm (2004) studies differences in job search behaviour between men and women and whether differences in job search behaviour explain the large gender wage gap in Estonia. She finds that unemployed men do indeed search for employment more actively than women and this difference reduces the residual gender wage gap significantly. No variable for unemployment benefits is included in the estimated models for search activity, but as the period studied is 1998–2000, there was anyway only a low means-tested unemployment allowance available and no unemployment insurance benefits yet. In addition, it is most likely that the majority of the unemployed studied were not eligible even for unemployment allowance any longer as the average unemployment duration for the unemployed in the sample was 3.45 years. Nevertheless, she includes a variable that indicates per capita labour income earned by other family members and an interaction term of this variable with a female dummy. The income per family member during unemployment should have a negative impact on job search intensity similar to that of unemployment benefits. The coefficient for the interaction term of income and female dummy should also be negative if unemployment income has a systematically greater impact on search activity for women. However, the impact of income turns out to be significant in only one model out of four and has a positive sign. The interaction term does not turn out to be significant in any of the models, so the estimation results indicate that income per family member during the unemployment period does not have much impact on job search activity. However, it can be argued that unemployment benefits and the income of other household members in the family can have a different impact on search behaviour as unemployment benefits are terminated upon entry into employment while the income of other family members might not be.

Hinnosaar (2003) studies a similar period (1997–2000) to Rõõm (2004) and also finds that women search for employment less actively than men and that income by other household members might not influence search intensity as the estimated coefficient has a positive sign, but turns out not to be significant. In addition, women have a lower reservation wage than men, which could also contribute to the persistence of the gender wage gap. Hinnosaar (2003) focuses on estimating the impact of unemployment benefits on the reservation wage and search intensity and uses the predicted values of reservation wages and search intensity to see if they have an impact on unemployment duration. As the data are from 1997–2000, there are no unemployment insurance benefits yet, but only the low means-tested unemployment allowances and subsistence benefits in the data. Her estimation results show that even very low benefits during the unemployment period decrease search intensity and through that prolong unemployment duration. However, the estimation results show that eligibility for

unemployment benefits does not influence the reservation wage[46] even though search theory predicts that unemployment benefits should increase the reservation wage, which in turn restricts the hazard of leaving unemployment. She does show that the income of the other household members increases the reservation wage and that a higher reservation wage does indeed increase unemployment duration. She argues that the result of unemployment benefits not influencing the reservation wage in contradiction to the predictions of search theory might be caused by the data used, which cover only the fact of eligibility for benefits available and not the exact level, or that some unobservable factors may have played a role[47].

Another study by Hinnosaar (2004) studies the impacts of different possible labour market policy reforms using a computable general equilibrium model. Data from 2001, before the unemployment insurance system was introduced, are used for the simulations. In addition, different elasticities are taken from previous studies that used data from countries other than Estonia. The replacement rate of benefits in the model is 32% for low-skilled workers and 23% for skilled workers.

One simulation regarding benefits by Hinnosaar (2004) considers the case where the replacement rate of benefits increases for both skilled and low-skilled workers. The simulation shows that this reform would increase wages for both groups of workers, while production and employment would decrease and unemployment would increase. The second simulation regarding benefits is an increase in the replacement rate only for high-skilled workers, who otherwise have a lower replacement rate. She argues that this simulation resembles the reform of introducing unemployment insurance benefits in Estonia. In this simulation the wage increase is much smaller, unemployment increases less and the decrease in production and labour demand is lower.

Research reports by Võrk and Leetmaa (2007) and Võrk, Leppik and Leetmaa (2005) also shed some light on the effects of benefits on unemployment duration. Both of these studies analyse collective redundancies in Estonia. The first of them uses data from 2005–2007 and uses propensity score matching to show that higher severance payments prolong the period of unemployment insurance benefit. The study from 2005 uses data from 2003–2004 and shows

[46] The estimated coefficient for unemployment benefits in the model for the reservation wage turns out in fact to be negative, indicating that unemployment benefits might even lower the reservation wage. However, this result does not turn out to be statistically significant.

[47] The analysis of this study regarding the impact of benefits on the reservation wage is presented in more detail in Rõõm (2003b). As the estimated models are very similar, the results are also very similar, though one major difference is that the eligibility for benefits is included in the model of the reservation wage. In this paper it is argued that unemployment benefits might not only influence job search intensity, but also the job offer arrival rate and through this also extend unemployment duration. An earlier paper on labour market flows by Rõõm (2002) also estimates a model for unemployment duration. However, this model does not incorporate any variable for unemployment benefits.

that on average people who are made redundant collectively experience shorter spells of unemployment insurance benefits. However, this conclusion ignores the fact that other unemployment insurance benefit recipients might also have received some severance payments. They also argue that people who were made redundant collectively might have had a better qualification level than other unemployed people.

In conclusion, there are only a few studies that use Estonian data to analyse the potential effects of unemployment benefits on labour market outcomes. Even though most of them use data from the period before unemployment insurance benefits had been implemented, they still tend to suggest that even very low benefits might have some impact on unemployment duration. Unfortunately, there are no studies on Estonian data analysing the effects of unemployment benefits on post-unemployment job quality.

2.3. Data used in the study

This thesis focuses on Estonian data on unemployment benefit recipients from the last global financial crisis. During this last economic downturn Estonia witnessed the highest rise in unemployment in the whole of the European Union. Although the Estonian economy had already started to shrink by the beginning of the crisis, the unemployment rate was still low (see Figure 10). In the second quarter of 2008, the unemployment rate in Estonia was 4%, one of the lowest in the European Union. During the crisis, Estonia witnessed rapid growth in the unemployment rate and by the first quarter of 2010 it had reached 20%, one of the highest in the European Union.

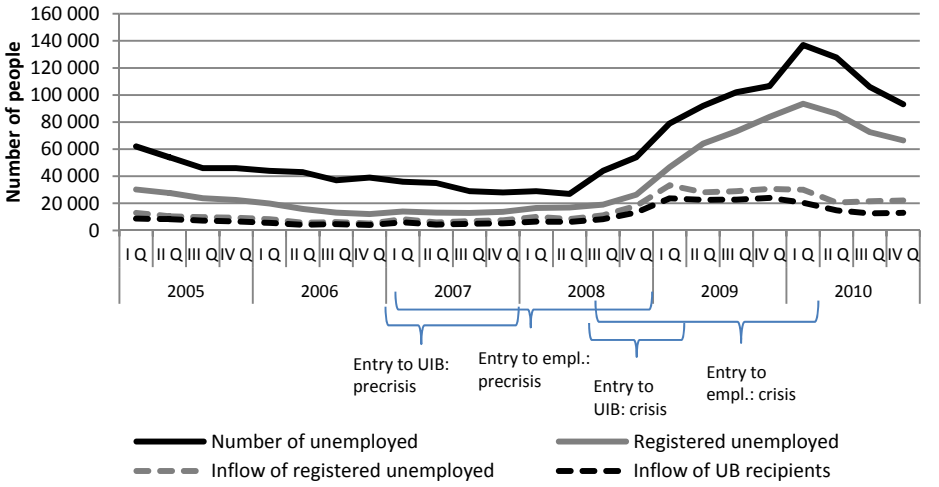

Figure 10. Number of unemployed in Estonia 2005–2010 and the scope of the study

UB – unemployment benefits (unemployment insurance benefit and unemployment allowance)
Sources: Statistics Estonia, Estonian Unemployment Insurance Fund

In this dissertation, the unemployment duration is first studied during the pre-crisis period to shed some light on whether the effects of benefits differ during the pre-crisis and crisis periods. To achieve this, the data for UIB recipients to whom UIB was granted during 2007 are analysed. The year 2007 was the first year when it became possible to grant UIB for 270 days and not only for 180 days, which had not been possible in earlier years because of the youth of the UIB system. During 2007, economic growth was slowing down, but the Estonian economy was not yet in crisis as the GDP growth rate was 7.5% in 2007.

The main focus in this dissertation is on the behaviour of unemployment benefit recipients during the crisis period. To analyse the crisis period, it looks at unemployment benefits granted during the first three quarters that saw the sharp increase in unemployment rate, from July 2008 until March 2009.

The thesis focuses on studying the labour market behaviour of unemployment insurance benefit recipients. Unemployment insurance benefit is paid upon involuntary unemployment; its size depends on the previous wage and its potential length depends on the previous record of insurance contributions. In some parts of the analysis of the disincentive effects during the crisis (Subsection 3.2), unemployment allowance recipients are also studied. Unemployment allowance is a low flat rate benefit for those unemployed who are unemployed voluntarily, meaning at least where formally the employer did not initiate the termination of the working contract, or whose previous employment record is relatively short. Unemployment allowance recipients are somewhat different from unemployment insurance benefit recipients in observable variables, but are also likely to be different in unobservable variables, so it is arguable whether unemployment allowance recipients can be used as a comparison group for unemployment insurance benefit recipients.

In addition, there might be an inflow to registered unemployment of people who do not qualify for either of the unemployment benefits. These are people who have previously had only a very short employment period of less than half a year during the previous year or who have not been in employment over a longer period at all and have previously been in inactivity or in unregistered unemployment. As these people are likely to be significantly different from benefit recipients, these observations cannot be included as a control group in a study estimating benefit effects. In addition, the unemployed who are not registered and for that reason do not receive any unemployment benefits are also likely to behave differently regardless of the benefit receipt and could not be used as a comparison group even were there data available about them for the study.

For these reasons the thesis concentrates on studying the differences in the behaviour of unemployment insurance benefit recipients with different potential benefit periods of 180 days and 270 days. The problem of unobservable variables in comparison of these groups is likely to be much smaller than it is in comparison of unemployment insurance benefit recipients with any of the other

groups of the unemployed. The unemployed with different potential benefit duration are all unemployed involuntarily and they have some relevant previous employment record. However, the length of the previous employment record can differ significantly as the requirement of longer previous insurance contributions for a longer benefit period tends to be in correlation with tenure in the previous job. To guard against the potential problem of unobservable variables caused by different previous tenure, estimations are also presented for observations near the cut-off point of eligibility for the longer potential period. This method resembles the RDD methodology and is applied to the crisis data (Subsections 3.2, 4.1 and 4.2). As there are too few observations during the pre-crisis period, it is not applicable to the pre-crisis data.

In addition, unemployment insurance benefit recipients who are continuing the benefit period from the last unemployment period are included in some parts of the analysis of the effect of unemployment benefits on unemployment duration. The potential unemployment insurance benefit period for them is different from 180/270 days and so the inclusion of those observations allows the effect of benefit receipt on the hazard of leaving unemployment over the unemployment period to be estimated. However, the inclusion of those observations does impose the limitation that such people might behave differently from the other unemployed as they have been in unemployment for a short period during the preceding year. On the other hand there are also recent unemployment spells in some of the observations of people with the maximum benefit period who were not eligible for or did not apply for unemployment benefits during their last unemployment period.

In consequence the thesis uses only data about unemployment benefit recipients. The focus is on comparing the behaviour of unemployment insurance benefit recipients with the potential benefit periods of 180 and 270 days, though in some parts of the analysis the unemployed with a different potential benefit period and unemployment allowance recipients are also considered. This means that the conclusions from the analyses can be drawn above all about the effects of the generosity of unemployment benefits as benefits with different generosity levels are compared and less about the total effects of the unemployment benefit system. This applies particularly in Chapter 4, where only 180-day-UIB and 270-day-UIB recipients are compared and so the differences in the behaviour of the unemployed arising specifically from the 90 days of difference in benefit generosity can be studied.

As already mentioned, the Estonian unemployment benefit system consists of unemployment insurance benefit and unemployment allowance. Until May 2009, registered unemployment and the unemployment allowance were administered by the Estonian Labour Market Board and unemployment insurance benefit was administered by the Estonian Unemployment Insurance Fund. In May 2009, the responsibilities of the Labour Market Board were taken over by the Unemployment Insurance Fund and so it became possible to merge the databases of registered unemployed and unemployment insurance benefit

recipients. There is a record for every benefit recipient in the registered unemployment database, because a person has to register as unemployed before applying for benefit.

The data on the characteristics of unemployment benefit recipients and the data about the passive and active measures they received are taken from the databases of the Estonian Unemployment Insurance Fund, including the database of the former Labour Market Board. More specifically, the following data from these databases are used: date of application for benefit, date of granting of benefit, potential end of benefit period, actual end of benefit period, reason for termination of benefit, rate of benefit granted, average previous wage, reason for termination of employment contract, gender, date of birth, education, citizenship, main language, county, residence in the countryside or in a town, duration of last employment, previous occupation, disability, lack of Estonian proficiency, knowledge of English, and potential and real beginning and ending dates of participation in different active measures. In the sample for the pre-crisis period there are a total of 6097 observations. The summary statistics for this group is provided in Section 3.1. The sample for the crisis period consists of 41,044 observations and the summary statistics for specific sub-groups under study are provided in Sections 3.2, 4.1 and 4.2.

The uniqueness of the research in this dissertation is that although it uses administrative data about registered unemployment, there is relatively good definition of whether and when exit to employment really occurs, because data about registered unemployment are in turn combined with wage data from the Estonian Tax and Customs Board[48]. Wage data for the observations from the pre-crisis period are observed for 2007–2008[49], so unemployment duration is studied during a slight economic slowdown but before the crisis in the Estonian labour market (see Figure 10). For the crisis period, the wage data for exploring benefit effects on unemployment duration are matched for the observations from July 2008 to March 2010[50] when unemployment peaked. For studying the effects on post-unemployment wages, the wage data until September 2010 are considered and the post-unemployment job duration is studied from the wage data up to April 2011. However, exits to employment during the crisis period are also studied in the analysis of post-unemployment wage and job duration,

[48] Employment in the formal sector is covered exceptionally well but it is not possible to take into account employment in the informal sector.

[49] In the sample all registered unemployment spells start between 01.01.2007 and 31.12.2007. Exit to employment can be in December 2008 at the latest, otherwise the spells are censored as of December 2008. In this way, the minimum length of a spell can be one day and the maximum two years. Censoring can occur between one and two years after the start of a spell.

[50] Registered unemployment spells start between 01.07.2008 and 31.03.2009. Exit to employment can be in March 2010 at the latest, otherwise the spells are censored as of March 2010. This means the minimum length of an unemployment spell is one day and the maximum seven quarters. Censoring can occur between one year and seven quarters after the beginning of an unemployment spell.

and only the observations where exit to employment took place by the first quarter of 2010 at the latest are included. The administrative data about taxes allow joblessness and employment periods to be determined very precisely beyond the benefit and registered unemployment periods. It is possible to determine unemployment spells up to the point when a person actually gets a job and starts earning a wage.

An exit into employment is considered to occur when the first wage observation appears in the data. Wage data are monthly and indicate the month when a person received a 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 in which the wage observation appears or during the previous month. For this reason all entries to employment are taken as occurring on the first day of the month in which the wage observation appears as an average of the start of a job up to 30 days earlier or up to 30 days later[51]. 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.

The entry to employment for an unemployed person is considered to have happened when any amount of wage is declared by an employer in the data and this determines the length of the unemployment period for unemployment duration analysis. For study of the post-unemployment wage, information about the size of the wage is also used. The wage declared in the second month of employment is considered to be the starting wage as the wage in the first month might very often not be for a full month. The post-unemployment average wage is calculated for people who received a wage for at least seven months over a period of nine months to allow for breaks in the wage because of illnesses and vacations where the wage might not be declared for every consecutive month.

In addition, information about the employer is used for studying post-unemployment job duration as a proxy for post-unemployment job quality. Only the wage declared by the employer who declared a wage in the first month of entry to employment is taken into account in the following months. The employment relationship is considered to be continuing if the same employer continues to be the one declaring the highest wage, meaning temporary or part-time jobs on the side are not taken into account. As with the study of the wage, breaks in the employment data are allowed and the employment relationship is deemed to continue if the same employer does not declare a wage for one month, but does declare it a month later.

Unfortunately, the data available for post-unemployment employment are limited to monthly data for the wage level and the registration number of the employer, so it is not possible to study any aspects of post-unemployment job quality other than wage and employment duration. However, post-unemploy-

[51] No statistics are available as to whether it is more common to receive a wage in the same month or in the following month.

ment wage and job duration are considered to be relatively adequate proxies for post-unemployment job quality in the empirical literature on unemployment benefit effects.

Subsection 2.1.3 established that sanctions are seldom imposed in Estonia and mostly for no-shows at the public employment service. There is no variation at all in sanctions for UIB recipients, where only termination is possible, and only limited variation for UA recipients, where termination and suspension are possible. If a benefit is terminated due to a no-show, the dominant sanction in the data, it is not possible to see from the available data whether a person did not show up because they had already entered employment or whether the sanction had the impact of making that person exit unemployment, because the wage data are only monthly and so they are not precise enough. Furthermore, there are no data available for the period under study on monitoring of the job search activity or threats of sanctions. This means it is not possible to estimate from the Estonian data whether monitoring and sanctions on benefit recipients could affect the disincentive effect or post-unemployment job quality.

All in all, the data used in the thesis can still be considered as exceptionally good for studying the effects of unemployment benefits compared to those used in many other studies on the topic. The use of administrative data allows the unemployment and employment periods and the wage level to be defined very precisely. In addition, the data cover the receipt of unemployment benefits and participation in active measures in detail as well as a broad range of the personal characteristics of the people registered as unemployed.

2.4. Hypotheses of the study

Drawing on the theoretical and empirical search theory literature discussed in the first chapter and the Estonian unemployment benefit system outlined in this chapter, three hypotheses are postulated in the thesis. Two of them concern the effects of unemployment benefits on unemployment duration and one of them the effects on post-unemployment job quality.

The first hypothesis of the thesis is that the unemployment benefit system in Estonia does incur longer unemployment spells, meaning unemployment benefits have disincentive effects and more generous benefits have higher disincentive effects. The existence of these effects stems straightforwardly from the search model. It can be shown that more generous benefits with higher levels or longer potential duration increase the reservation wage and decrease job search activity. This means there is a lower probability of a job offer being received and a lower probability of a job offer being accepted. This in turn leads to longer unemployment spells.

The positive relationship between unemployment benefits and unemployment duration is also substantiated in many previous studies for example Røed

and Zhang (2003), van Ours and Vodopivec (2006), Lalive *et al.* (2011)). Furthermore, the few previous studies conducted on Estonian data a decade ago have also identified possible negative effects from subsistence benefits and unemployment allowance on labour supply (Hinnosaar (2003), or slightly less confirming results by Kuddo *et al.* (2002)). The system of unemployment benefits in Estonia has become far more generous than it was in that time period, so the disincentive effects of the system of unemployment benefits should now be even more evident.

While most studies concerning the relationship between the generosity of unemployment benefits and unemployment duration do confirm the existence of the disincentive effect of benefits, there are also some studies that do not find it. These may be cases where systems of unemployment benefits with stricter monitoring, sanctioning and activation are studied. There are several studies showing that the application of stricter monitoring, activation and sanctions decreases the disincentive effect significantly (for example Abbring *et al*. (2005), Boone *et al.* (2009), Svarer (2011)). This means the disincentive effect of benefits cannot emerge as easily in systems that apply stricter eligibility criteria for benefits. However, the level of monitoring and sanctioning during the period studied has been quite modest, and so it can be expected that significant disincentive effects of unemployment benefits will indeed occur.

The second hypothesis postulated in the thesis is that the effect of unemployment benefits on unemployment duration is smaller during a period of crisis than during better economic times. In the framework of search theory, the magnitude of the disincentive effect through business cycles is ambiguous as it can be shown that there might be both effects that make it lower and effects that make it higher. Although it is rather more expected that the disincentive effect might be milder in worse economic circumstances, it is ultimately unproven empirically.

There are only a few empirical studies investigating the magnitude of the disincentive effect in different economic situations. These studies mainly suggest that there are lower disincentive effects in worse economic circumstances (for example Schmieder *et al*. (2010), Kroft and Notowidigdo (2011)). This thesis studies the disincentive effect of unemployment benefits during an extremely deep recession and compares the results with the pre-crisis period when the economic situation was better. It follows that if the disincentive effect is indeed smaller in a worse economic situation, this should be visible in the data used in this study.

The third hypothesis posed in the thesis is that more generous unemployment benefits incur higher post-unemployment job quality. It is argued in the search literature that unemployment benefits decrease the opportunity cost of job search and hence relax the restrictions on searching. In this way more generous benefits could lead to better match quality between workers and jobs and improve post-unemployment job quality.

There are several empirical studies that show the positive relationship between the generosity of unemployment benefits and post-unemployment job quality (for example Gangl (2004a), Centeno and Novo (2006), Tatsiramos (2009)), but also some that do not find strong support for it (for example Addison and Blackburn (2000), Lalive (2007), (Schmieder *et al.* (2012)). The positive effect of unemployment benefits tends to be found more often on subsequent job duration rather than on the post-unemployment wage. The positive effect of unemployment benefits on the post-unemployment wage might be milder because unemployment benefits are at the same time still expected to increase unemployment duration. However, the offer wage distribution might deteriorate when the unemployment spell lengthens and so it is more likely that the Estonian data might also show the effect of the generosity of unemployment benefits to be stronger on job duration than on wages.

3. THE IMPACT OF THE GENEROSITY OF UNEMPLOYMENT BENEFITS ON UNEMPLOYMENT DURATION IN ESTONIA

3.1. Disincentive effects of unemployment insurance benefits: the pre-crisis period[52]

3.1.1 Introduction

The search model predicts a disincentive effect of unemployment benefits on the exit from unemployment into employment as more generous unemployment benefits increase unemployment duration. This effect is often substantiated in empirical studies such as Røed and Zhang (2003), Lalive *et al.* (2006), though research on Eastern European data is very scarce (van Ours and Vodopivec (2006)).

This section uses a dataset about unemployment insurance benefit recipients and their exits to employment in Estonia before the global economic crisis to investigate the effects of benefits on unemployment duration. The number of registered unemployed and the number of new UIB recipients both fell to their lowest level by the end of 2006, a year with very high economic growth of 10%. In 2007, growth started to slow down and unemployment started to grow until in 2009 it had surpassed even the level of the previous 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 it is then 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.

First, the duration of unemployment is analysed using non-parametric methods. After that, a piecewise-constant proportional hazard model is applied to estimate the impact of unemployment benefits and of other covariates. Both methods reveal strong disincentive effects and a spike at benefit exhaustion.

In addition, the study presented in this section covers participation in active measures during the unemployment spell. Recent literature suggests that active labour market programmes might work better as a stick rather than as a carrot (see for example Black *et al.* (2003), Geerdsen (2006), Geerdsen and Holm (2007)). The threat of being required to participate in an active measure might have an *ex ante* effect and make people leave unemployment for employment. 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 to 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

[52] Some parts of this section are published in Lauringson (2011).

the probability of leaving unemployment into employment is lower just before the start of these measures.

3.1.2. Non-parametric analysis

In the study presented in this section, the labour market behaviour of two groups of UIB recipients is studied: the unemployed with a potential UIB period of 180 days and the unemployed with a potential UIB period of 270 days. The semi-parametric analysis also covers those UIB recipients who continue their UIB period for the remaining days from a previous benefit period because they were initially granted UIB for 180 or 270 days, but were briefly in employment and during the unemployment spell under study were consequently granted a shorter UIB period. Inclusion of those benefit recipients allows the effects of unemployment benefits to be estimated parametrically[53]. In the non-parametric analysis these benefit recipients are not included to reveal better the different behaviour of benefit recipients due to the different potential benefit period.

The groups of people to whom UIB is granted for 180 days and for 270 days are different in several ways (see Table 2). Recipients for 270 days are on average slightly older and better educated and have previously worked in higher-ranking occupations. Their tenure in their last job was on average longer, which is in some part also the reason why they are eligible for the longer unemployment insurance benefit.

To study the effects of unemployment benefits on unemployment duration during the pre-crisis period, data about unemployment insurance payments and the characteristics of recipients are combined with wage data from the Estonian Tax and Customs Board up to December 2008. This means it is possible to determine unemployment spells up to the point when a person actually gets a job and starts earning a wage.

An exit from unemployment into employment is considered to have occurred when the first wage observation appears in the monthly tax data. The first wage observation is taken into account if it is later than the beginning of the unemployment spell and the unemployment benefit spell. When this method is applied, 75.5% of spells end in employment with 76.1% of 180-day-UIB recipients and 74.9% of 270-day-UIB recipients exiting to employment.

[53] The inclusion of these benefit recipients is crucial for the estimation of the effects of benefits on unemployment duration. Nevertheless, the inclusion of these recipients has a limitation that they might exhibit a slightly different disincentive effect of unemployment benefits as they have already once accepted a job during the benefit period. However, there are observations with very different previous benefit periods, including observations where the unemployed have accepted a job offer at the very end of their benefit period.

Table 2. Description of UIB recipients in 2007

	Days granted:	
	180	**270**
Number of observations	3 029	3 304
Average UIB daily rate for 1–100 days, EEK[54]	120.7	145.2
Average UIB daily rate for 101+ days, EEK	96.5	116.2
Average UIB replacement rate for 1–100 days	49.8%	49.7%
Share of people who received UA after UIB	28.9%	0.2%
Continuing benefit for the remaining days from a previous benefit period	7.2%	2.3%
Average previous daily wage, EEK	245.9	298.1
Previous UIB contributions, in months	31.3	63.7
Average tenure in previous job, years	1.9	8.4
Males	36.7%	37.6%
Age at the beginning of UIB period	40.7	46.7
Estonian citizens[55]	72.6%	73.9%
Main language Estonian	51.1%	53.3%
Basic education or less	14.8%	11.8%
Higher education	15.8%	19.8%
Living in a town	70.9%	73.0%
Disabled	14.4%	15.6%
Exposed to training	16.8%	22.4%
Exposed to any active measure	34.6%	41.9%
Previous occupation		
Managers	5.8%	10.7%
Professionals	6.1%	7.4%
Technicians and associated professionals	10.6%	15.0%
Clerical support workers	7.4%	8.5%
Service and sales workers	17.4%	11.7%
Skilled agricultural, forestry and fishery workers	2.0%	1.0%
Craft and related trades workers	17.4%	14.7%
Plant and machine operators, and assemblers	10.4%	14.6%
Elementary occupations	22.9%	16.3%

Note: days granted as the initial grant of UIB (unemployed continuing their 180-day-UIB are under 180-day-UIB recipients and unemployed continuing their 270-day-UIB are under 270-day-UIB recipients).
Only those observations are excluded where the retirement age began during the period of unemployment insurance benefit or when some variables used in the analyses were missing in the data.
The average replacement rate does not equal 50% during the first 100 days of benefit receipt, because the minimum and maximum levels of UIB apply. In 2007, the minimum level of UIB was 32.9 EEK and the maximum level 383.36 EEK. The average replacement rate being under 50% indicates that the maximum level affects it more than the minimum level.

[54] 1 EUR = 15.6466 EEK

[55] As a Soviet legacy, Estonia has a large minority of Russians living in Estonia. At the beginning of 2007 there were 69% Estonians and 26% Russians among the Estonian population according to Statistics Estonia. However, people of Russian nationality do not always have Estonian or Russian citizenship and at the beginning of 2007 there were more than 120 000 people i.e. 9.4% of Estonian population, with undetermined citizenship according to the Estonian Ministry of the Interior.

Kaplan-Meier survival estimates that consider the exit to employment as described in subsection 1.2.1 (equation 21) are presented in Figure 11. In addition, adjusted survival functions are calculated so that when an exit to employment from wage data is earlier than the actual end of the benefit, the actual end of the benefit is considered as the 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 benefit was terminated due to employment only when the person told the Labour Market Board they had got a job. Benefit was also terminated when a person did not fulfil any of the activity criteria, which in almost all of the existing cases meant that the person failed to come to a prescribed appointment (see Subsection 2.1.3). However, whether the person received a wage was not confirmed, for example by the Tax and Customs Board database, as this has only happened since 2010[56].

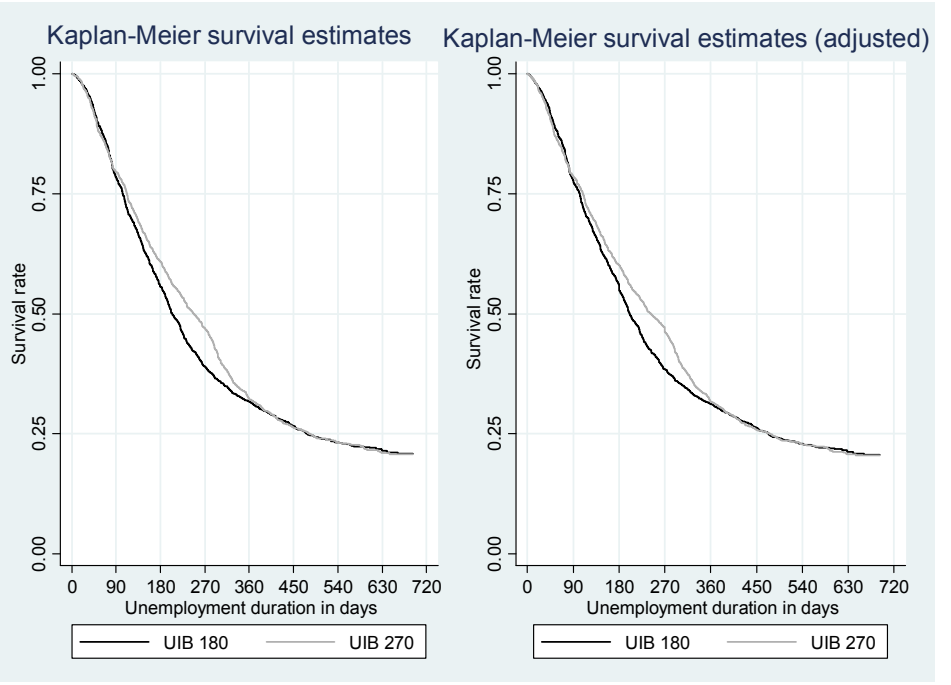

Figure 11. Kaplan-Meier survival estimates, non-adjusted and adjusted using the end of the benefit period

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.

[56] However, it is not possible to estimate how many of the unemployed started to receive a wage before the end of UIB payments, thus abusing the system, from the data used. The tax data were checked for wage payments since 2010 and also for earlier unemployment records, particularly when an unemployed person was still registered or had re-registered since 2010. In these cases the unemployed had to pay back the excess payments and these amounts are not included in the data.

The two graphs look quite similar. The 270-day-benefit recipients exit unemployment more slowly until somewhat more than 270 days, after which 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, though only slightly.

The smoothed hazard rates for the non-adjusted and adjusted data also look almost identical (see Figure 12). For 180-day benefits the hazard rate is at its maximum at around 180 and for 270-day benefits the peak comes slightly after 270 days. When the hazard rates are smoothed less (see Appendix 5), then the rightward shift of the spike for 270-day-benefit recipients is much smaller. The rightward shift in the smoothed hazard estimates appears because the rise in the hazard rate for entering employment in the end of benefit period is sharper than the decline in the hazard rate afterwards. In addition, some delay in entering employment might appear in the data if it is more common for the employers to pay the wage in the following month and less common for it to be paid in the same month, although if the employment spells were considered to start one month earlier, it would underestimate the length of the unemployment spells. It is also clear that adjusting the data with the actual ends of benefit periods might overestimate the spike at benefit exhaustion.

Appendix 5 presents hazard functions for groups with different characteristics. These show that males exit later and people with higher education exit earlier when benefits are granted for longer periods, while younger people exit earlier and older people much later, disabled people exit much later, and people who speak Estonian as their main language might exit earlier. Hazard functions grouped by 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 service and sales workers might exit earlier than others. Crafts and related trades workers tend to exit later[57].

There are 15 counties in Estonia, but generally regional differences are not very large. Nevertheless, unemployment has always been much higher in Ida-Viru county in north-eastern Estonia. Large industries that employed many people during the Soviet period have to a large extent been closed down but labour in the region is not mobile enough to move to other regions. In the southern Estonian Valga and Võru counties, unemployment is also relatively higher. In Harju county, where the capital city is located and many businesses operate, the situation is much better. The hazard functions for these counties show that people in Ida-Viru, Valga and Võru counties do indeed exit later into

[57] For this time period there are no data available in the database for the occupation studied or the economic activity of the last employer. However, these variables are very likely to be in very high correlation with previous occupation and the estimation results would be similar.

employment. However, Harju county does not seem to differ very much from the others.

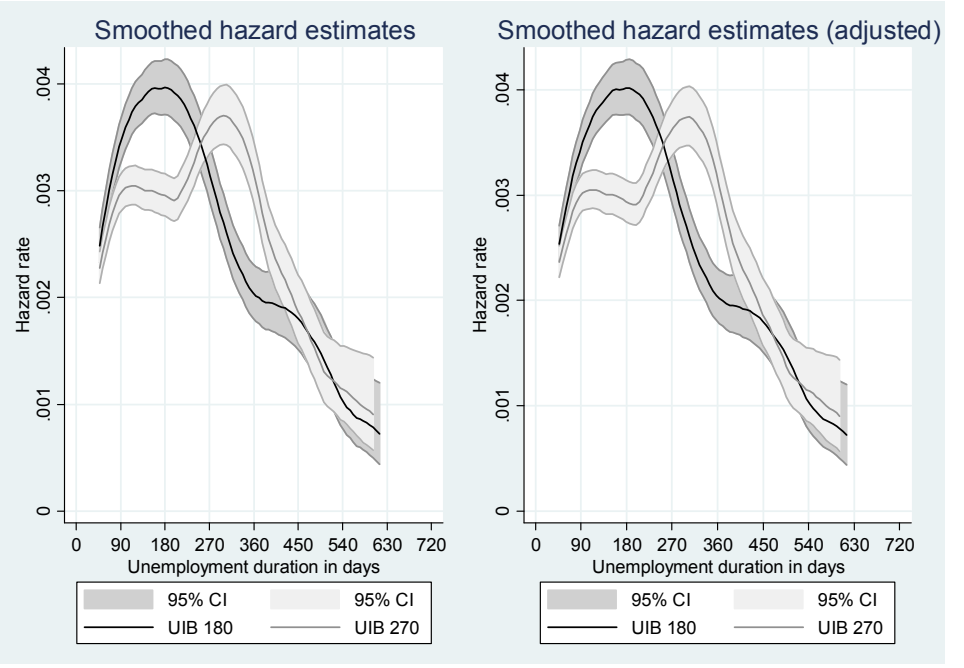

Figure 12. Smoothed hazard rates for exiting into employment with 95% confidence intervals, non-adjusted and adjusted using the end of the benefit period.

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.

An important factor determining unemployment duration might also be severance payment. During the period studied, this was paid as a lump sum on the last day of employment and depended on tenure and the exact reason for the termination of employment. In addition, severance payments were higher in the public sector (at up to 12 months of salary) than in the private sector (at up to 4 months of salary)[58]. 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 a higher severance payment because tenure was shorter. In general, a higher severance payment seems to mean a lower exit rate. An exception to this is when the severance payment is

[58] In the current paper the level of severance payment is calculated from the reason for employment termination and tenure. In reality, the severance payment may differ if an employer does not follow the law and refuses to pay the severance payment. In addition, if the employer goes bankrupt, workers might not get their severance payment at the beginning of their unemployment spell.

equal to one month's 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 the job or the work to be done due to a lack of professional skills or for reasons of health.

3.1.3. 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 as presented in subsection 1.2.1 (equation 22). This is a popular model because of its flexibility and with this model it is possible to incorporate the time-varying covariates that are necessary for estimating the impact of unemployment benefits:

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

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 interval *(m = 1,...,M)* as time has been divided into intervals *[0, a_1), [a_1, a_2)... [a_{M-1}, a_M), [a_M, ∞)*, where a_m are known constants. In the last interval all the observations are censored[59] at a_M. In this study, the intervals are set as 10-day periods up to 500 days, and after that as 30-day periods as there are then relatively few observations and exit rates then seem to change very little.

Unobservable heterogeneity or frailty is introduced in the model as an unobservable multiplicative effect to obtain a more general model. In the current study, individual specific unobserved heterogeneity is added to the model following a gamma distribution with mean 1 and variance θ). The hazard function with unobservable heterogeneity is a more general model as it reduces to a hazard function without unobservable heterogeneity when θ approaches 0.

Vector x is included in the model to incorporate covariates that can affect unemployment duration, including variables for unemployment benefits. In this study, benefit effects are estimated in two different versions as time-varying covariates: 1) any amount of unemployment benefits (referred to in the following tables as model type I); 2) as a grouped amount of benefits (referred

[59] 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.

to in the tables as model type II). If a person started to receive UA after the UIB period, this is also taken into account. All the observations are used in these models, including those benefit recipients who were granted a UIB period shorter than 180 or 270 days as they had received some period of UIB within the year before the benefit application. This ensures that there are observations with and without unemployment benefits during the first 180 days of unemployment spell, as otherwise there would only be observations with unemployment benefits during that period.

Unemployment benefits are included in the models in two different ways, as any amount of benefits and as different benefit levels. Adding different levels for benefits in the model sheds some light on whether the disincentive effect varies with the size of the benefit. However, as unemployment insurance benefits depend on the previous wage, the disincentive effect might be affected by some characteristics of the unemployed person and not only by the benefit level. This influence is lessened somewhat by the addition to the models of unemployment allowance, which is not affected by the previous wage. Nevertheless, the receipt of benefits is also modelled basically as a dummy variable showing whether a person received any benefits during the interval or not. In this way the estimations of benefit effects are not affected by the previous wage level.

Another set of time-varying covariates describes the labour market situation. To do this, variables for the monthly regional registered unemployment rate, monthly change in the registered unemployment rate and monthly inflow of registered vacancies are included in the models.

In addition, time-varying covariates for participation in active labour market measures are added. On the one hand, exit to employment might be higher after participation in active measures if the measures make the unemployed person more attractive to the potential employers or if the measures teach the unemployed how to search a job for example. On the other hand, locking-in effects might occur during the participation as the unemployed might have less time or motivation to look for a job while in an active measure. Additionally, recent literature suggests that active labour market programmes as activation methods for benefit recipients might work better as a stick than a as carrot, as an *ex ante* threat effect of active measures might occur and the hazard of leaving unemployment rises before active measures. In this study, time-varying covariates are added for the waiting periods for active measures[60], periods while participating in active measures and periods after participation in active measures.

The other covariates are included in the estimations as at the beginning of the unemployment spell: gender, age, education, main spoken language as Esto-

[60] Anticipation periods are also included in the estimations for those people who eventually did not participate in active measures, for example if they entered employment before the active measure started. Anticipation periods of 30 days are used in the estimations.

nian, previous occupation, residence in a town or the countryside, disability, previous employment in the public sector, previous employment abroad, reason for employment termination and tenure of last job. Severance payment is not included as tenure and reason for employment termination also define the level of severance payment.

The estimated hazard ratios[61] for benefit effects are presented in Table 3. There is unobservable heterogeneity present in most of the models, meaning that the hazard ratios presented in the table hold at t_0, which is 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).

The first block of models in Table 3 includes all the available observations from the time period studied. The estimations show that the unemployed receiving unemployment benefits have a hazard of leaving unemployment for employment that is less than half that of the unemployed currently not on benefits. The estimations taking into account the level of benefits suggest that a higher level of benefits might cause stronger disincentive effects than lower levels of benefit, though as higher levels of benefits mean a higher previous wage, it can be argued alternatively that the estimations show that people with a higher previous wage exhibit stronger disincentive effects from unemployment benefits.

In addition, Table 3 presents estimation results separately for the unemployed with initial UIB periods of 180 days and 270 days. As Table 2 showed that these two groups are different in several respects, it could be argued that their labour market behaviour could also be different. The estimations indicate that the behaviour of 270-day-UIB recipients tends to be on average somewhat less distorted by the receipt of benefits, though as their benefit period tends to be longer, the benefit effect emerges for a longer time period and distorts the behaviour more than comparison of these estimations shows. The effect of unemployment benefits on the hazard of leaving unemployment also appears to be more homogeneous across different benefit levels in the group of 270-day-UIB recipients, while 180-day-UIB recipients exhibit much larger differences in the disincentive effect across benefit levels or across previous wage levels.

[61] The hazard ratio for dummy variables shows the hazard rate of the group under study divided by the hazard rate of the reference group. A hazard ratio smaller than 1 shows that the group under study has a lower hazard rate than the reference group.

Table 3. Estimation results for benefit covariates in piecewise-constant proportional hazard models

Observations included	Model type	Covariate	Compared to	Hazard ratio	P>z
All UIB recipients	I	Any amount of benefit	No benefit	0.477	0.000
	II	0 EEK < UIB daily rate <100 EEK	No benefit	0.482	0.000
		100 EEK ≤ UIB daily rate <200 EEK		0.487	0.000
		200 EEK ≤ UIB daily rate <300 EEK		0.401	0.000
		300 EEK ≤ UB rate <400 EEK		0.323	0.000
UIB 180	I	Any amount of benefit	No benefit	0.431	0.000
	II	0 EEK < UIB daily rate <100 EEK	No benefit	0.433	0.000
		100 EEK ≤ UIB daily rate <200 EEK		0.461	0.000
		200 EEK ≤ UIB daily rate <300 EEK		0.335	0.000
		300 EEK ≤ UB rate <400 EEK		0.234	0.000
UIB 270	I	Any amount of benefit	No benefit	0.519	0.014
	II	0 EEK < UIB daily rate <100 EEK	No benefit	0.527	0.017
		100 EEK ≤ UIB daily rate <200 EEK		0.526	0.017
		200 EEK ≤ UIB daily rate <300 EEK		0.465	0.006
		300 EEK ≤ UB rate <400 EEK		0.408	0.002

I – a dummy variable for benefit receipt during an interval, II – different benefit levels compared during an interval.

The estimations results in Table 3 present the average effects of unemployment benefits during the unemployment benefit period. However, Figure 12 indicates that the effect of benefits might vary during the benefit period as there is a spike in the hazard of leaving unemployment for employment at the end of benefit period. In consequence the hazard of leaving unemployment is modelled next so that the spikes in the hazard rate are also taken into account. As the non-parametric methods indicate that the hazard rate starts increasing before the exhaustion of benefits and stays higher for a short while after the exhaustion date, there are dummy variables for higher hazard rate included both before and after the end of the benefit period. The diagnostics of the models suggest models where dummy variables are included to show the periods of 60 days before UIB and UA exhaustion and 60 days after UIB and UA exhaustion. The estimation results for these models are presented in Table 4. This table provides estimations where spikes are modelled separately for UIB and UA periods and separately for initial 180-day-UIB and initial 270-day-UIB and the following UA periods, and both of these models are run in two different ways to include benefit receipt giving a total of four different estimation results.

Table 4. Estimation results for benefit covariates and spikes in the hazard rate due to benefits in piecewise-constant proportional hazard models

Model type	Covariate	Com-pared to	Different spike for UIB and UA		Different spike for UIB-180, UIB-270 and UA	
			Hazard ratio	P>z	Hazard ratio	P>z
I	Any amount of benefit	No benefit	0.401	0.000	0.374	0.000
	60 days before UIB-180 exhaustion	All other periods	1.304	0.000	1.219	0.005
	60 days before UIB-270 exhaustion				1.422	0.003
	60 days before UA exhaustion		1.740	0.000	2.045	0.000
	60 days after UIB-180 exhaustion		1.083	0.278	0.856	0.094
	60 days after UIB-270 exhaustion				1.580	0.000
	60 days after UA exhaustion		0.705	0.003	0.872	0.287
II	0 EEK < UIB daily rate <100 EEK	No benefit	0.401	0.000	0.374	0.000
	100 EEK ≤ UIB daily rate <200 EEK		0.423	0.000	0.395	0.000
	200 EEK ≤ UIB daily rate <300 EEK		0.352	0.000	0.330	0.000
	300 EEK ≤ UB rate <400 EEK		0.282	0.000	0.266	0.000
	60 days before UIB-180 exhaustion	All other periods	1.303	0.000	1.219	0.005
	60 days before UIB-270 exhaustion				1.417	0.003
	60 days before UA exhaustion		1.745	0.000	2.045	0.000
	60 days after UIB-180 exhaustion		1.081	0.294	0.856	0.095
	60 days after UIB-270 exhaustion				1.572	0.000
	60 days after UA exhaustion		0.707	0.004	0.872	0.290

I – a dummy variable for benefit receipt during an interval, II – different benefit levels during an interval compared.

The estimations where a common spike is assumed for any UIB period indicate that there is a statistically significant rise in the hazard rate prior to the exhaustion date, but the spike is not significant after that date. The estimation results that distinguish between the initial potential benefit period suggest that the hazard rates are also significantly different after the potential UIB period but might not be after the UA period. When interpreting the results in the table, it is important to consider that before the benefit exhaustion date the variables for benefit receipt matter as well, as the hazard ratios multiply, while after the

benefit exhaustion they do not matter. The total effects caused by unemployment benefits as estimated by the model containing dummy variables for any benefit receipt and spikes before and after UIB-180, UIB-270 and UA are presented in Figure 13 (the model presented on the right in the upper part of Table 4). The figure depicts benefit effects for the three most common groups among UIB recipients: 1) unemployed with UIB period of 270 days; 2) unemployed with UIB of 180 days; 3) unemployed with UIB of 180 days followed by UA for 90 days.

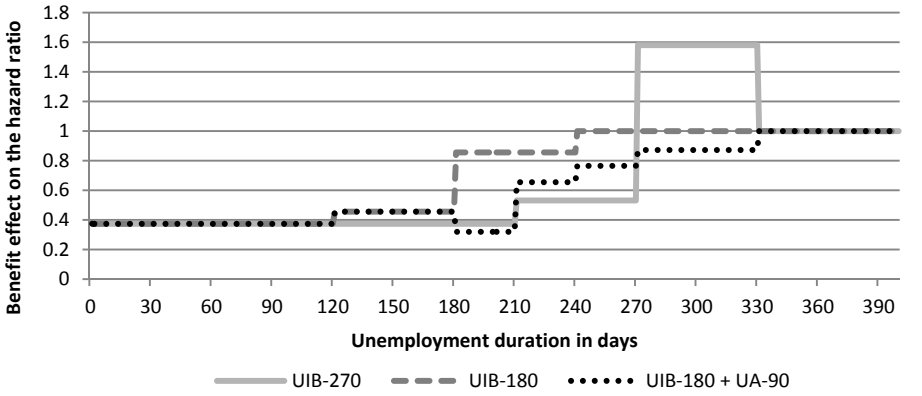

Figure 13. Estimation results for benefit effects in piecewise-constant proportional hazard models where spikes in the hazard due to unemployment benefits are taken into account

Figure 13 essentially depicts the hazard ratios for benefit recipients compared to the unemployed without benefits, so without any benefits the hazard ratio would be equal to one through the unemployment period. The figure demonstrates that the spike around the end date of benefit exhaustion is higher for 270-day-UIB recipients, as was also suggested by the less smooth hazard rates for leaving unemployment shown in Appendix 5. Furthermore, the figure proves that unemployment benefits do prolong unemployment duration. For 180-day-UIB recipients the hazard of leaving unemployment is lower throughout the benefit period and beyond it than it would be if they did not receive unemployment benefits. For a while after the benefit period, 270-day-UIB recipients have an even higher hazard of leaving unemployment than without any benefit receipts, but it still does not compensate for the lower hazard rate earlier during the benefit period.

The shape of the hazard function depicted in Figure 12 and Appendix 5 is affected not only by the benefit effects but also by the baseline hazard function, and it can also be affected somewhat by participation in active measures and changes in the economic situation during the unemployment spell; the level of the hazard function depends on the different characteristics of the unemployed.

The baseline hazard estimated with the model including variables for benefit receipt and spikes is presented in Figure 14. The figure shows that the baseline hazard of leaving unemployment for employment increases during the first few months of unemployment and afterwards declines gradually. This suggests that in the very beginning of the unemployment period, the unemployed do not start searching for a job very actively or that they are very selective about job offers. The gradual decline in the baseline hazard later on might be caused by the deteriorating job offer distribution as the long-term unemployed might not be as attractive to the potential employers while their human capital might depreciate. The search activity might also fall for this reason as the marginal returns of search are lower.

Figure 14. Estimation results for covariates of time intervals in piecewise-constant proportional hazard models where spikes in the hazard due to unemployment benefits are taken into account[62]

In conclusion, the estimation results show that the labour market behaviour of the unemployed is influenced by the receipt of unemployment benefits. The hazard of leaving unemployment for the unemployed receiving unemployment benefits tends to be on average less than half that of the unemployed currently not on benefits. Furthermore, people receiving a higher level of unemployment benefits, basically the unemployed with a higher previous wage, exit unemployment at an even slower pace. In addition, the hazard of leaving unemployment rises prior to the benefit exhaustion date and continues to be higher for some period afterwards. However, the rise in the hazard rate may be somewhat delayed in the data compared to the reality if it is more common for the employers to pay the wage during the next month rather than during the current month of employment.

The results for the other covariates in the models where separate spikes for UIB and UA and the receipt of benefits are included as dummy variables are

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

presented in Appendix 6. The results are presented by benefit types for only one version of the models as the hazard ratios for the other covariates are very similar in all the models. In all the models men have significantly lower hazard rates at around 17% while young people might exit earlier and older people exit significantly later. The unemployed who mainly speak Estonian have hazard rates for exiting into employment that are 1.2–1.4 times higher. The disabled unemployed experience much lower hazard rates.

The estimation results that men and non-Estonians have a lower hazard of leaving unemployment for employment is similar to the results of Masso and Krillo (2011). Among other estimations, they estimate the flows from unemployment to employment in 2008, a time period that overlaps with the time period in this study. They use the data from the Labour Force Survey and also show that men exhibit a lower flow from unemployment to employment than women and non-Estonians have a lower flow from unemployment to employment than Estonians.

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

Tenure covariates show that longer tenure in general means a lower hazard rate for exiting into employment. An interesting result is that people whose last employment was somewhere abroad experience much lower hazard rates. One reason for this is probably that people who have worked abroad would also try to find a job abroad again, but if they do succeed in finding a job abroad, this is mostly not visible in the data as only Estonian tax data are used to detect employment.

People who have been dismissed 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 become unemployed for 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 probability of liquidation or bankruptcy quite some time in advance and might have started looking for a new job before the unemployment spell.

Interesting results from the study concern time-varying covariates for participation in active labour market measures. Recent literature suggests that active labour market programmes might work better as a stick than as 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[63],

[63] Anticipation periods are also included for those people who eventually did not get active measures, perhaps because they entered employment before the active measure started. Anticipation periods of 30 days are used in the calculations.

periods while receiving active measures and periods after receiving active measures. It turns out that people who are directed towards different training courses, work practice or counselling have much lower exit rates before the start of the measure. Exit rates are also lower during the period they are receiving the various active measures.

Hazard rates tend to be significantly higher after the receipt of work practice and occupational training. However, the positive effects of Estonian courses, counselling and job search training turn out to be more questionable.

The result 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. Unlike in several other countries, the unemployed in Estonia are not forced to participate in active measures in order to continue drawing unemployment benefits. However, the results indicate negative anticipation effects and locking-in effects while the hazard rates are not significantly higher after every active measure. In this sense 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.

3.1.4. Conclusion

Search theory predicts that an increase in the amount or maximum duration of unemployment benefits reduces the probability of an unemployed person exiting unemployment. In the current study conducted on Estonian data from the pre-crisis period as presented in this section, both non-parametric and parametric estimations of the hazard of leaving unemployment to employment show that unemployment benefits do indeed have a strong and significant disincentive effect on the hazard rates. Benefit effects prove to be even stronger than most of the other covariates.

The estimation results indicate that the receipt of benefits more than halves the hazard of leaving unemployment for employment. The hazard of leaving unemployment for the unemployed who receive higher benefits and have also had a previously higher wage is even more influenced by the receipt of benefits. The analysis also demonstrates that the hazard of leaving unemployment is significantly higher just prior to the end of the benefit period, implying that the disincentive effect decreases during the benefit period.

The study shows that the baseline hazard of leaving unemployment for employment decreases gradually during the unemployment period. However, during the very beginning of the unemployment period there is a rise in the baseline hazard. These results suggest that the unemployed might not start looking for a job in the very beginning of the unemployment period and that they increase their search activity over the first few months irrespective of benefit receipt. The gradual decline in the hazard rate afterwards is most probably caused by the deterioration in job offers.

The study presented in this section shows the strong disincentive effects of unemployment benefits during the pre-crisis period as most of the period under study was a period of relatively high GDP growth. However, the question remains whether this effect also occurs during a period of deep crisis. Another question is whether unemployment benefits also support job search; in other words, whether people get better jobs because they can prolong their job search. These issues are dealt with in the next sections.

3.2. Disincentive effects of unemployment insurance benefits: the crisis period

3.2.1. Introduction

The search model predicts a strong disincentive effect of unemployment benefits on exiting unemployment into employment and this effect is also often substantiated in empirical studies. However, 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 on the disincentive effect. The search model predicts that on the one hand, the reservation wage declines and the unemployed become less selective during an economic downturn, but on the other hand, the unemployed might decrease their job search intensity as the marginal benefit of the search effort might fall as 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. The disincentive effects of unemployment benefits are expected to be rather milder during an economic downturn, though it eventually remains an empirical question. Yet, also the empirical research on the cyclicality of disincentive effects is very scarce (for example Schmieder *et al.* (2010) and Kroft and Notowidigdo (2011); a more thorough overview of this matter is provided in Subsections 1.1.3 and 1.3.1).

The study presented in the previous section (Section 3.1) showed that the disincentive effect occurred in Estonia during the period before the global economic crisis. The study presented in the current section explores the disincentive effect in times of rocketing unemployment using Estonian data as the rise in unemployment there during the last crisis was the highest in the whole European Union. In Estonia, the number of unemployed people grew more than fivefold in less than two years while the number unemployed less than doubled 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 (covered in Section 3.1) to draw conclusions about the size of the disincentive effect in different economic situations.

3.2.2. Data

The study looks at unemployment benefits granted in Estonia from July 2008 until March 2009, meaning 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, which is when unemployment reached its peak. As in Section 3.1, those unemployed who were continuing their benefit period for the remaining days of a previous benefit period are included in the semi-parametric estimation models but not in the non-parametric analysis.

The study looks at both forms of unemployment benefits available in Estonia, unemployment insurance benefit and unemployment allowance. UIB is generally much higher than the flat rate UA, but has more stringent criteria for eligibility, covering only involuntary unemployment and setting stricter criteria about previous employment (see Subsection 2.1.3.). In order to make UIB and UA recipients more comparable, only those UA recipients are considered who were entitled to UA because of previous working record and not because of alternative activities such as studying or childcare. The characteristics of the benefit recipients under study are presented in Table 5. In addition to the three main groups of benefit 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 meaning the unemployed who were previously engaged in full-time studies are excluded and the unemployed whose employment contract was ended following the employee's breach of contract are excluded.

The major difference between 180-day-UIB and 270-day-UIB recipients lies in the average previous tenure, as this is highly correlated with the insurance contributions that determine the length of UIB. In addition, 270-day-UIB recipients previously earned a higher wage, are more educated, are 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 even lower ranking jobs. Compared to the pre-crisis characteristics of UIB recipients (Section 3.1, Table 2), the overall picture is similar, though the characteristics reflect the fact that the crisis hit the real estate and construction market more, with slightly more unemployed during the crisis who used to be craft and related trades workers and fewer who were employed as professionals, technicians and associate professionals; the share of unemployed men is also higher during the crisis period.

Table 5. Description of unemployment benefit recipients by type of benefit

	UIB 180	UIB 270	UA (all)	UA 270
Number of observations	10148	13232	17645	15925
UB daily rate for 1–100 days, EEK	163.1	197.6	32.9	32.9
UB daily rate for 101–180 days, EEK	130.5	158.1	32.9	32.9
UB daily rate for 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 at the beginning of UB period	36.7	44.8	35.5	36.3
Main language Estonian	54%	58%	51%	50%
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%

3.2.3. The crisis period versus the pre-crisis period

The crisis and pre-crisis periods are compared using data on UIB recipients. First, the duration of unemployment is analysed using non-parametric methods. Figure 15 presents Kaplan-Meier survival estimates. Before the crisis the survival function of 270-day-UIB recipients was constantly higher than that of 180-day-UIB recipients. As the distance between the survival functions was at its highest at 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 that of 180-day-UIB recipients is around the 270th day. This suggests that the disincentive effect is still there during the crisis.

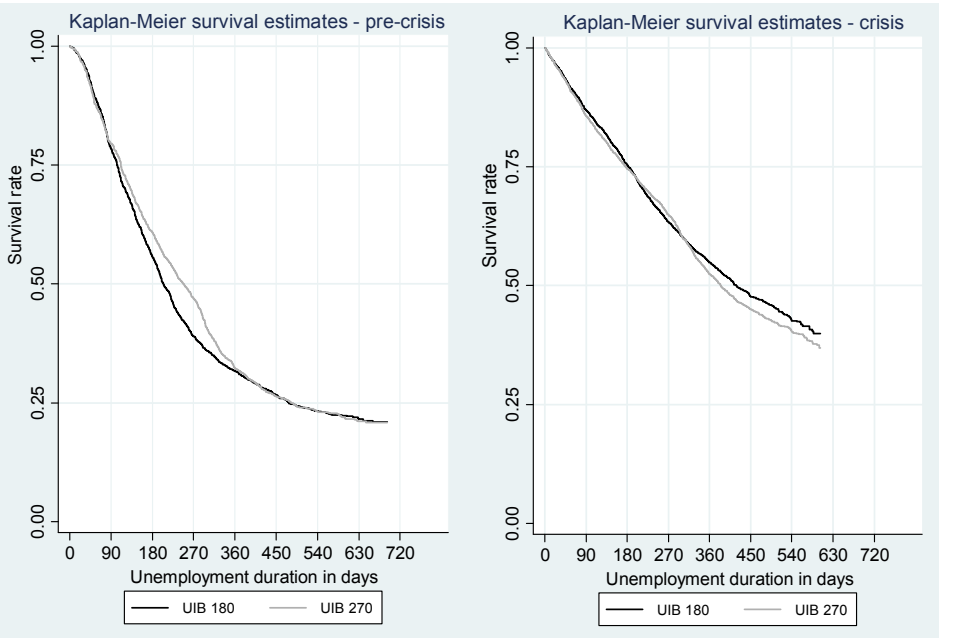

Figure 15. Kaplan-Meier survival estimates, the pre-crisis and the crisis period

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 16) reveals that the unemployed eligible for 270-day-UIB experience a very sharp rise in the hazard rate for leaving 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. Compared to the hazard functions during the pre-crisis period, the shape of the smoothed hazard functions remains similar, but at a much lower level. While the hump around the end of the benefit has remained clearly evident during the crisis for 270-day-UIB recipients, the hazard function for 180-day-UIB recipients has flattened somewhat [64].

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

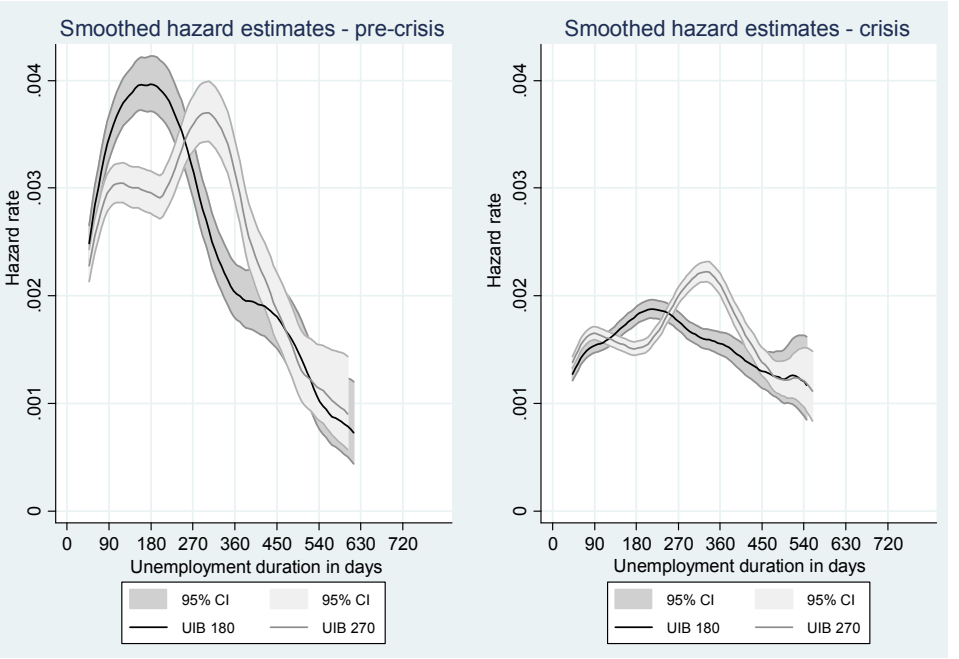

Figure 16. Smoothed hazard rates for exiting into employment with 95% confidence intervals, the pre-crisis and the crisis period

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.

Less smooth hazard functions show that the rise at the end of benefit period is even sharper and coincides more with the end of the maximum benefit period (Figure 17). The figure of less smooth hazard rates also shows that the spike at the end of benefit period is higher for 270-day-UIB recipients both during the pre-crisis and the crisis periods. However, as the spike is narrower for 270-day-UIB recipients than for 180-day-UIB recipients during the pre-crisis period, the spike for them appears lower when smoothed more. The opposite applies for the crisis data, when the spike for 180-day-UIB recipients is much narrower. The figure also shows that the hazard of leaving unemployment for employment during the first year of unemployment is much higher during the pre-crisis period than during the crisis period. After the benefit periods, the hazard rates turn out to be more similar in level. On the one hand, it could be argued that this phenomenon could be caused by higher disincentive effects during the pre-crisis period, but on the other hand, the longer unemployment spells in the pre-crisis data might already be affected somewhat by the crisis and the longer unemployment spells of the crisis period might already be affected by the recovery.

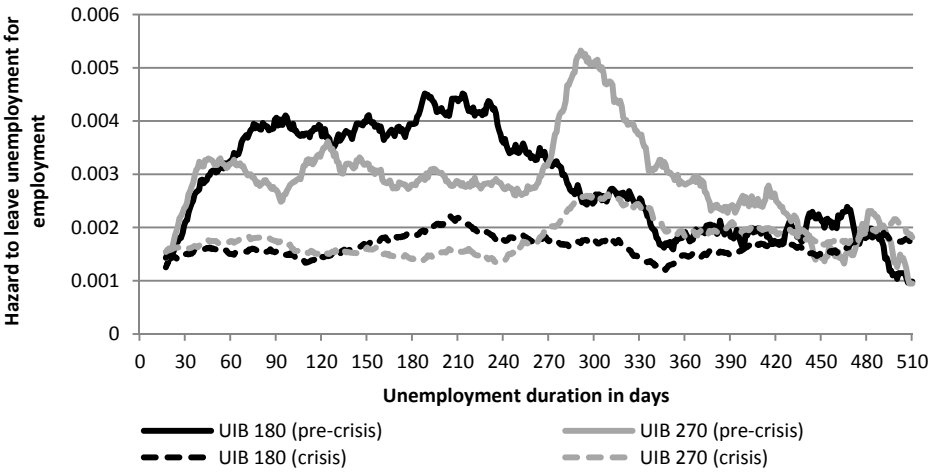

Figure 17. Smoothed hazard rates for exiting into employment, pre-crisis and crisis period

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.

Alongside the non-parametric method, a piecewise-constant proportional hazard model is applied to estimate the impact of unemployment benefits and other covariates (see subsection 1.2.1, equation 22):

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

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 signifies the interval *(m = 1,...,M)* as time has been divided into smaller periods *[0, a_1), [a_1, a_2)... [a_{M-1}, a_M), [a_M, ∞)*. In the last interval all the observations are censored[65] at a_M.

Vector x includes covariates for unemployment benefit, generally the size of the benefit as a time-varying covariate or a dummy for any unemployment benefit receipt; the UIB recipient characteristics at the beginning of the unemployment spell of gender, age, education, tenure at last job, being a native speaker of Estonian, being disabled, living in a town or the countryside, previous profession, previous job in Estonian public sector/ Estonian private

[65] 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.

sector/ abroad, and 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 of monthly regional registered unemployment rate, monthly change in registered unemployment rate and monthly inflow of registered vacancies. The variables and models are defined as similarly as possible to the variables and models in Section 3.1 to make the estimation results of the crisis and pre-crisis period comparable.

First, variables for benefit receipt are included in the model, not taking into account the spikes in the hazard rate. The parameter estimates for the covariates of unemployment benefits are presented in Table 6. Compared to the pre-crisis period, the benefit disincentive effects appear to be in general slightly smaller and more homogeneous for both benefit levels and for the different potential benefit periods[66]. However, the differences between the estimation results for crisis and pre-crisis data are quite small even though the recession was extremely deep. In general, the unemployed receiving unemployment benefits exit unemployment into employment about half as fast as the unemployed currently not on benefits in both the crisis and the pre-crisis periods.
Nevertheless, during the crisis the disincentive effects appear to be more similar across benefit levels. During the pre-crisis period, the labour market behaviour of people with very high unemployment benefits (because of a higher previous wage) was more affected by unemployment benefits than was the behaviour of other groups. During the crisis period, the benefit effects on this group are not much different from those on the other groups. Indeed the disincentive effects of lower benefits, UIB for previous low wage earners and UA, might even have increased slightly during the crisis.

In addition to the estimation results for UIB recipients, estimations for UA recipients are also shown in Table 6. UA recipients exhibit smaller disincentive effects, but their benefit level is also lower as it is fixed at 32.9 EEK per day, which is the lower bound of the benefit interval in the model. The estimation results of this model for the crisis period indicate that very low benefit rates might incur lower disincentive effects, but the differences in disincentive effects might be smaller at higher benefit levels.

The estimation results incorporating spikes in the hazard rate in the models are presented in Table 7 and the full estimation results are given in Appendix 8. Like the estimations for the pre-crisis period presented in Subsection 3.1.3, the models for the crisis data favour models with dummy variables of 60 days prior to benefit exhaustion date and 60 days after benefit exhaustion data. Table 7 shows estimations where spikes are modelled separately for UIB and UA periods and separately for initial 180-day-UIB, initial 270-day-UIB and the following UA periods.

[66] Some differences in the estimates can also be caused by the differences in the pool of benefit recipients as the crisis hit more some sectors than others. In addition, the pool of benefit recipients in the pre-crisis period is very small.

Table 6. Estimation results for benefit covariates in piecewise-constant proportional hazard models

Model type	Covariate	Reference	Hazard ratio: pre-crisis			Hazard ratio: crisis			
			UIB 180	UIB 270	All UIB	UIB 180	UIB 270	All UIB	UA
I	Any amount of benefit	No UB	0.431***	0.519**	0.477***	0.432***	0.543***	0.475***	0.708***
II	0 EEK < UB rate <100 EEK	No UB	0.433***	0.527**	0.482***	0.435***	0.465***	0.445***	0.708***
	100 EEK ≤ UB rate <200 EEK		0.461***	0.526**	0.487***	0.499***	0.593***	0.550***	x
	200 EEK ≤ UB rate <300 EEK		0.335***	0.465***	0.401***	0.473***	0.587***	0.537***	x
	300 EEK ≤ UB rate <400 EEK		0.234***	0.408***	0.323***	0.531***	0.628***	0.577***	x
	400 EEK ≤ UB rate		x	x	x	0.477***	0.581***	0.525***	x

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

I – a dummy variable for benefit receipt during an interval, II – different benefit levels during an interval compared.

Table 7. Estimation results for benefit covariates and spikes in the hazard rate due to benefits in piecewise-constant proportional hazard models

Model type	Covariate	Reference	All UIB recipients, different spike for UIB and UA		All UIB recipients, different spike for UIB-180, UIB-270 and UA		All UA recipients
			Pre-crisis	Crisis	Pre-crisis	Crisis	Crisis
I	Any amount of benefit	No UB	0.401***	0.437***	0.374***	0.371***	0.421***
	60 days before UIB-180 exhaustion	All other periods	1.304***	1.225***	1.219***	0.981	x
	60 days before UIB-270 exhaustion				1.422***	1.830***	x
	60 days before UA exhaustion		1.740***	1.413***	2.045***	1.984***	1.496***
	60 days after UIB-180 exhaustion		1.083	1.122***	0.856*	0.969	x
	60 days after UIB-270 exhaustion				1.580***	1.510***	x
	60 days after UA exhaustion		0.705***	0.840***	0.872	1.015	0.693***
II	0 EEK < UB rate <100 EEK	No UB	0.401***	0.414***	0.374***	0.354***	0.421***
	100 EEK ≤ UB rate <200 EEK		0.423***	0.557***	0.395***	0.461***	x
	200 EEK ≤ UB rate <300 EEK		0.352***	0.552***	0.330***	0.458***	x
	300 EEK ≤ UB rate <400 EEK		0.282***	0.597***	0.266***	0.495***	x
	400 EEK ≤ UB rate		x	0.545***	x	0.457***	x
	60 days before UIB-180 exhaustion	All other periods	1.303***	1.217***	1.219***	1.003	x
	60 days before UIB-270 exhaustion				1.417***	1.758***	1.496***
	60 days before UA exhaustion		1.745***	1.586***	2.045***	2.153***	x
	60 days after UIB-180 exhaustion		1.081	1.251***	0.856*	1.084	x
	60 days after UIB-270 exhaustion				1.572***	1.595***	x
	60 days after UA exhaustion		0.707***	0.901*	0.872	1.059	0.693***

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

I – a dummy variable for benefit receipt during an interval, II – different benefit levels during an interval compared.

When variables for spikes are included in the models, the estimation results for the variables for benefit receipt continue to indicate slightly lower disincentive effects, particularly when different benefit levels are added to the models. The estimated parameters for benefit receipt turn out to be more homogeneous for the crisis period like they did in the models that did not include dummies for spikes. On top of this, the disincentive effects of unemployment benefits for UA recipients also prove to be very similar to the effects for UIB recipients when the spikes in the hazard rate are taken into account.

The variables for the spikes also tend to identify slightly lower distortionary effects from benefits during the crisis, though the differences between the crisis and the pre-crisis data are again fairly marginal. When interpreting the results of benefit effects in total, it is necessary to remember that before the benefit exhaustion date the hazard ratios for benefit receipt and the spike multiply, while after benefit exhaustion only the spike matters. The total effects of unemployment benefits estimated by a model including dummy variables for any benefit receipt and spikes before and after UIB-180, UIB-270 and UA are presented in Figure 18. In the model presented in this figure the spikes before and after are modelled in even more detail at one and two months before the exhaustion and one and two months after the exhaustion of a benefit. The figure illustrates benefit effects during and before the crisis for the three most common groups among UIB recipients: 1) the unemployed with UIB for 270 days; 2) the unemployed with UIB for 180 days; 3) the unemployed with UIB for 180 days followed by UA for 90 days.

Figure 18 demonstrates that the effect of unemployment benefits on the hazard of leaving unemployment for employment is very similar during both the crisis and the pre-crisis periods. The disincentive effect of benefits might be only marginally lower during the crisis as the hazard ratio compared to no unemployment benefits is only marginally higher. In general, unemployment benefits prolong unemployment duration significantly during both the crisis and the pre-crisis periods as the hazard ratio for leaving unemployment tends to be lower than 1 compared to no benefit receipts (only 270-day-UIB recipients have a higher hazard rate than other unemployed without benefits during for a while after benefit receipt).

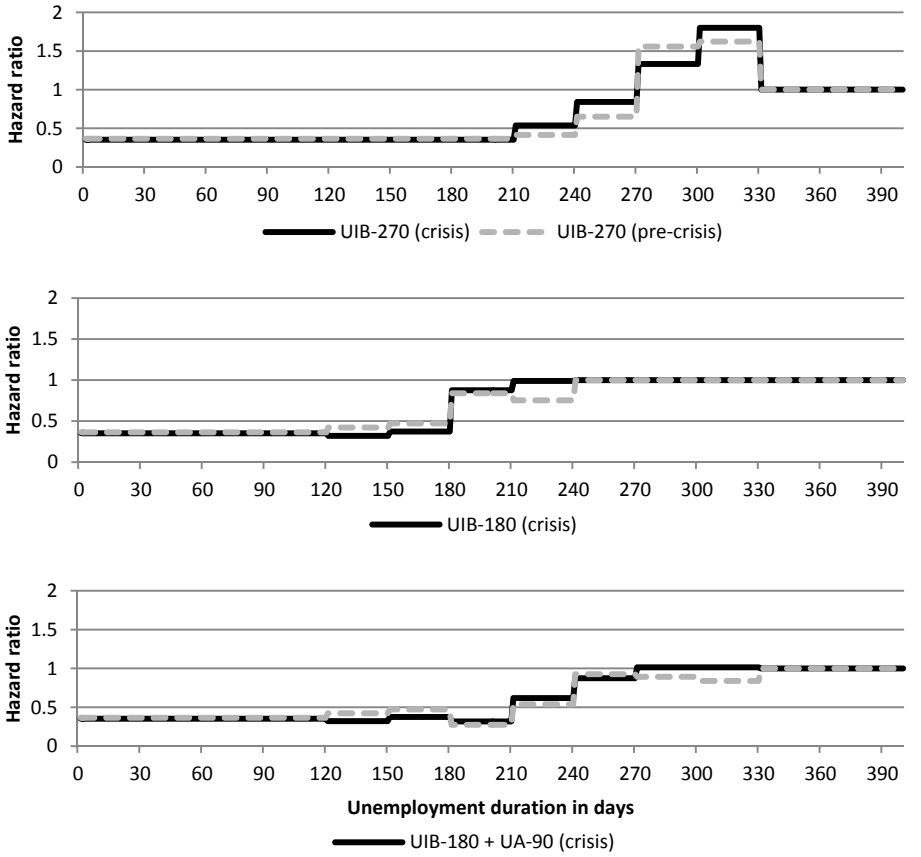

Figure 18. Estimation results for benefit effects in piecewise-constant proportional hazard models where spikes in the hazard due to unemployment benefits are taken into account

Table 8 reports the information presented in Figure 18 as average hazard ratios over different periods. If only benefit periods are compared, which are the first 180 days for 180-day-UIB recipients and 270 days for the other groups, then the average hazard ratio compared to no benefit receipts tends to be around 0.4, and benefits hinder the transition to employment by a factor of more than two. However, as the benefit effects also appear after the benefit period and tend to be smaller then, or in the case of 270-day-UIB recipients even display the opposite effect, the average hazard ratio over the whole period of distortionary effects shows in total a smaller disincentive effect from benefits. With the first 330 days of unemployment, which represents the point when the benefit effects vanish from the data for all these three types of benefit, the average hazard ratio is around 0.6. Over this period, the unemployed with the least generous benefits, who are the 180-day-UIB recipients, exhibit the smallest disincentive effect. The disincentive effect for 270-day-UIB recipients is somewhat bigger

and those unemployed receiving 180-day-UIB and afterwards 90-day-UA seem to exhibit even greater disincentive effects. In addition, over this period of unemployment the distortionary effects of unemployment benefits are smaller for the crisis period, though the difference is rather small. In any case, when the unemployment duration approaches infinity, the hazard ratio approaches one, meaning the effect of benefits approaches zero.

Table 8. Hazard ratios of benefit recipients compared to no benefit receipts in piecewise-constant proportional hazard models where spikes in the hazard due to unemployment benefits are taken into account

	The effect of unemployment benefits during benefit period		**The effect of unemployment benefits during the period of benefit effects appearing**		**The effect of unemployment benefits during the first 330 days of unemployment**	
Benefit type	Pre-crisis period	Crisis period	Pre-crisis period	Crisis period	Pre-crisis period	Crisis period
UIB-270	0.402	0.427	0.618	0.634	0.618	0.634
UIB-180	0.392	0.350	0.493	0.496	0.631	0.633
UIB-180 + UA-90	0.454	0.436	0.529	0.546	0.529	0.546

Search theory predicts that the hazard of leaving unemployment rises during the benefit period *ceteris paribus*. It is usually assumed that income and leisure are complements and that hence the hazard rate should shift up after the benefit period and stabilise at that level. In general the graphs presented in Figure 18 coincide with search theory. The hazard of leaving unemployment does indeed rise in the benefit period and stabilises later at a higher level *ceteris paribus*. However, there is still an increase in the hazard rate for some time after the end of benefit period, especially for 270-day-UIB recipients. It is likely, that some part of the spike during the benefit period is somewhat delayed in the data as it might be more common for employers to pay the wage in the following month than in the current month of employment.

In addition, there is a decline in the hazard rate before the stabilisation in both the crisis and the pre-crisis data, particularly for 270-day-UIB recipients. On the one hand, this could be caused by the shadow economy. Some of the unemployed might have already started working informally during the benefit period and have formalised their contracts only after benefit exhaustion. This would mean that the hazard ratio pictured in Figure 18 would be at a higher level during the benefit period if the informal sector were taken into account as well. The spike in the end of benefit period, particularly after the benefit period, would however be smaller. So including the informal sector in the analysis

might reveal slightly milder distortionary effects from unemployment benefits[67]. Nevertheless, there are no data available in this study for analysing the informal sector.

Alternatively, the spike in the hazard rate at the end of benefit period and the later decline could be explained by optimised timing of job starting dates as suggested by a model by Boone and van Ours (2009). This proposes that the unemployed might negotiate with their prospective employers to start the job only after the end of the benefit period and that this would cause the accumulation of entrances to employment after the benefit exhaustion date. It is likely that 270-day-UIB recipients can negotiate with the employers more successfully as they tend to work in higher ranking jobs, have more experience and have a higher education level, so employers might be more willing to wait for this kind of labour and that would cause a more pronounced spike at the end of the benefit period for 270-day-UIB recipients.

Besides the benefit effects depicted in Figure 18, the other major component shaping the overall hazard function visible in Figure 17 is the baseline hazard function. The baseline hazard functions for UIB and UA recipients estimated on the crisis data are reported in Figure 19. The baseline hazard for UIB recipients shows a steady decline throughout the unemployment period, indicating the deterioration in job offers. For UIB recipients there is a rise in the baseline hazard rate for about 1.5 months, after which their baseline hazard for leaving unemployment for employment declines very similarly to that of the UIB recipients.

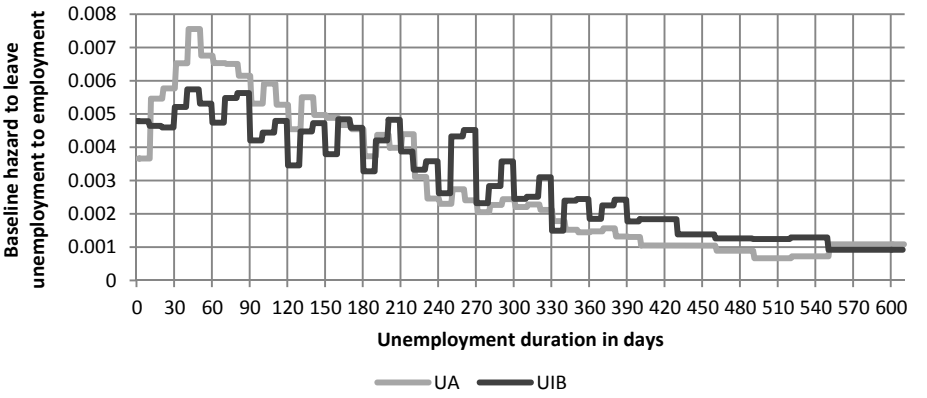

Figure 19. Estimation results for covariates of time intervals in piecewise-constant proportional hazard models where spikes in the hazard due to unemployment benefits are taken into account, the crisis period[68]

[67] In addition, it can be argued that the exits to the informal sector could affect the shape of the hazard function if it were assumed that the unemployed prefer to take up a job in the formal sector rather than the informal sector, for example because social security is provided in the formal sector.

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

Figure 20 compares the baseline hazard for UIB recipients during the crisis and pre-crisis periods. In general, the hazard of leaving unemployment for employment declines during the unemployment period in both cases. However, the baseline hazard is at a much lower level during the crisis period as there are fewer chances of exiting unemployment, but search activity might also be lower as the marginal return of job search might be lower. In addition, during the pre-crisis period the baseline hazard increases somewhat before the decline while the baseline hazard during the crisis period starts declining quite early in the unemployment period. This suggests that when the economic situation is better, the unemployed might not start looking for a job very actively at the very beginning of the unemployment period as they might use the beginning of the unemployment period rather more as a vacation before the next job. During the crisis period, the unemployed seem to start looking for a job straight away at the beginning of the unemployment period.

The finding that the baseline hazard declines during the unemployment spell is quite predictable due to the likely deterioration in job offers when the unemployment spell lengthens. In addition, the decline in the hazard rate is also shown for those unemployment benefit systems where unemployment benefits are basically infinite and therefore no spikes occur (see for example Cockx and Dejemeppe (2002), Degraeve (2012)) and for those unemployment systems where activation is at a very high level that also minimises benefit effects and spikes in the hazard rate (see for example Koskela and Uusitalo (2004)).

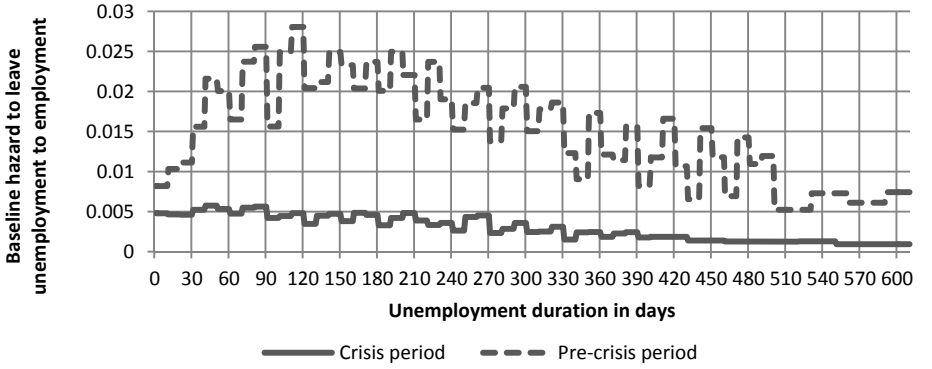

Figure 20. Estimation results for covariates of time intervals in piecewise-constant proportional hazard models where spikes in the hazard due to unemployment benefits are taken into account, for UIB recipients during the crisis and the pre-crisis periods

3.2.4. The impact of the benefit period

Since the number of unemployment benefit recipients grew sharply because of the crisis, 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[69]. 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 a record of unemployment insurance contributions of 54–58 months are considered. As 56 months of unemployment insurance contributions is when people start to be eligible for the longer benefit, there could be a risk that some people are able to convince their employer to extend the employment contract so they qualify for the longer benefit. Figure 21 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 of a few months less (the full figure is presented in Appendix 9). It can be concluded that it is not likely that people can manipulate their unemployment insurance record in Estonia.

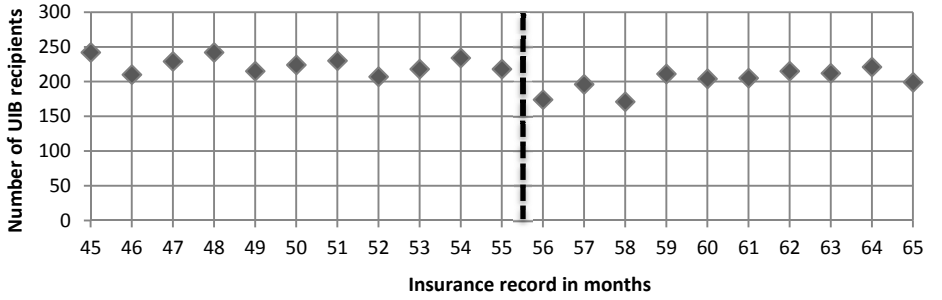

Figure 21. Number of UIB recipients on the basis of previous unemployment insurance contributions

The descriptive statistics for UIB recipients with unemployment insurance records from 54 to 58 months are presented in Table 9. The table shows that after the unemployment insurance record is constrained, the two groups under study are now more similar not only on the basis of previous average tenure, but also in other characteristics. The greatest difference between these two groups is now that the 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 the very low UA, or not even that.

[69] In this subsection, 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.

Table 9. Description of UIB recipients with unemployment insurance records 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 for 1–100 days, EEK	175.6	185.5	0.127
UB daily rate for 101–180 days, EEK	140.5	148.4	0.128
UB daily rate for 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

The survival and hazard estimates for the constrained sample are illustrated in Figure 22. Even though the characteristics of the two groups are relatively similar, the labour market behaviour is quite different. The survival function for the 270-day-UIB recipients is continuously higher than the survival function for the 180-day-UIB recipients. The hazard functions pictured here 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 16), the hazard for the unemployed with an insurance record of 54–55 months, the maximum for this group, exhibit a higher hazard function, meaning the probability of leaving unemployment into employment is higher.

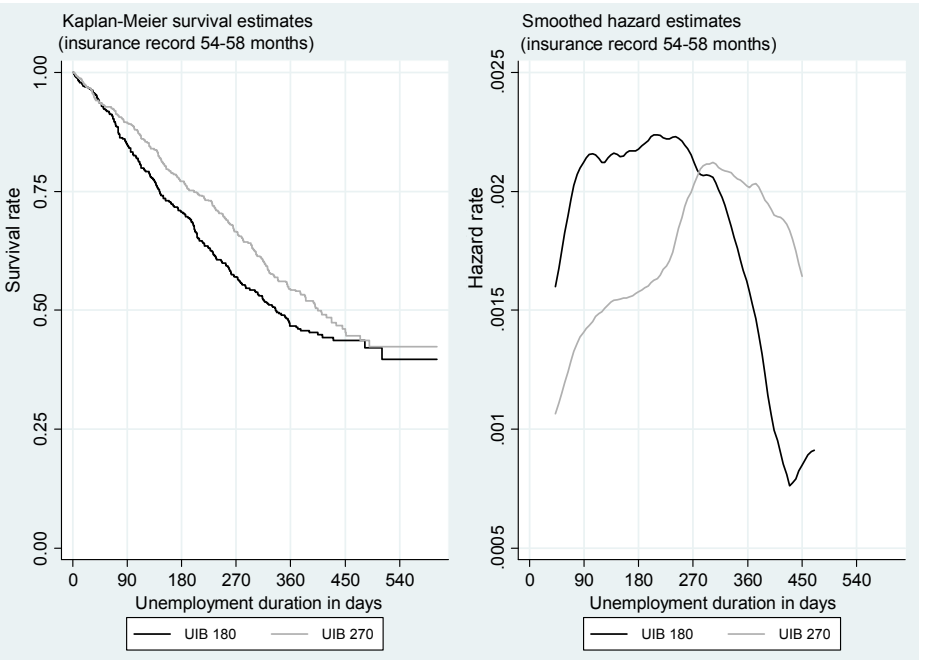

Figure 22. Kaplan-Meier survival estimates and smoothed hazard estimates of UIB recipients with unemployment insurance records of 54–58 months

Note: in general, 180-day-UIB recipients are eligible for 90-day-UA, which is even more likely following longer previous employment as presented on this figure. This might be the reason why both 270-day-UIB and 180-day-UIB recipients have the highest hazard rate for leaving unemployment about the same time.
In addition to the effects of unemployment benefits, the figures might be influenced by the fact that in some time intervals there are relatively few observations available.

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 any amount of UB and 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 half as likely for people to leave unemployment for employment when they get any amount of unemployment benefit. The hazard ratio estimate for the covariate showing a longer UIB period turns out to be 0.830, which is significant at 0.05 level. This estimation reveals that in this group, people with longer unemployment insurance benefit do indeed experience a lower hazard of exiting unemployment into 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 10). Here, the hazard ratio estimation for 270-day-UIB recipients is 0.811 and even slightly more significant.

Table 10. 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		0.507	0.003
100 EEK ≤ UB rate <200 EEK		0.599	0.033
200 EEK ≤ UB rate <300 EEK	UB = 0 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 11). 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, as the 270-day-UIB recipients are less likely to exit unemployment. The less constrained the sample, the lower 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 that for 270-day-UIB recipients.

Table 11. 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	0.164	0.011
UIB 270 > 0	(UIB 180)	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	0.200	0.000
UIB 270 > 0	(UIB 180)	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	0.322	0.000
UIB 270 > 0	(UIB 180)	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	0.293	0.000
UIB 270 > 0	(UIB 180)	0.419	0.000

Note: the estimation results indicate quite big disincentive effects from unemployment benefits in this time period. It is possible that some 180-day-UIB recipients do not apply for 90-day-UA because they already have a job waiting. In that case the models might overestimate the benefit effects.

The behaviour of benefit recipients with different lengths of previous unemployment insurance contributions is depicted in Figure 23. These figures show that there is a drop in the share of people in employment in the cut-off point 180 days, 270 days and 360 days after the beginning of the unemployment spell. The first graph describes the situation where 180-day-UIB recipients are

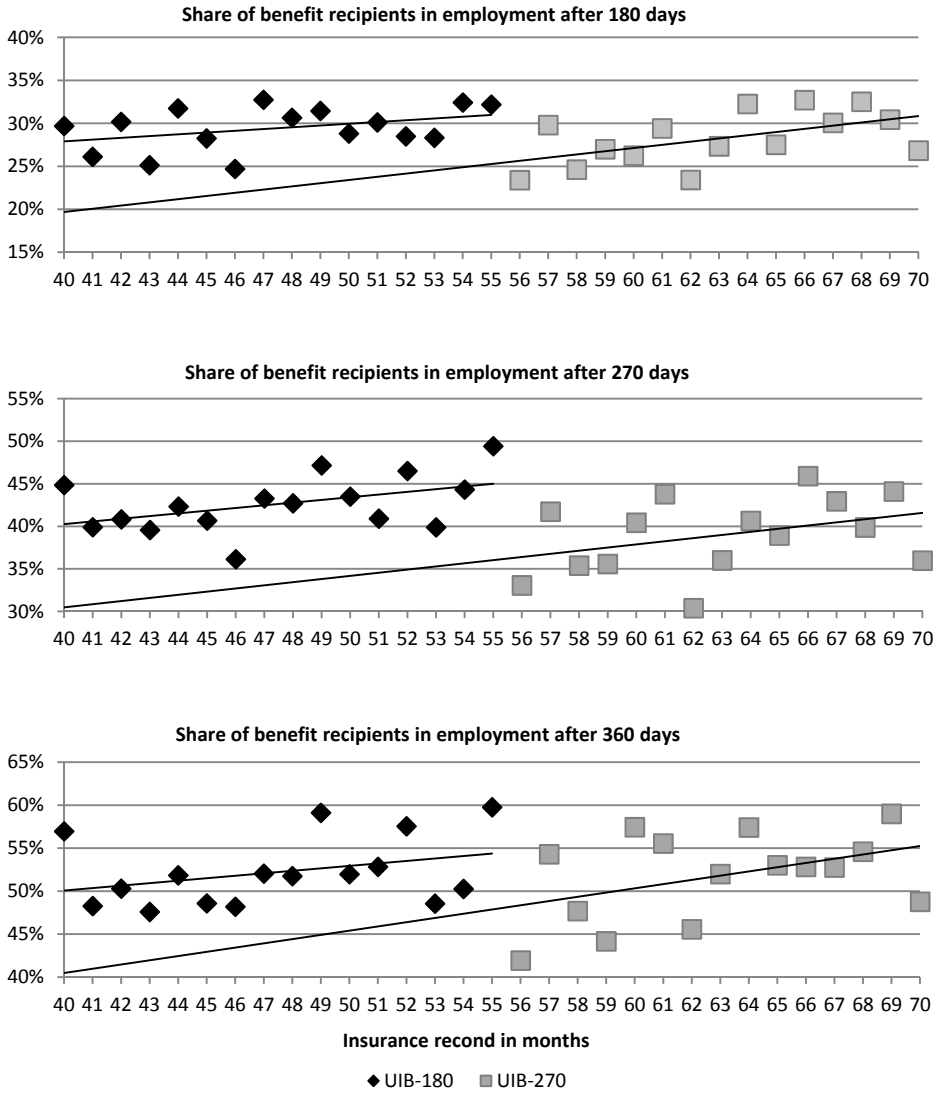

Figure 23. Share of UIB recipients in employment after 180, 270 and 360 days after the beginning of the benefit period, by previous unemployment insurance record in months.

just finishing their unemployment insurance benefit period and 270-day-UIB recipients can still continue receiving the benefit. The drop on the cut-off point is visible in this graph, but is much smaller than on the second graph where 180-day-UIB recipients have had to be without UIB for three months and 270-day-UIB recipients are only finishing their benefit. On the third graph it is shown that after both groups have exhausted their benefits, the drop on the cut-off point diminishes again. These graphs suggest again that the job search and acceptance behaviour change on the cut-off point of 56 months of previous unemployment insurance contributions, meaning the behaviour changes along with the length of the benefit. Figure 23 also shows that the share of the unemployed who have entered employment rises with the length of previous unemployment insurance record at all three points in time studied. This explains the results found in Table 11, where with a very small bandwidth of previous contributions the results indicate that 270-day-UIB recipients are less likely to exit unemployment, but the results change with larger bandwidths.

3.2.5. 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[70]. In order to make the groups comparable, only those UA recipients are considered whose last activity was employment, not any other similar activity granting eligibility under the law, and who left employment formally because of a mutual agreement or at the 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 for termination of the employment contract, whether unemployment was involuntary or voluntary[71], and this is also the reason why some people are eligible for unemployment insurance benefit and others only for unemployment allowance. The descriptive statistics for these two groups are presented in Table 12. The differences between UA and UIB recipients in the constrained sample are smaller than those in the unconstrained sample (Table 5) but remain to some extent.

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

[71] 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 at the initiative of the employer.

Table 12. Description of unemployment benefit recipients with tenure in the previous job of 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 for 1–100 days, EEK	192.7	32.9	0.000
UB daily rate for 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
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 24. The survival estimates are similar up to 270 days, which is the end of the benefit period, and move apart after that point. During the benefit period, UIB recipients tend to have similar survival estimates, but after the benefit period they are much lower. The results suggest that the receipt of UIB lifts the survival estimates more than UA receipt does and that is why the two groups appear to behave similarly. Later on, after benefit exhaustion, the differences between the two groups indicated by Table 12 become more evident and make the two groups behave differently. Overall this supports the assumption that higher benefits hamper exits from unemployment more than lower benefits do. The picture of smoothed hazard functions shows that both groups are affected by the entitlement to benefit, as both groups have spikes in the hazard functions at the end of the potential benefit period, but the spike is much higher for UIB

recipients, suggesting that this group is affected more by the benefit disincentive effect.

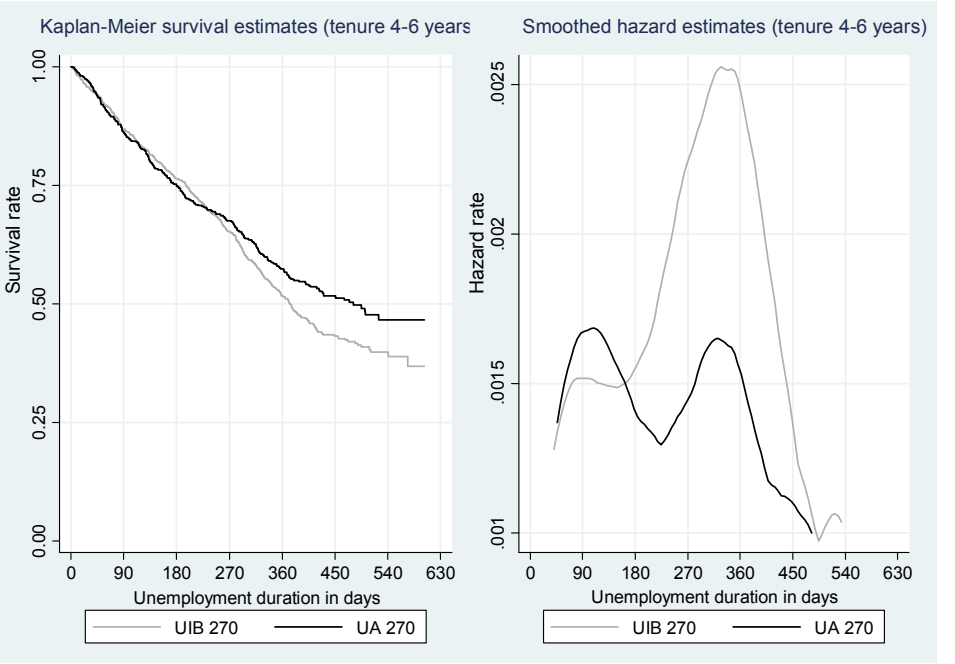

Figure 24. Kaplan-Meier survival estimates and smoothed hazard estimates for unemployment benefit recipients with tenure in their previous job of 4 to 6 years

Subsequently, the hazard function of these two groups is estimated in a joint model using a piecewise-constant proportional hazard model framework[72]. The model includes a covariate for UIB recipients, with UA recipients remaining as the control group, and the rest of the covariates that are not related to benefits (see Table 13). The model is estimated separately for the whole period, for the benefit period and for the period after benefit receipt. The estimations show that the exit rate from unemployment to employment is in general higher for UIB recipients. 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 are. This result gives reason to believe that the two groups remain somewhat different regardless of the trimming of the previous employment period and that during the benefit period, the exit rate to employment for UIB recipients is more hindered because of their higher unemployment benefit.

[72] Though there is a limitation that the two groups might be somewhat different regardless of the similar previous employment record.

Table 13. 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
$1 \leq t$; tenure 4–6 years	UIB 270	UA 270	1.167**	0.037
$1 \leq t \leq 270$; 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

3.2.6. Other factors of unemployment duration

All the estimated piecewise-constant proportional hazard models described in the previous subsections of this section include other covariates besides covariates for unemployment benefit receipt. The coefficients for the other variables in the different models turn out to be similar and these results are also quite similar to those of the study conducted on the pre-crisis data (described in Section 3.1). The estimations for hazard ratios are presented in detail in Appendix 8 for models which contain a dummy variable for benefit receipt and dummy variables for spikes in the hazard rate 60 days before and after the benefit exhaustion.

The hazard rate for men for exiting unemployment into employment turns out to be lower than that for women. Young people exit unemployment earlier and older people later. Estonian native speakers exit unemployment earlier, disabled people exit it later, and people living in towns rather than the country-side exit earlier. Looking at previous occupation, it is seen that professionals and service and sales workers might exit earlier, but the exit rate is much lower for craft and related trades workers, which includes construction workers. As the crisis was especially deep in the construction and real estate markets, the results turn out to be as predicted. In addition, the exit rate also tends to be lower for people previously engaged in elementary occupations, meaning people who are likely to have lower skill levels.

These results resemble the results for flows between employment and un-employment calculated from the data of the Labour Force Survey for the crisis period in Estonia by Meriküll (2011) and Masso and Krillo (2011). Meriküll (2011) shows that during the crisis, it was harder for people with low Estonian language skills and people with a low level of education to exit unemployment, but it was easier for women. The estimation results of Masso and Krillo (2011) indicate that the flow from unemployment to employment during the crisis was lower for men than it was for women and it was also lower for non-Estonians than for Estonians. While the level of flows from unemployment to employment declined for all groups during the crisis, the decline was particularly steep for men.

The estimation results in this thesis also indicate that it was relatively slightly more difficult for men to exit unemployment for employment during the crisis (estimation results in Appendix 8 compared to estimation results for the

pre-crisis period in Appendix 6). The estimation results also show that during the crisis the hazard of leaving unemployment for employment fell more for non-Estonian speakers, but less for people with higher education. These results of this thesis and those of Meriküll (2011) and Masso and Krillo (2011) reflect the structural changes that took place in the economy. The sectors that suffered more from the crisis were construction, real estate, and to an extent industry, particularly metalworking and machinery, meaning that the sectors that shrank during the crisis were those that employ more men, and also more non-Estonians and fewer people with higher education.

People with longer tenure in their previous job might exit unemployment later. This means that severance payments might also have a hampering effect on the exit from unemployment into employment. With those whose employment contract was terminated, people who were unsuitable for their job and people who were incapable of their work in the long-term exited unemployment significantly later than the other unemployed.

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 registered as unemployed rose throughout the period under study, the inflow of vacancies declined until November 2009 and increased sharply thereafter (see Figure 25). 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 of and increase in the registered unemployment rate lower hazard rates significantly. The inflow of vacancies increases the hazard of leaving unemployment.

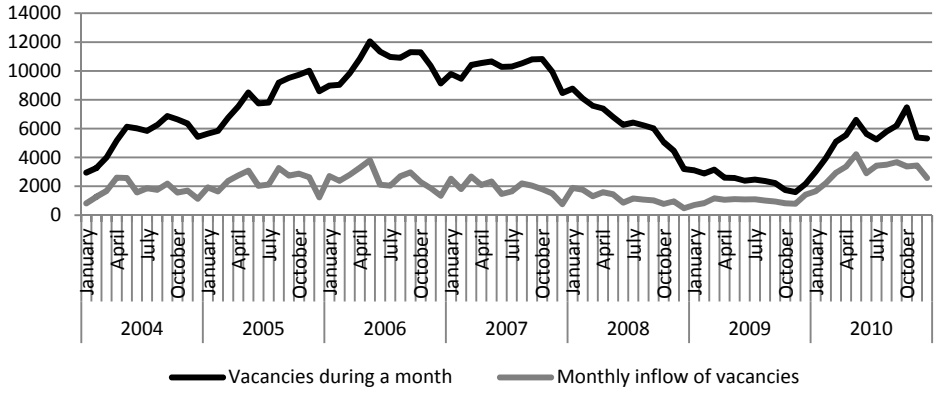

Figure 25. Number of vacancies mediated by the Estonian Unemployment Insurance Fund 2004–2010

Sources: Estonian Unemployment Insurance Fund

Like the study conducted on the pre-crisis data presented in Section 3.1, the analysis on the crisis data shows that the hazard of leaving unemployment prior to and during participation in active measures decreases[73]. The hazard rate is lower before and during the participation in various training and counselling measures. As participation in the active measures is voluntary rather than compulsory, it does not tend to cause threat effects that would make people leave unemployment before the beginning of a measure.

Hazard rates are significantly higher after work practice or occupational training have been completed. Post-effects for Estonian language courses turn out to be significant for UA recipients only[74]. There are fewer Estonian speakers among UA recipients (see Table 5), so this group might benefit more from Estonian lessons. Counselling has a small positive effect for 270-day-UIB recipients, who are 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.

In conclusion, the results for active measures in the system of unemployment benefits indicate that anticipation effects and locking-in effects exist that lower the hazard of leaving unemployment. The hazard rate is higher after some active measures, but not after all of them. Further analysis is needed to evaluate whether all of those measures incur positive labour market outcomes for the participants after all.

3.2.7. Conclusion

Search theory predicts a disincentive effects for 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. The study presented in this section uses data on Estonian unemployment benefit recipients to answer this question. During the recent global financial crisis the number of unemployed people rose in Estonia more than fivefold in less than two years.

It is shown in this section that the disincentive effects of unemployment benefits exist even during a period of deep recession, though the size of the

[73] Anticipation periods are also included for these people who eventually did not get active measures, for example because they entered employment before the active measure started). Anticipation periods of 30 days are used in the calculations.

[74] A recent study by Lauringson *et al.* (2011) shows that the occupational labour market training provided by the Estonian Unemployment Insurance Fund did indeed have positive effects on the labour market outcomes of the participants in both 2009 and 2010. The estimated average treatment effects on the treated for Estonian courses, however, turned out to be significant and positive in 2010 but not in 2009, and 2009 is also the time period studied in this thesis. As Estonian courses in 2009 were not yet focused on occupational Estonian as they were during later years, these courses did not help the participants return more quickly back to employment.

effect might be slightly smaller than it is when the economic situation is better. However, regardless of the extremely difficult economic situation, the fall in the disincentive effect appears to be very marginal. 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 slightly milder disincentive effects from unemployment benefits during a recession, like the few existing studies on the cyclicality of disincentive effects (see for example Schmieder *et al* (2010) and Bover *et al* (2002)). In consequence, it can be argued that it might be reasonable to increase the generosity of unemployment 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 alongside 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 of leaving unemployment just before the period of an active measure and during the period they are receiving an active measure. This is also in accordance with the system of active measures in Estonia where people are not forced to participate, but are in fact willing to do so. 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 for conclusions to be drawn on their impact on employment.

4. THE IMPACT OF THE GENEROSITY OF UNEMPLOYMENT BENEFITS ON POST-UNEMPLOYMENT JOB QUALITY IN ESTONIA

4.1. Unemployment insurance generosity in a period of crisis: the effect on post-unemployment wages

4.1.1. Introduction

In general, the conclusions drawn from search theory concerning unemployment benefits are quite negative as benefits are assumed to increase unemployment duration. However, a positive impact can be found on post-unemployment job quality, and the relationship between the generosity of unemployment benefits and post-unemployment job quality is shown in this section using the data from the recent crisis period.

The previous chapter (Chapter 3) reveals from Estonian data that unemployment benefits increase unemployment duration significantly both in good economic conditions and in a severe recession. The study presented in this section uses the same Estonian data from the recession period as Section 3.2 did to explore whether more generous benefits increase not only unemployment duration but also post-unemployment job quality. The study shows that a longer potential benefit period allows people to search for longer and accept relatively higher wages during the benefit period with a smaller drop from their previous wage than would have been possible if they had been entitled to a shorter benefit. The effect is found during the period when the matched control group of people on the shorter benefit has exhausted their benefit, but the treatment group of people on the longer benefit can still continue to receive their benefit. This implies that the spike at the end of the benefit period happens at least to some extent because people become less selective towards the end of their benefit period and not only because of their greater search intensity.

4.1.2. Data and methodology

The study presented in this section, like that in Section 3.2, looks at unemployment insurance benefits granted during the first three quarters of the sharp increase in the unemployment rate, from July 2008 until March 2009 (see Figure 26). The data for unemployment benefit recipients from the Estonian Unemployment Insurance Fund are combined with wage data from the Estonian Tax and Customs Board up to September 2010[75]. The entry to employment is

[75] The use of tax data allows the time a job is accepted and the accepted wage level to be defined exceptionally well, though only in the formal sector. However, according to a business survey by Putninš and Sauka (2011), there might be a significant share of employers in Estonia who under-report their number of employees and employers who under-report

dealt with like in Section 3.2, running until the spring of 2010, which saw the peak in unemployment rate. The wage data, however, are combined for a longer time span up to September 2010 to allow the wage effects after entry into employment to be studied.

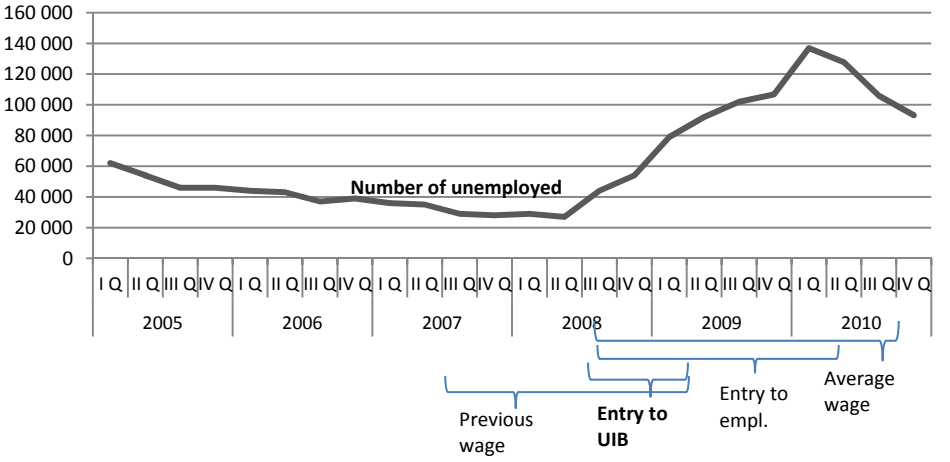

Figure 26. Number of unemployed in Estonia for 2005–2010 and the scope of the study

Source: Statistics Estonia

This section focuses on UIB recipients only[76], comparing labour market outcomes for people with different potential benefit periods. During the period under study it was possible to be eligible for either 180-day-UIB or 270-day-UIB. To be entitled to the longer benefit of 270 days, there is an additional criterion that a person has to have made contributions for at least 56 months[77].

The characteristics of the benefit recipients analysed in this study are presented in Table 14. Unlike Section 3.2 this study does not include the unemployed who received active measures during their registered unemployment

wages. If accepting part of the wage in the informal sector after the unemployment spell is more common than working partly informally before the unemployment spell, then the estimations that only consider the informal sector would overestimate the accepted wage drop. However, the share of the shadow economy tends to be higher in some certain sectors, such as construction, and lower in others. At the same time, the unemployed tend to look for a job in the same sectors where they worked previously, so it is likely that those who accept a partly informal wage might also have earned partly informal wage previously. In that case, the exclusion of informal sector might not cause big differences in the estimations.

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

[77] A more thorough overview of the Estonian unemployment benefit system is provided in Subsection 2.1.3.

spell. Those observations are excluded to restrict the study to only the pure effect of unemployment benefits on job quality.

Table 14. Description of UIB recipients by type of benefit and exit to employment

Variable	All		Enter employment*		Enter empl. for ≥2 months*		Enter empl. for ≥7 months*	
	UIB 180	UIB 270	UIB 180	UIB 270	UIB 180	UIB 270	UIB 180	UIB 270
Number of observations	7780	9327	4157	5366	3796	5038	1886	2875
Average previous monthly wage, EEK	9832	12590	10585	13589	10592	13698	10670	13994
Average tenure of the previous job, years	1.5	5.9	1.5	5.0	1.5	5.0	1.6	5.3
Males	57%	59%	53%	56%	52%	56%	45%	50%
Age at the beginning of UIB period	36	45	35	43	35	43	34	42
Main language Estonian	52%	57%	58%	62%	59%	63%	63%	67%
Knowledge of English	28%	19%	34%	23%	34%	24%	39%	28%
Basic education or less	21%	14%	20%	13%	19%	13%	17%	11%
Higher education	12%	16%	14%	18%	14%	18%	19%	21%
Living in a town	71%	69%	70%	67%	70%	67%	70%	66%
Disabled	7%	8%	6%	5%	5%	5%	5%	4%
Previous occupation								
Managers	6%	10%	7%	12%	7%	12%	10%	14%
Professionals	4%	6%	5%	6%	5%	6%	7%	8%
Technicians and associate professionals	8%	10%	9%	10%	9%	10%	11%	11%
Clerical support workers	6%	6%	6%	6%	6%	6%	8%	7%
Service and sales workers	14%	9%	16%	10%	16%	10%	17%	11%
Skilled agricultural, forestry and fishery workers	1%	1%	1%	1%	1%	1%	1%	1%
Craft and related trades workers	32%	29%	28%	26%	28%	26%	22%	22%
Plant and machine operators, and assemblers	10%	14%	10%	13%	10%	14%	9%	14%
Elementary occupations	19%	16%	17%	15%	17%	15%	15%	13%

* Unemployed who entered employment by April 2010 at the latest.
Note: People who received active measures are not considered in the table as they are not used in this study. In addition, benefit recipients who are continuing the remaining days of benefit from a previous benefit period are excluded.
EEK – the currency used in Estonia until 31.12.2010 (1 EUR = 15.6466 EEK).

Even these smaller samples show similar differences between 180-day-UIB and 270-day-UIB recipients to those shown in the whole samples dealt with in Section 3.2. The biggest difference between 180-day-UIB and 270-day-UIB recipients lies in the average previous tenure, as this is highly correlated with the period of unemployment insurance contributions that determine the length

of UIB. Furthermore, 270-day-UIB recipients have previously earned a higher wage, are more educated, are older, and held a previous job with a slightly higher ranking. In addition to this, Table 14 presents the mean values of variables for those UIB recipients who exited unemployment by April 2010 at the latest. The means of characteristics are provided for all exits to employment, for those people whose exit to employment lasted at least two months and for those whose exit to employment lasted at least seven months, meaning they received a wage in at least seven months during a nine-month period after entering employment. The UIB recipients who enter employment have previously earned a higher wage, are more educated, are younger, and have worked previously in jobs with higher rankings, and there is a higher share of women, native speakers of Estonian and people with a knowledge of English among them. The same differences are even larger when people who enter employment for a longer term are compared with the whole sample.

The estimation of hazard rates by type of UIB recipient is presented in Figure 27; for a shorter time span the smoothed hazard rates are presented in Figure 16 and 17 in Section 3.2. The figure reveals clear spikes in the hazard rates at the ends of UIB periods. The study presented in the previous chapter (Section 3.2) used the same data and showed that the disincentive effects remain even during a period of crisis and that both higher benefit level and maximum duration of benefit decrease significantly the hazard of leaving unemployment to employment.

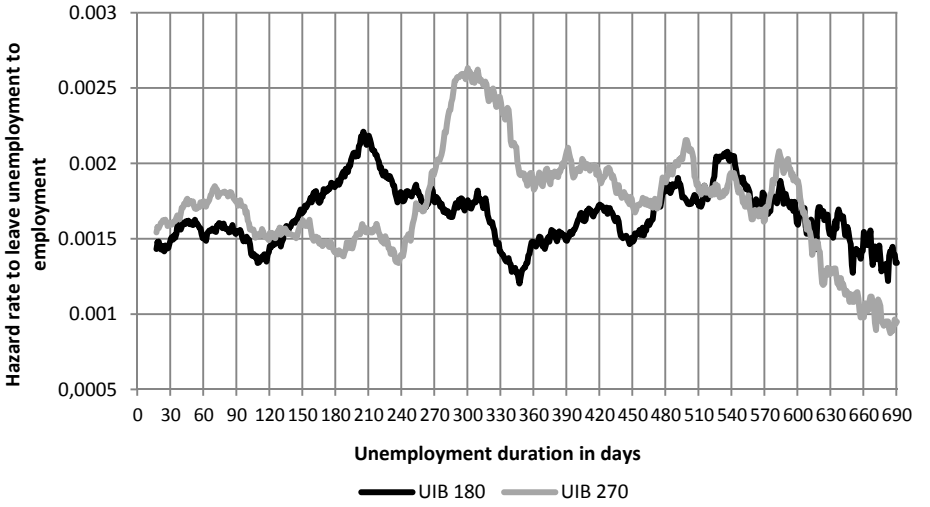

Figure 27. Smoothed hazard rates for exiting into employment

This section explores whether a longer unemployment benefit period improves the job match quality as it allows a person to look for a job longer with lower restrictions. With regards to job match quality, a rise or fall in the starting wage

and in the average wage compared to the previous wage are looked at. In addition to the overall difference between shorter and longer term UIB recipients, differences in different periods of the unemployment spell when exit occurs are also investigated. The difference in post-unemployment job quality should occur particularly when 180-day-UIB recipients are about to exhaust their benefit, and when their benefit is exhausted but 270-day-UIB recipients are still receiving their benefit. In Figure 27 it can be seen that the hazard of leaving unemployment for 180-day-UIB recipients is higher around 150–240 days in the unemployment spell, so this is also the period the study focuses on.

In addition, it is examined whether there is a post-unemployment job quality difference for people who accept job offers around 270–360 days of the unemployment spell, as 270-day-UIB recipients exhibit a lot higher hazard rate then as their benefit has just lapsed. The beginning of the unemployment spell at 1–150 days is also studied, where hazard rates are more similar but 270-day-UIB recipients demonstrate a slightly higher hazard of leaving unemployment.

To make different groups of UIB recipients more comparable, the method of propensity score matching is applied as presented in Subsection 1.2.2 (see thorough overview in Caliendo and Kopeinig (2008), Caliendo (2006) and Blundell and Costa Dias (2009)). Stata modules by Leuven and Sianesi (2003) and Gangl (2004b) are used for conducting estimations. Samples are matched using nearest neighbour matching with a probit model, using one nearest neighbour with replacement. Average treatment effects on the treated are estimated over the common support area. People who received active measures, mainly training, are not used in the estimations as participation in active measures could affect the treatment effects, though most benefit recipients did not receive active measures during the period under study.

4.1.3. Estimation results: starting wage

For differences in job match quality between people entitled to 180 and 270 days of benefit to be studied, the differences in the starting wage are first estimated. The starting wage is defined as the wage in the second month, because the wage in the very first month might not be for a full month. The starting wage is compared to the person's previous wage, which is defined as the average wage which was used as the basis for granting the benefit, typically the nine employed months preceding the last three employed months[78].

[78] In the calculations of wage change, the rise is truncated at 100%, so the wage change can be between –100% and 100%. The wages for calculating the change are in nominal terms, meaning the wage changes on the market in time are not considered. The time period under study is quite short and the wage level was quite stable during the crisis. The national average wage decreased by 5% during 2009 and increased by 1% in 2010; the average wage increases varied more by economic sector, but no information about the previous or future sectors of the unemployed was available.

The drop in the starting wage for 180-day-UIB and 270-day-UIB recipients is illustrated in Figure 28 (upper panel). The figure shows that the accepted wage declines during the unemployment spell, meaning the scar effects are bigger the longer a person is unemployed. People who exit unemployment straight away during the first three months of unemployment might not necessarily lose in their wage, but people who have already been unemployed for more than a year might have to settle for only two thirds of their previous wage.

The accepted wage declines particularly quickly during the benefit period as also predicted by search theory. In general, the wage drop compared to the previous wage is larger for 270-day-UIB recipients, but the wage drop is larger for 180-day-UIB recipients around the period when their benefit lapses but 270-day-UIB recipients can continue to receive their benefit. Similarly, the drop in wage is especially large for 270-day-UIB recipients when their benefit lapses. In this, even unmatched data identify that the accepted wage is affected by the potential period of benefits, and at the end of the benefit period the hazard of exiting unemployment rises because the acceptable drop in wage is larger and not only because job search intensity is higher.

In addition, it can be seen in Figure 28 (lower panel) that shifting the graph for 180-day-UIB recipients down by 8% would result in very similar accepted wage drops to those of 270-day-UIB recipients during the beginning of the unemployment period. When benefits expire for 180-day-UIB recipients, their accepted wage drop quickly accelerates, and 270-day-UIB recipients suffer larger losses when their benefits expire, after which the wage drops are again similar. This would suggest that the behaviour of both types of benefit recipient are highly influenced by the benefit receipt.

Recipients of 180-day-UIB have previously had a lower wage probably above all because of their shorter tenure (see Table 14), but the offer wage distribution for them might not be lower to the same degree. On the one hand, 180-day-UIB recipients have already accumulated some tenure and skills, raising the wage distribution for them on their next job, while on the other hand, 270-day-UIB recipients have had to have a break in their long tenure, which was mainly for one single employer, and so it is more likely that they have had to accept a larger wage drop than 180-day-UIB recipients; the differences between the two groups are smaller for the future employer than they were for the previous employer. That is why the graph of accepted wage drops for 180-day-UIB recipients is at a somewhat higher level than for 270-day-UIB recipients. This suggestion is also supported by the figure of accepted wage drops by UIB recipients whose previous record of unemployment insurance contributions is between 32–79 months (see Appendix 10). Limiting the period of insurance contributions, which determines the benefit length and is closely related to tenure, makes the two groups of benefit recipients more similar (see Appendix 11). The figure confirms similarities in wage drops in the beginning

and later on during the benefit period and differences around the benefit exhaustion dates.

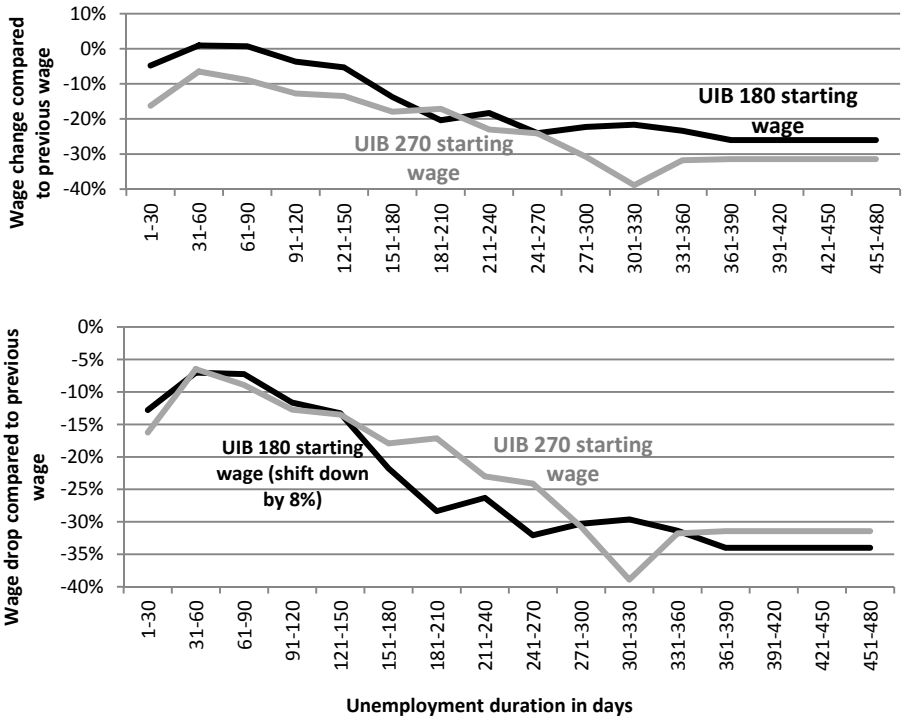

Figure 28. The change in the starting wage compared to the previous wage for 180-day-UIB and 270-day-UIB recipients

Note: Average change over intervals of 30 days up to 360 days; the last interval is 360–480 days as there are fewer observations. Only those unemployed are considered who entered employment by the beginning of April 2010 at the latest.

The next part of this section examines the accepted wage drops for the two groups of benefit recipients matched by propensity score matching. Table 15 presents the estimation results for the differences in unmatched samples and matched samples (the probit models for matching 180-day-UIB and 270-day-UIB recipients are presented in Appendix 12; the mean values of the most relevant variables for the unmatched and matched samples are presented in Appendix 13; propensity score distributions are graphed in Appendix 14). The estimations are given for people who had found a job by the beginning of April 2010 at the latest, or during the period when unemployment was still rising.

Both groups of benefit recipients start earning a lower wage than their wage before unemployment. When wage differences between shorter and longer term benefit recipients are estimated for the overall period (model 1), the unmatched differences show that the wage declines significantly more, in fact almost 8%

more, for 270-day-UIB recipients. The matched samples produce results that indicate no significant differences in the drop in the post-unemployment starting wage.

The estimation results show much greater differences for the period of 151–240 days of the unemployment spell, which is the period when the benefit lapses for 180-day-UIB recipients but still continues for 270-day-UIB recipients (model 3). The estimation results for matched samples show that 270-day-UIB recipients exhibit an 8.4% smaller drop in the starting wage than they would have seen if they had been entitled to benefits only for 180 days (significant at the 0.05 level).

Table 15. Estimation results for the differences in the change in the starting wage

	Treated (270)	Controls (180)	Difference	T-stat	p-value
Latest entry to employment in April 2010 (model no. 1)					
Unmatched: 2nd month wage rise from previous wage	–20.5%	–12.8%	–7.7%	–7.78	0.000
ATT: 2nd month wage rise from previous wage	–20.5%	–20.5%	0.1%	0.03	0.976
Entry to employment at 1–150 days from the beginning of benefit period (model no. 2)					
Unmatched: 2nd month wage rise from previous wage	–11.1%	–2.1%	–9.0%	–6.00	0.000
ATT: 2nd month wage rise from previous wage	–10.8%	–7.1%	–3.7%	–1.46	0.144
Entry to employment at 151–240 days from the beginning of benefit period (model no. 3)					
Unmatched: 2nd month wage rise from previous wage	–19.2%	–17.4%	–1.8%	–0.92	0.358
ATT: 2nd month wage rise from previous wage	–19.0%	–27.5%	8.4%	2.53	0.011
Entry to employment at 271–360 days from the beginning of benefit period, latest in April 2010 (model no. 4)					
Unmatched: 2nd month wage rise from previous wage	–34.0%	–22.3%	–11.7%	–5.00	0.000
ATT: 2nd month wage rise from previous wage	–33.3%	–34.8%	1.5%	0.35	0.726

The estimation results for the people who leave unemployment relatively quickly during 1–150 days of the unemployment spell (model 2) and who leave relatively slowly during 271–360 days of the unemployment spell (model 4) show that 270-day-UIB recipients accept wage drops that are about 10% larger for unmatched samples. Matched samples show no significant differences in wage declines.

Wage changes in the starting wage using matched samples are presented in Figure 29. For matching, models 2, 3 and 4 are used, and similar models for the periods of 241–270 days and 361–480 days are estimated in addition. Wage changes are calculated as averages over 30-day-periods of exits from unemployment to employment and only the last interval is longer at 361–480 days. The figure shows that for the first 150 days of unemployment the accepted wage drop increases slightly for both 270-day-UIB recipients and the control group and the wage drop is smaller for the control group. After that, the accepted wage drop plummets for the control group as their benefit lapses, and afterwards their accepted wage drop deepens only to some extent. The change in the starting wage for 270-day-UIB recipients falls at a slower pace throughout their benefit period, and this drop is smaller during the period when matched 180-day-UIB recipients have exhausted their benefit period but 270-day-UIB recipients still have not. Afterwards, the wage drops of the two groups are quite similar.

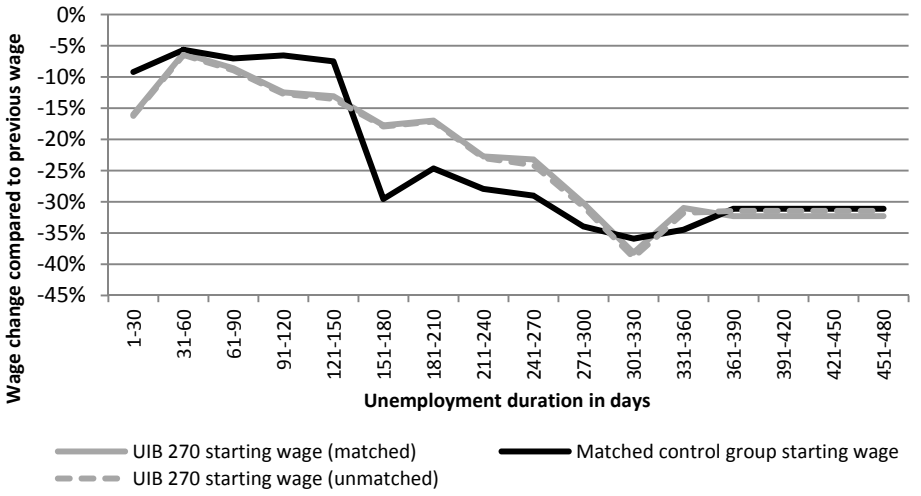

Figure 29. The change in the starting wage compared to the previous wage for 270-day-UIB recipients and for the matched control group of 180-day-UIB recipients

Note: Average change over intervals of 30 days up to 360 days; the last interval is 360–480 days as there are fewer observations. Only those unemployed are considered who entered employment by the beginning of April 2010 at the latest.

Figure 29 shows that the drop in the accepted starting wage compared to the previous wage is particularly steep around the point when benefits lapse for both 180-day-UIB and 270-day-UIB recipients. After the fall, the wage change rises somewhat in both cases before gradually falling again. When the graphs of hazard rates and wage changes are compared (Figure 27 and 29 combined in Figure 30), it can be seen that the peaks in the hazard rate coincide more or less

with the larger drops in the accepted wage. The graphs also depict clearly the inverse relationship between the hazard rates and wage changes. At the beginning of the unemployment spell 270-day-UIB recipients have a higher hazard of leaving unemployment at the expense of larger drops in the accepted wage. When the end of the benefit period approaches for 180-day-UIB recipients, their hazard rate rises and the drop in the accepted wage quickly plummets. The approaching end of benefit for 270-day-UIB recipients causes a rising hazard rate and larger wage drops for that group as well. It can be concluded that the higher hazard of exiting unemployment into employment means larger drops in the starting wage are accepted and not just that search intensity is higher; the data in use do not indicate whether the job search intensity also changes along with the reservation wage.

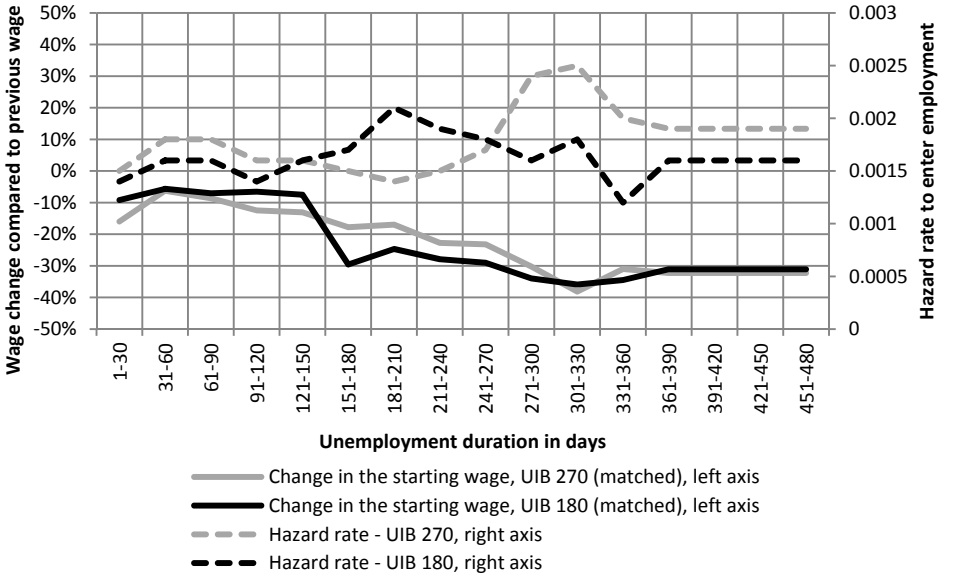

Figure 30. Hazard rates for exiting unemployment into employment and the change in the starting wage compared to the previous wage

Note: For changes in the wage, average change over intervals of 30 days up to 360 days; the last interval is 360–480 days as there are fewer observations. Only those unemployed are considered who entered employment by the beginning of April 2010 at the latest. Hazard rates are calculated for the same time intervals as wage change.

Figures 28–30 depicted average changes in the accepted wage. The change in the reservation wage should be reflected more by the accepted wage changes in the lower percentiles. Figure 31 illustrates the accepted wage changes in the fifth percentile and in the first quartile. The figure shows even more clearly the relationship between the end of the benefit period and the accepted wage change. Both groups of benefit recipients exhibit larger drops in the accepted

wage at the end of the benefit periods. There is basically no difference in the wage drop when both groups receive benefits or when neither group receives benefit. The difference in wage drops occurs when only one of the groups receives benefit.

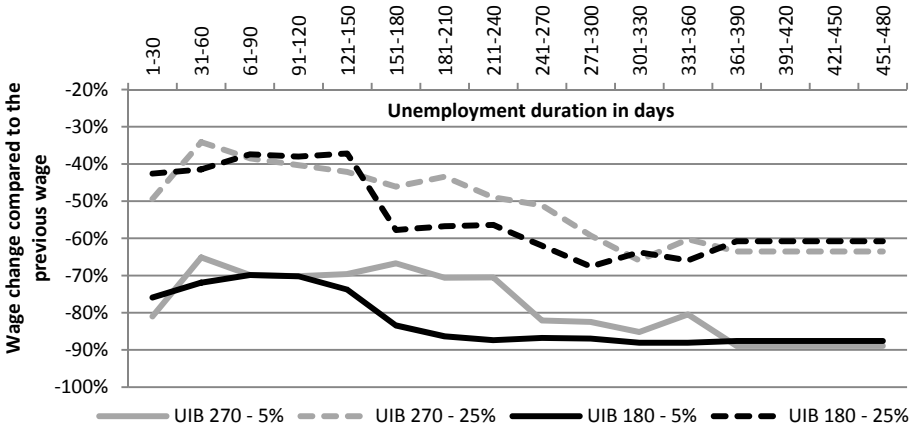

Figure 31. The change in the starting wage compared to the previous wage, the fifth percentile and the first quartile for 270-day-UIB recipients and for the matched control group of 180-day-UIB recipients

Figure 31 also shows that after the end of benefit, 5% of the unemployed who enter employment settle for a wage that is at least 90% lower than their previous wage. A quarter of the unemployed who enter employment after the end of benefit accept a wage drop of at least 60%.

Figure 32 presents the distribution of the change in the starting wage compared to the previous wage. Firstly, 270-day-UIB recipients are matched with 180-day-UIB recipients irrespective of when they leave unemployment (model no. 1). In this case it can be seen that the matched 180-day-UIB recipients suffer more from more severe wage drops. However, there are also relatively more who start earning a very much higher wage than previously. Recipients of 270-day-UIB show more density around smaller wage losses and gains and hence in total the average treatment effect on treated does not turn out to be significant as the average wage losses are similar.

Secondly, Figure 32 depicts in more detail the results of the model when only those UIB recipients who leave unemployment at 151–240 days of their unemployment period are studied (model no. 3). In this case there is in fact a relatively larger share of matched 180-day-UIB recipients who suffer large losses in wages and relatively more 270-day-UIB recipients who experience minor drops or minor rises in their starting wage. While 22% of 270-day-UIB recipients during that period accept wage drops of more than 50%, this share is 34% among 180-day-UIB recipients. In addition, 24% of 270-day-UIB recipients accept a higher wage than their previous wage and 26% accept a

wage drop of up to a quarter. Among 180-day-UIB recipients these shares are 22% and 15% respectively.

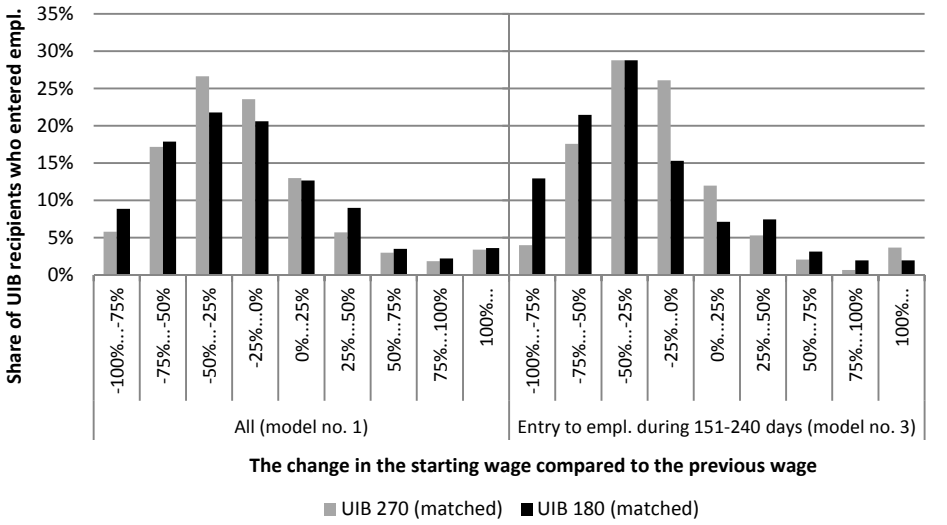

Figure 32. The distribution of the change in the starting wage compared to the previous wage (models no. 1 and 3)

Similar conclusions can be drawn on the percentiles of the change in the starting wage graphed in Appendix 15. The lower percentiles of 270-day-UIB recipients accept smaller wage drops than 180-day-UIB recipients. This effect is stressed during the entry into employment at around 151–240 days of the unemployment spell.

4.1.4. Estimation results: average wage

As well as the starting wage, the average wage over a longer period is studied. As the previous wage used in the study, which serves as the basis for benefits, is calculated over a period of nine months, the post-unemployment average wage is calculated over a period of the same length. The wage from the second until the tenth month is taken, as the wage in the very first month might not be for a full month. Only those people who received a wage for at least seven months during those nine months are considered. This makes it possible to include in the study people who are off from the work for a short while due to vacations or sickness.

As with the starting wage, the average wage is compared to the previous wage in a similar manner, through a relative wage change. The estimations are calculated for people who exited unemployment into employment by December 2009 at the latest as the tax data are available only until September 2010. The

differences in the starting wage are calculated for the same group as well, with the differences from the previous subsection being that the exit to employment had to be by December 2009 at the latest and that the criterion of at least seven months of wages during the first nine months still had to hold, so that very temporary employment is not considered.

Figure 33 presents the change in the starting wage and in the average wage compared to the previous wage for people who received a wage for at least seven months during the first nine months of the employment spell. The picture is similar to Figure 28 as in general 180-day-UIB recipients experience smaller drops in their wage than 270-day-UIB recipients do, with the exception of the period when 180-day-UIB recipients run out of benefit. The figure also shows that the wage increases over time for both groups and the average wage over a longer period is higher than the starting wage.

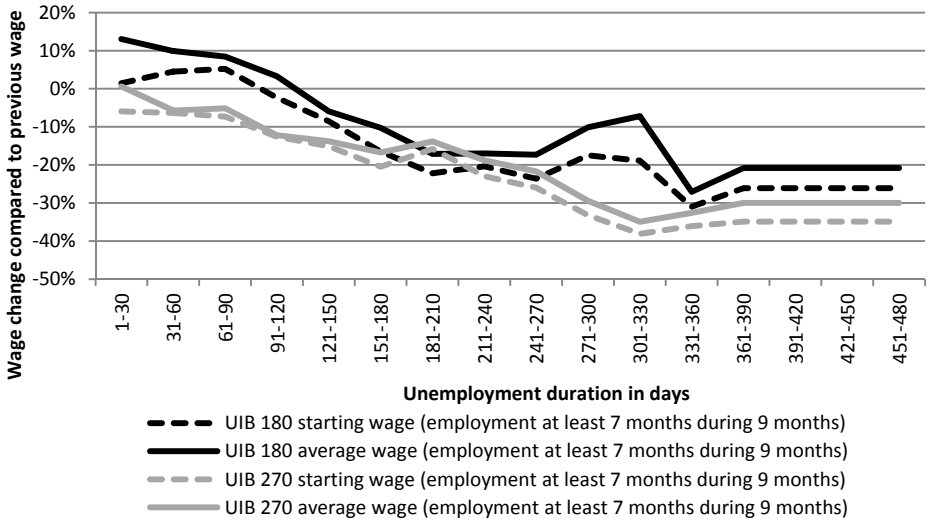

Figure 33. The change in the average wage and in the starting wage compared to the previous wage for 180-day-UIB and 270-day-UIB recipients (excluding short employment spells)

Note: Average change over intervals of 30 days up to 360 days; the last interval is 360–480 days as there are fewer observations. Only those unemployed are considered who entered employment by the beginning of December 2009 at the latest.

Table 16 presents the estimation results for the differences in the average wage in the unmatched samples and matched samples (the probit models for matching 180-day-UIB and 270-day-UIB recipients are presented in Appendix 16; the mean values of the most relevant variables for the unmatched and matched samples are presented in Appendix 17; propensity score distributions are graphed in Appendix 18). For every group studied, the estimations for the differences in the starting wage are also provided.

Table 16. Estimation results for the differences in the change in the average wage

	Treated (270)	Controls (180)	Difference	T-stat	p-value
Latest entry to employment in Dec 2009 (model no. 5)					
Unmatched: 2nd month wage rise from previous wage	–17.2%	–10.1%	–7.1%	–5.59	0.000
ATT: 2nd month wage rise from previous wage	–16.7%	–17.2%	0.5%	0.23	0.818
Unmatched: 9 month average wage rise from previous wage	–14.5%	–4.6%	–9.8%	–8.33	0.000
ATT: 9 month average wage rise from previous wage	–13.9%	–12.5%	–1.5%	–0.70	0.484
Entry to employment at 1–150 days after the beginning of benefit period (model no. 6)					
Unmatched: 2nd month wage rise from previous wage	–9.0%	0.6%	–9.6%	–5.40	0.000
ATT: 2nd month wage rise from previous wage	–8.5%	–3.3%	–5.2%	–1.79	0.074
Unmatched: 9 month average wage rise from previous wage	–7.1%	5.8%	–12.8%	–7.97	0.000
ATT: 9 month average wage rise from previous wage	–6.6%	0.2%	–6.7%	–2.44	0.015
Entry to employment at 151–240 days after the beginning of benefit period (model no. 7)					
Unmatched: 2nd month wage rise from previous wage	–19.8%	–19.7%	–0.1%	–0.03	0.976
ATT: 2nd month wage rise from previous wage	–18.6%	–30.4%	11.8%	3.04	0.002
Unmatched: 9 month average wage rise from previous wage	–16.5%	–14.8%	–1.6%	–0.71	0.478
ATT: 9 month average wage rise from previous wage	–15.3%	–25.1%	9.9%	2.78	0.006
Entry to employment at 271–360 days after the beginning of benefit period (model no. 8)					
Unmatched: 2nd month wage rise from previous wage	–35.2%	–20.0%	–15.2%	–4.43	0.000
ATT: 2nd month wage rise from previous wage	–34.4%	–33.1%	–1.3%	–0.17	0.865
Unmatched: 9 month average wage rise from previous wage	–31.7%	–11.6%	–20.1%	–6.15	0.000
ATT: 9 month average wage rise from previous wage	–30.8%	–24.0%	–6.9%	–0.90	0.368

The estimation results for the differences in the average wage are similar to the estimated differences in the starting wage. The differences in the wage change for the whole group under study do not turn out to be significant (model 5). However, large differences occur for people who exit unemployment at 151–240 days of their unemployment spell (model 7). Recipients of 270-day-UIB exhibit a 9.9% smaller wage drop in their average wage and an 11.8% smaller drop in the starting wage than the matched control group (both significant at the 0.01 level).

During the beginning of the unemployment spell, the control group entitled to 180-day-UIB typically accept jobs where they earn quite similar wages to those of their previous job; for unmatched data the increase in the average wage is 5.8%, and for matched data it is 0.2% (model 6). Recipients of 270-day-UIB accept offers that involve a wage drop of about 7%, which might be the reason why they exhibit higher exit rates from unemployment during that period. For people exiting unemployment during the period when both types of benefit recipient have exhausted their benefits, there are no statistically significant differences in the wage drops (model 8).

This means that during the beginning of the unemployment spell, 270-day-UIB recipients accept jobs with a relatively lower wage. When 180-day-UIB recipients' benefits lapse, then 180-day-UIB recipients have larger drops in wages. Afterwards there are no significant differences, so the estimation results show no significant wage differentials for the whole period. However, the relative wage changes accepted by different UIB recipients are different during different periods.

The wage change in the starting and average wages for longer employment spells using matched samples is presented in Figure 34. Models 6, 7 and 8 are used for matching and in addition, similar models are estimated for the periods of 241–270 days and 361–480 days. Wage changes are calculated in the same way as in the previous subsection with averages over 30-day-periods of exits from unemployment to employment, while the last interval is longer. The figure shows increasing wage drops over benefit periods and more stable wage drops after benefit periods. The sharpest drop in wage for the control group is at 151–180 days of the unemployment spell, which is just when their benefit expires. Recipients of 270-day-UIB experience a slighter decline in wages during the benefit period, so the decline in the average wage for the jobs accepted at 151–270 days of unemployment spell is smaller for 270-day-UIB recipients than it is for 180-day-UIB recipients. However, 270-day-UIB recipients exhibit a larger drop in the accepted wage at around 300 days of the unemployment spell as their benefit period ends then.

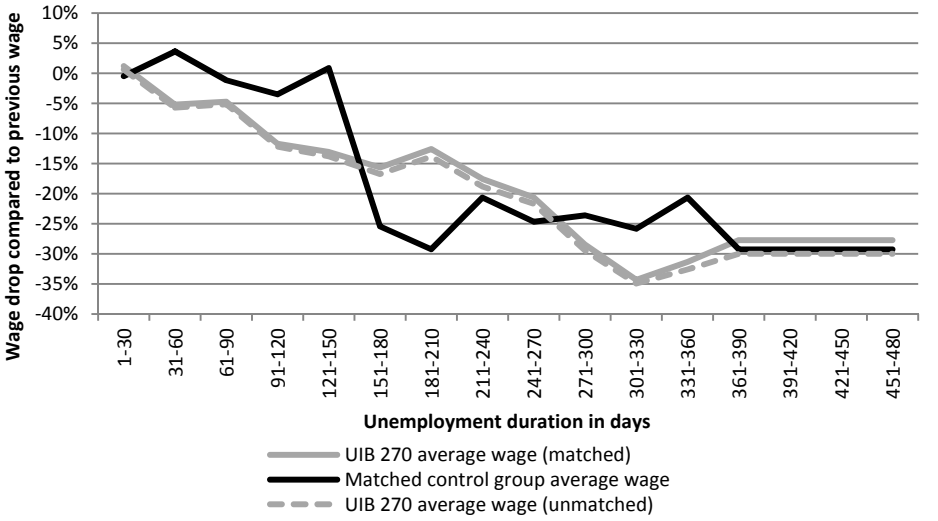

Figure 34. The change in the average wage compared to the previous wage for longer employment spells for 270-day-UIB recipients and for the matched control group of 180-day-UIB recipients

Note: Average change over intervals of 30 days up to 360 days; the last interval is 360–480 days as there are fewer observations. Only those unemployed are considered who entered employment by the beginning of December 2009 at the latest.

Figure 34 depicting the drop in the average wage shows a slightly more blurred picture than Figure 29 or Figures 30 and 31 depicting the drop in the starting wage. There are bigger differences between the two groups of benefit recipients at the beginning of the unemployment period and also later on. This shows that the starting wage might be a better proxy for the job quality of the accepted job than the average wage as the average wage may be affected more by events that happen later on during the employment period, including a change of job. In addition, the starting wage can be assumed to show the movements in the reservation wage better.

Similar conclusions can be drawn from Figure 35, which illustrates the distribution of the change in the average wage, to those drawn from Figure 32, which depicts the distribution of changes in the starting wage. When UIB recipients who exit unemployment in the period of 151–240 days of unemployment are matched, the estimations show that there is a relatively larger share of 270-day-UIB recipients who experience a minor drop in their average wage compared to their previous wage and a relatively larger share of matched 180-day-UIB recipients who suffer large drops in the average wage. Of the 180-day-UIB recipients who have exited unemployment during 151–240 days of the unemployment spell, 25% experience wage drops of more than 50% compared to their previous wage. The share of these severe wage drops among 270-day-

UIB recipients is only 13%. Of the 180-day-UIB recipients, 22% have a higher post-unemployment average wage than their previous wage, while the share among 270-day-UIB recipients is 24%. The percentiles of the change in the average wage graphed in Appendix 19 confirm that the lower percentiles of 270-day-UIB recipients accept smaller wage drops than 180-day-UIB recipients do, especially during the entry to employment at 151–240 days of the unemployment spell.

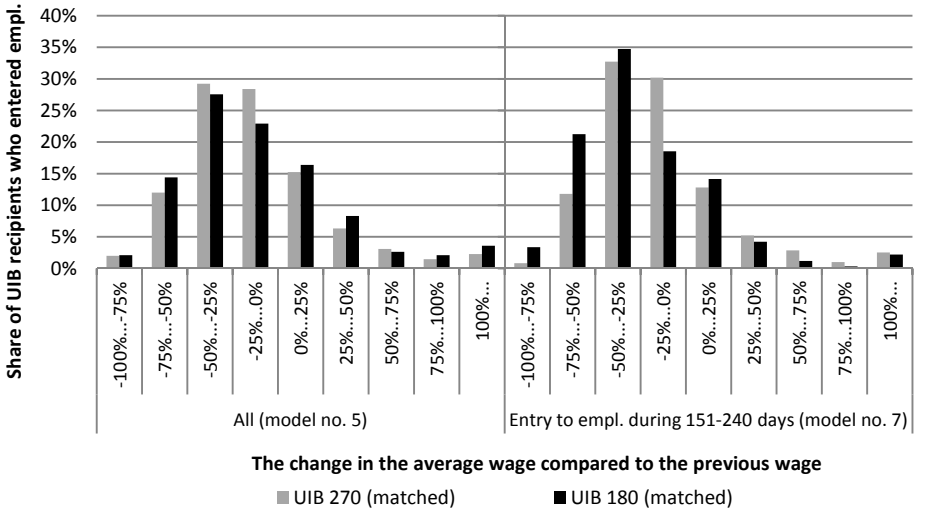

Figure 35. The distribution of the change in the average wage compared to the previous wage (models no. 5 and 7)

4.1.5. Addressing the problem of adverse selection

The previous subsections showed that in general the drop in the accepted wage becomes larger as the unemployment spell lengthens. In addition, the drop in the accepted wage tends to be sharper around the end of the benefit period. This raises the question of whether the movements in the changes of the accepted wage are caused by individual characteristics. Appendix 20 presents some individual characteristics – education, occupations, language, age and previous tenure – of the unemployed exiting into employment during different unemployment spells. It can be seen that the pool of the unemployed leaving unemployment in different time periods does indeed change over time as individual characteristics tend to deteriorate gradually. Basically this shows the same effects as the different covariates estimated with hazard models in Section 3.2 (Appendix 8), but the changes in these characteristics are not as severe around the end of benefit period as the relative changes in accepted wage.

Another indicator that should reflect the value of human capital and that also directly affects the calculation of change in the accepted wage compared to the

previous wage is the previous wage itself. The graphs in Appendix 21 depict the starting wage and the previous wage in absolute terms for both 180-day-UIB and 270-day-UIB recipients. Both matched and unmatched data for the previous wage reveal that there is actually no deterioration from the previous wage along the unemployment spell. However, the unmatched data shows that people who exit at around the end of the benefit period have previously had a higher wage. In the matched data these jumps are much smaller.

The level of unemployment benefits is based on the previous average wage, meaning the reasons behind the changes in the previous average wage during the unemployment spell reflect the level of unemployment benefits. From this it appears that those who leave unemployment for employment straight after the unemployment benefit period tend to be those who get higher unemployment benefits (see Figure 36 and Appendix 22). In this point, this paper confirms again that people with higher unemployment benefits are less eager to exit unemployment during the unemployment benefit spell, but the hazard of entering employment for them rises at the end of the benefit period. However, these effects are almost absent in the matched data and do not cause the effects in the post-unemployment wage studied in the previous subsections, or if so, then only for 270-day-UIB recipients at the end of their benefit.

It can be concluded from these graphs that the severe drop in the accepted wage at the end of the benefit period for 180-day-UIB recipients is indeed there because they accept a much lower wage when their benefit period lapses. The bigger drop in the accepted wage for 270-day-UIB recipients at the end of their benefit period is caused partly because of their willingness to accept a lower wage as well, though it might also be partly caused by the fact that at the end of the benefit period there are relatively more exits to employment by people with higher unemployment benefit and a higher previous wage.

In addition, it could be argued that the differences in the behaviour of different groups of benefit recipients could be caused by unobservable characteristics, as propensity score matching assumes selection to treatment on observables only. However, as the study shows differences in labour market behaviour specifically during the period when benefits differ (see for example Figure 30), it is highly unlikely that any variable other than the generosity of benefits could cause such differences.

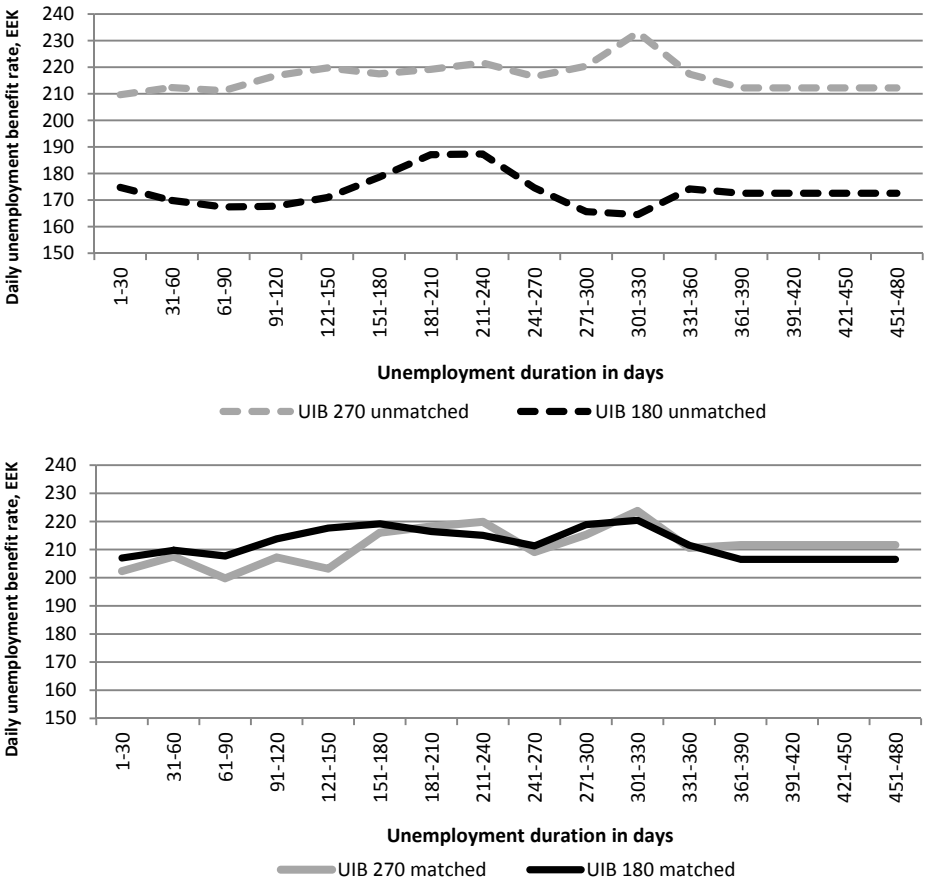

Figure 36. Daily unemployment benefit rate during the first 100 days for 270-day-UIB recipients and for 180-day-UIB recipients

4.1.6. Conclusion

The current section uses Estonian data from the period of the last global economic downturn when unemployment in Estonia grew more than in any other EU country. A previous study using that data described in Section 3.2 has shown that the behaviour of unemployed people is seriously affected by the receipt of benefits even during a period of crisis. Higher or longer benefits incur lower hazards of leaving unemployment and the hazard rate reaches its highest level at the end of the benefit period, after which it drops significantly. The current study presented in this section shows that at least some part of that rise in the hazard rate occurs because people become less selective and are forced to

accept jobs with lower quality, meaning a lower wage, and the rise is not only caused by increased job search intensity[79].

In this study two groups of unemployment benefit recipients are examined – the unemployed receiving unemployment insurance benefit for 270 days and the unemployed receiving the benefit for 180 days. The estimations are provided for the average treatment effects on the treated, where people eligible for the longer benefit are considered as treated. A significant difference occurs during the period when the 180-day-UIB recipients are exhausting their benefit and have a rise in the hazard rate for leaving unemployment, but the 270-day-UIB recipients can still continue with their benefit. During that period the average drop in both the accepted starting wage and the accepted average wage compared to their previous wage is almost 10% smaller for 270-day-UIB recipients, and is statistically significant. This result resembles somewhat the results by Gaure *et al.* (2008) who estimate from Norwegian data that just prior to benefit exhaustion there is a drop of 10% in accepted earnings.

The wage decline for 270-day-UIB recipients is smaller on average during the period when the difference occurs, because there is a smaller share of people who accept a very large wage decline compared to the group of shorter-term benefit recipients. Among the shorter-term benefit recipients, 34% accept a wage drop of at least 50% during that period, but only 22% of longer-term benefit recipients do likewise. However, the overall difference in the drop of the accepted wage for all possible unemployment spells does not turn out to be significant, because the control group of 180-day-UIB recipients with a shorter unemployment spell accepts relatively smaller wage drops and after longer unemployment spells both groups accept similar wage drops.

The estimations over the matched samples show that people eligible for a longer benefit period experience a gradual wage decline over their benefit period and afterwards their accepted wage stabilises at a lower level. The control group of shorter unemployment insurance benefit recipients accepts wage offers during their benefit period that incur relatively lower wage drops compared to their previous wage. At the end of their benefit period they exhibit a serious drop in the accepted wage and a spike in the hazard rate for exiting unemployment to employment. Afterwards, the drop in the accepted wage slowly expands and stabilises at a similar level to that of longer benefit recipients. In total, recipients of shorter benefit accept relatively smaller wage drops during their benefit period, but a lot larger after their benefit is exhausted than do the longer-term benefit recipients, who can still continue receiving their benefit. After both groups have exhausted their benefits, the relative wage drops are alike.

The study shows that the hazard of leaving unemployment and the accepted wage are very tightly connected. A higher hazard rate for leaving unemployment

[79] Unfortunately it is not possible to draw conclusions using this data as to whether the job search intensity also changes.

into employment always occurs in the data at the cost of accepting larger drops in the wage. The results of this paper can be interpreted as proof of unemployment benefits increasing the reservation wage as proposed by search theory. At the same time unemployment benefit works as a job search subsidy by letting the unemployed prolong their job search so they can find a job of higher quality.

4.2. Unemployment insurance generosity in a period of crisis: the effect on post-unemployment employment duration

4.2.1. Introduction

Chapter 3 confirmed the main conclusion of search theory that more generous unemployment benefits increase unemployment duration and that this effect occurs even in a period of a deep recession. However, it was shown in Section 4.1 that more generous benefits with longer potential duration might also support the job search and that the unemployed can accept a higher wage while on benefit receipt. In the current section it is established that more generous unemployment benefits also increase post-unemployment job quality in terms of longer job duration. It might be argued that job duration could be an even better proxy for job match quality than wage, stemming from the models of job turnover that treat job match as an experience good (for example Jovanovic (1979)).

The study shows that people who receive unemployment benefits with longer potential duration and exit to employment stay with the same employer for a longer period. The difference in job duration tends largely to be revealed straight away in the earlier stage of employment, implying that there are fewer bad matches between workers and jobs when benefits are more generous. This suggests that more generous benefits might relax the job search constraints so that people can accept jobs that suit them better.

4.2.2. Data and methodology

This section looks at the unemployment insurance benefits granted during the first three quarters of the sharp increase in the unemployment rate during the most recent crisis, from July 2008 until March 2009, similarly to Sections 3.2 and 4.1 (see Figure 37). The data on unemployment benefit recipients are combined with wage data up to April 2011. The entry into employment is considered until the spring of 2010 like in Sections 3.2 and 4.1, as this is when the unemployment rate peaked. The employment data are combined for a longer time period than in those sections, running up to April 2011, to allow the employment duration after the unemployment period to be studied.

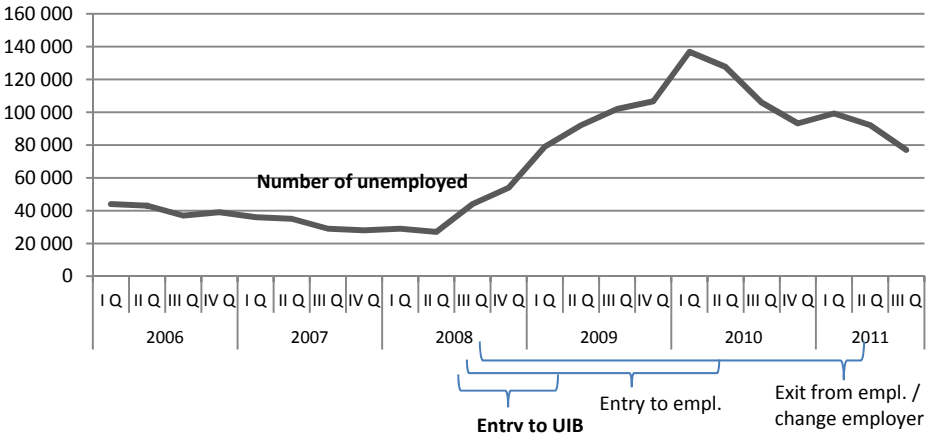

Figure 37. Number of unemployed in Estonia for 2006–2011 and the scope of the study

Source: Statistics Estonia

Section 4.1 focused on 180-day-UIB and 270-day-UIB recipients to see the differences in the accepted wage between these two groups. The current section studies the same two groups to explore whether differences also exist in the duration of the accepted job. If unemployment benefits support the job search, the match quality between the job and the worker should be improved and people should stay longer in the accepted job. As with the accepted wage, the differences in job duration should occur above all among the jobs accepted at 150–240 days of the unemployment period. This is the period when 180-day-UIB recipients are exhausting their benefit but 270-day-UIB recipients are still receiving the benefit.

In this study, data are available for received wage and employer, but not for employment starting and ending dates, so employment duration is defined as the period when a person receives a wage from the same employer. As there may be no wage paid in some months because of vacation or sickness, breaks in the wage data are allowed so that if for one month the wage is not declared, but the next month it is, the job duration is considered to continue. For each observation only the primary employer is considered, which is defined as the one who declares the highest wage for a month, meaning that smaller jobs on the side are not considered. The employment duration is observable for every observation up to at least 13 months as the employment spell of those who entered employment in August 2008 is censored at 33 months and for those who only entered employment in April 2011, the censoring takes place at 13 months.

The characteristics of the UIB recipients who had entered employment by April 2010 are presented in Table 17; the first column of characteristics in the table is basically the same as the second column in Table 14 in Section 4.1. In addition, the characteristics are shown for those people who continued

Table 17. Description of UIB recipients who entered employment

Variable	Enter employment		Exit job after ≤ 4 months		Stay on the job ≥ 13 months	
	UIB 180	UIB 270	UIB 180	UIB 270	UIB 180	UIB 270
Number of observations	4157	5366	1553	1616	1588	2606
Average previous monthly wage, EEK	10585	13589	10600	13155	10555	13717
Average tenure of the previous job, years	1.5	5.0	1.5	4.5	1.6	5.3
Males	53%	56%	58%	57%	50%	55%
Age in the beginning of employment period	35	43	35	43	36	43
Main language Estonian	58%	62%	58%	63%	58%	62%
Knowledge of English	34%	23%	35%	23%	33%	23%
Basic education or less	20%	13%	21%	14%	18%	12%
Higher education	14%	18%	12%	16%	15%	19%
Living in a town	70%	67%	72%	70%	69%	66%
Disabled	6%	5%	7%	7%	5%	5%
Previous occupation						
Managers	7%	12%	6%	11%	8%	12%
Professionals	5%	6%	4%	5%	6%	7%
Technicians and associate professionals	9%	10%	9%	10%	9%	11%
Clerical support workers	6%	6%	6%	5%	6%	6%
Service and sales workers	16%	10%	17%	11%	14%	10%
Skilled agricultural, forestry and fishery workers	1%	1%	1%	1%	1%	1%
Craft and related trades workers	28%	26%	29%	27%	26%	24%
Plant and machine operators, and assemblers	10%	13%	9%	13%	11%	14%
Elementary occupations	17%	15%	18%	18%	18%	15%

Note: People who received active measures are not considered in the table as they are not used in this study. In addition, benefit recipients who are continuing the remaining days of benefit from a previous benefit period are excluded. Only those people are considered who entered employment by April 2010 at the latest.
EEK – the currency used in Estonia until 31.12.2010 (1 EUR = 15.6466 EEK).

to receive a wage from the same employer for up to four months, which is the maximum duration of the probationary period in Estonia, and for those who received a wage for 13 months (more than one year). Recipients of 270-day-UIB tend to have had longer previous tenure, a higher previous wage, higher education, higher age and so forth, and these differences remain for people with only short post-unemployment job duration or with longer post-unemployment job duration. Generally, people who exit the new job relatively quickly are slightly less educated and have worked in lower ranking jobs than the average

person who entered employment. The opposite is true for people who stay in their new job longer, but the differences in mean characteristics for post-unemployment job duration are generally quite small. However, while 37% of 180-day-UIB recipients keep the new job for up to four months and 38% continue in the same job for at least 13 months, the share of 270-day-UIB recipients in the first group is lower and the share of them in the second group is higher, as 30% stay in the job for up to four months and 49% for at least 13 months. So on average 270-day-UIB recipients accept jobs where they continue working for a longer period of time than do 180-day-UIB recipients.

In order to investigate the differences in post-unemployment job duration between 180-day-UIB and 270-day-UIB recipients, several different methods are used in this study. First, the duration analysis methods of non-parametric Kaplan-Meier estimator and semi-parametric piecewise-constant proportional hazard rate model described in subsection 1.2.1 are applied. After that, the propensity score matching described in subsection 1.2.2 is used like in Section 4.2 where differences in post-unemployment wage were studied.

4.2.3. Non-parametric estimation results

Non-parametric estimations of survival rates and hazard rates for exiting a job (when the employer stops declaring a paid wage) for 180-day-UIB and 270-day-UIB recipients are depicted in Figure 38[80]. The figure shows that the employment survival rates are continuously higher for 270-day-UIB recipients. Hazard rate estimates reveal that the hazard of leaving a job is higher for 180-day-UIB recipients at any duration of employment. The difference in hazard rates is particularly high at the beginning of the employment spell, meaning there is a relatively higher share of workers among 180-day-UIB recipients who exit a job after a shorter time.

The estimates presented in Figure 38 might be affected by the selection to the benefit type. The unemployed with a longer previous employment record tend to be eligible for a longer UIB period, but they might also be more likely to keep their next job for longer, so there might be a correlation between the previous job duration and the accepted job duration regardless of the unemployment benefits. To overcome the problem of selection, the survival estimates are also studied for people with more similar previous employment records, who are the unemployed near the cut-off point of eligibility for the longer potential benefit period.

[80] Less smooth hazard rate estimations are shown in Appendix 23.

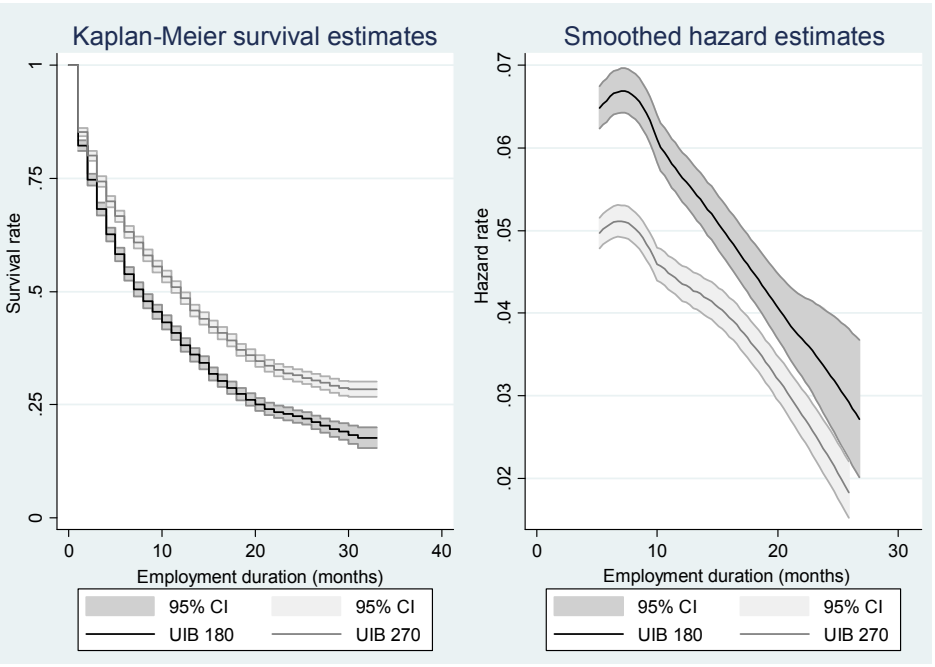

Figure 38. Kaplan-Meier survival estimates and smoothed hazard estimates of post-unemployment employment[81].

The result that 270-day-UIB recipients experience a higher rate for keeping a job still holds for the smaller sample near the cut-off point of benefit entitlement. Figure 39 presents survival estimates for benefit recipients who had previously paid 32–79 months of unemployment insurance contributions, and for benefit recipients who had paid 54–58 months of insurance contributions as 56 months is the limit when the unemployed are eligible for the 270-day benefit instead of the 180-day benefit. For smaller samples the differences in observable characteristics are also much smaller and are closer to random selection as people cannot manipulate by themselves the eligibility for longer term benefit around the cut-off point. For both the more constrained samples the 270-day-UIB recipients have a continuously higher job survival rate.

[81] A limitation of applying the Kaplan-Meier estimator is that it assumes that the censoring value and the duration are independent. If the successive duration variables of unemployment duration and employment duration are assumed to be correlated variables because unemployment duration has an influence on the potential censoring value of employment duration, a non-parametric estimation method suggested by Visser (1996) could be imagined.

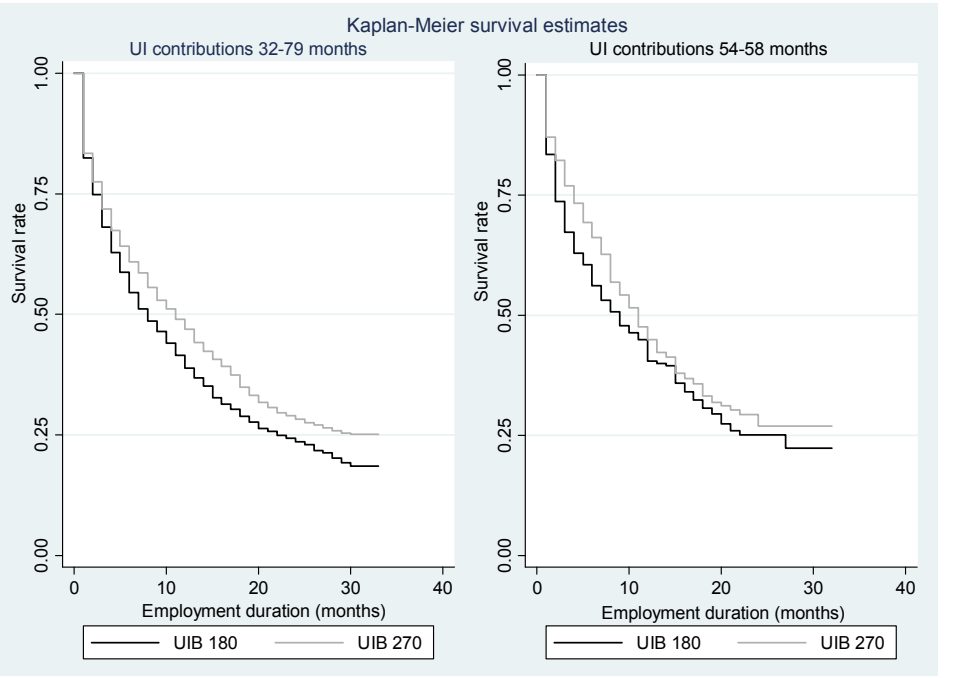

Figure 39. Kaplan-Meier survival estimates and smoothed hazard estimates of post-unemployment employment

Like with the accepted wage studied in Section 4.1, the greatest difference in post-unemployment job duration can be expected among those unemployed who accept a job at around 151–240 days of the unemployment spell when one group is finishing its benefit and the other group can still continue to receive UIB. During the beginning of the unemployment benefit period the two groups of benefit recipients can behave more similarly and so there should not be such big differences in the accepted jobs. The differences can also be smaller later in the unemployment period when both groups have exhausted their benefit.

Figure 40 presents the estimated survival rates and hazard rates for three different periods of accepting a job: 1) 1–150 days of the unemployment period, 2) 151–240 days of the unemployment period, 3) 271–360 days of the unemployment period. The figure reveals that in all of these three periods for accepting a job, 270-day-UIB recipients always have a higher job survival rate and a lower hazard of leaving the job. However, the behaviour of 180-day-UIB recipients and 270-day-UIB recipients is indeed more similar in the group of people who accepted a job during the first 150 days of their benefit period. The hazard rate for the 270-day-UIB recipients who accepted a job at 151–240 days of benefit period is very similar to that for the 270-day-UIB recipients who accepted a job at the beginning of benefit period. At the same time, 180-day-UIB recipients experience a significant rise in the hazard rate for exiting a job in

the group who accepted the job at 151–240 days of unemployment, which is the end of the benefit period. The hazard rate is particularly high at the beginning of the employment period, which indicates bad matches between workers and jobs (a high share of jobs that are quit or where the employee is forced to quit relatively quickly). People who accept a job at 271–360 days of the unemployment period experience a rather higher hazard of exiting a job in both groups of benefit recipients (the higher hazard is again revealed particularly in the beginning of the employment spell)[82].

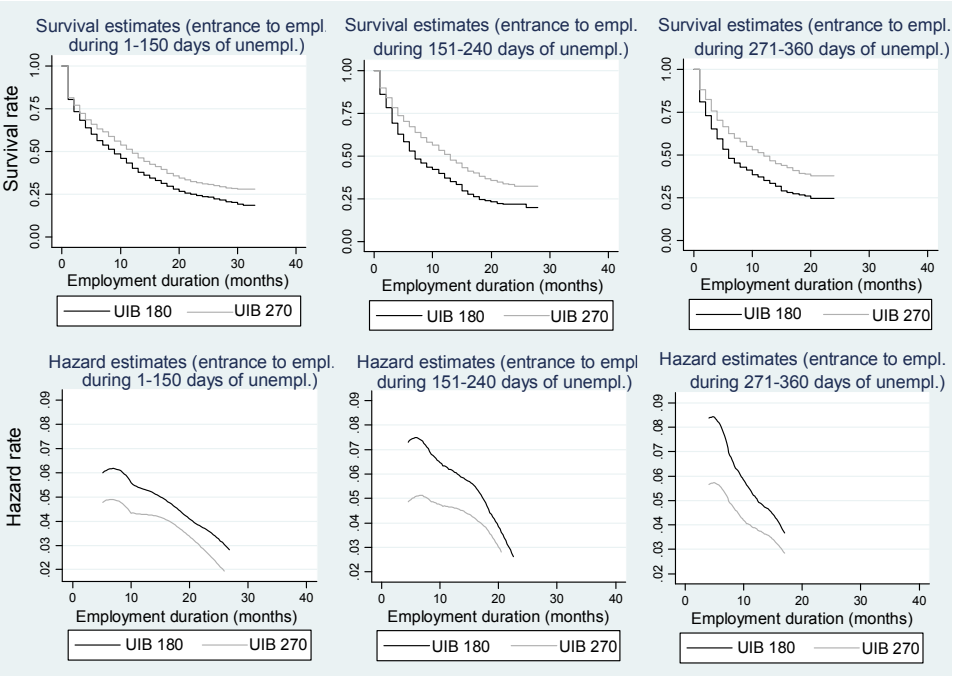

Figure 40. Kaplan-Meier survival estimates and smoothed hazard estimates of post-unemployment employment by time of accepting a job

Figure 41 combines the dimensions of the previous unemployment insurance record (to overcome the problem of selection) and the time period of acceptance of the job. The graphs on the left side depict the people who left the job during the first four months, which is the usual probationary period in Estonia, as a share of all the people who entered employment. The graphs on the right side show the share of people who stayed in the accepted job for at least more than one year (13 months). Following Jovanovic (1979), a mismatch between a worker and a job should be detected quite early during the employment spell, so

[82] However, it could be argued that the results might be affected somewhat by the selection to the type of benefit due to different previous employment record.

that a worker's job separation probability is a decreasing function of job tenure. This means that most of the mismatch should already have been revealed during the 13 months studied in this thesis.

The figure shows that 270-day-UIB recipients tend to have a lower share of people who leave the job relatively quickly and a higher share who keep the job longer. Clearer changes in these shares around the cut-off point for benefit eligibility are visible for those people who accepted a job at 151–240 days of unemployment when 180-day-UIB recipients were about to exhaust their benefit.

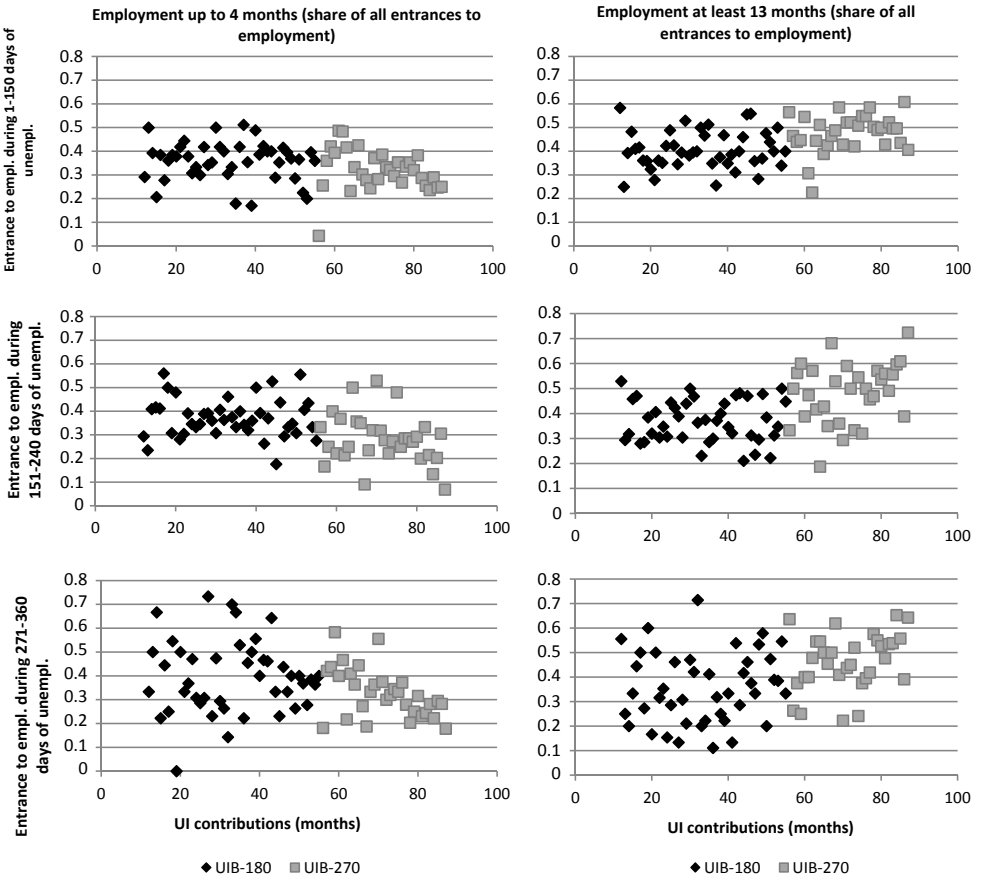

Figure 41. Share of accepted jobs lasting up to 4 months and jobs lasting at least 13 months

4.2.4. Estimation results of propensity score matching

In the current section propensity score matching is used to compare 270-day-UIB recipients with those 180-day-UIB recipients who are more comparable in terms of all relevant observable characteristics (see subsection 1.2.2 for overview of the method). Stata modules created by Leuven and Sianesi (2003) and Gangl (2004b) are used to run the estimations. A probit model is applied for calculating the propensity scores where 270-day-UIB recipients are matched with 180-day-UIB recipients using nearest neighbour matching of one nearest neighbour with replacement over the common support area to calculate the average treatment effect on the treated. Like in Section 4.1, the unemployed who received active measures are not used in the estimations as participation in active measures could affect the treatment effects, though only a very small share of the unemployed received active measures during the period under study. The samples are somewhat larger than in Section 4.1 as people who entered employment for only one month are also included. In Section 4.1 only the wage in the second month was looked at to study the full month wage, which in turn excluded people who received a wage for only one month.

Table 18 displays the estimation results for the differences in the share of people with employment duration of up to four months and in the share of people with employment duration of at least 13 months (the probit models for matching 180-day-UIB and 270-day-UIB recipients are presented in Appendix 24; the mean values of the most relevant variables for the unmatched and matched samples are presented in Appendix 25). The first block of the table reports the estimations that do not consider the differences concerning when exactly during the unemployment period people accepted the job. The results show that there are 6.3% fewer people among 270-day-UIB recipients who already leave the job during the probationary period and 7.2% more who keep the job for more than one year. This means that the difference in employment duration already emerges in the very beginning of the employment spell as bad matches between jobs and workers are ended during the first few months.

In addition, Table 18 presents estimation results for employment duration separately by time of entering employment, basically meaning that there is strict matching of job acceptance in terms of unemployment period. The estimations for those people who already accept a job during the first 150 days of unemployment show similar results to those of estimations over the whole sample. The estimations show that the differences between the two types of benefit recipients in fact expand somewhat in the groups that enter employment later.

Table 18. Estimation results for the differences in the employment duration

	Treated (270)	Controls (180)	Diffe-rence	T-stat	p-value
Latest entry to employment in April 2010 (model no. 1)					
Unmatched: share of job durations up to 4 months	30.1%	37.4%	–7.2%	–7.46	0.000
ATT: share of job durations up to 4 months	30.1%	36.4%	–6.3%	–3.84	0.000
Unmatched: share of job durations at least 13 months	48.6%	38.2%	10.4%	10.16	0.000
ATT: share of job durations at least 13 months	48.6%	41.4%	7.2%	4.24	0.000
Entry to employment at 1–150 days from the beginning of benefit period (model no. 2)					
Unmatched: share of job durations up to 4 months	31.3%	36.1%	–4.8%	–3.25	0.001
ATT: share of job durations up to 4 months	31.4%	37.8%	–6.4%	–2.59	0.010
Unmatched: share of job durations at least 13 months	49.1%	40.3%	8.8%	5.64	0.000
ATT: share of job durations at least 13 months	49.0%	40.8%	8.2%	3.24	0.001
Entry to employment at 151–240 days from the beginning of benefit period (model no. 3)					
Unmatched: share of job durations up to 4 months	26.4%	37.4%	–11.0%	–5.32	0.000
ATT: share of job durations up to 4 months	26.3%	33.5%	–7.2%	–2.14	0.020
Unmatched: share of job durations at least 13 months	50.9%	37.1%	13.8%	6.31	0.000
ATT: share of job durations at least 13 months	51.0%	38.1%	13.0%	3.75	0.000
Entry to employment at 271–360 days from the beginning of benefit period, latest in April 2010 (model no. 4)					
Unmatched: share of job durations up to 4 months	29.8%	40.5%	–10.7%	–4.47	0.000
ATT: share of job durations up to 4 months	30.2%	44.7%	–14.5%	–3.32	0.001
Unmatched: share of job durations at least 13 months	49.3%	35.1%	14.1%	5.62	0.000
ATT: share of job durations at least 13 months	48.8%	34.9%	13.9%	3.21	0.001

To increase the comparability of the two groups of benefit recipients even further, the next set studied are only those benefit recipients who had accumulated 32–79 months of unemployment insurance contributions before their unemployment period, giving a smaller bandwidth of benefit recipients around the cut-off point of 270-day-benefit eligibility. The estimation results for this smaller sample are shown in Table 19 (the probit models for matching 180-day-UIB and 270-day-UIB recipients are presented in Appendix 26; the mean values of the relevant variables for the unmatched and matched samples are presented in Appendix 27).

The first block of Table 19 displays the results for all people who entered employment before April 2010 and shows that there are on average 4% fewer people among 270-day-UIB recipients who leave work during the probationary period than among the otherwise similar 180-day-UIB recipients. The share of people keeping their job for more than a year is 6.1% higher among 270-day-UIB recipients. The estimated differences for people who accepted a job during the first 150 days of unemployment are lower and not significant at the 0.1 level. The estimated differences are greater for the period when one group of benefit recipients exhausts its benefit and the other one continues to receive its benefit, as there are 10.6% fewer people with a short employment period and 10.4% more people with an employment period of more than a year. The estimated differences for people who accepted a job after 270 days of the unemployment period are only slightly smaller.

In several estimations over different groups the differences in the share of short employment spells are similar to the differences in the share of long employment spells. This implies that a large part of the differences in employment duration might already emerge at the beginning of the employment period. In consequence, 180-day-UIB recipients might end up more often in temporary jobs or in worse matching jobs that are already terminated during the probationary period. The difference in job match quality might not be very big for those people who accept a job relatively early in their unemployment period, but there may be about 10% more bad matches among 180-day-UIB recipients who accept a job at the end of their benefit. This means there is also a statistically significant difference of more than 6% in badly matching jobs for the whole sample irrespective of the job acceptance period. In general, the estimation results for unmatched and matched samples turn out to be similar.

Table 19. Estimation results for the differences in the employment duration for people with 32–79 months of unemployment insurance contributions

	Treated (270)	Controls (180)	Diffe-rence	T-stat	p-value
Latest entry to employment in April 2010 (model no. 1)					
Unmatched: share of job durations up to 4 months	32.7%	37.2%	–4.5%	–3.49	0.000
ATT: share of job durations up to 4 months	32.6%	36.7%	–4.0%	–1.93	0.054
Unmatched: share of job durations at least 13 months	47.0%	38.8%	8.2%	6.05	0.000
ATT: share of job durations at least 13 months	47.0%	40.8%	6.1%	2.86	0.004
Entry to employment at 1–150 days from the beginning of benefit period (model no. 2)					
Unmatched: share of job durations up to 4 months	33.1%	35.3%	–2.2%	–1.15	0.250
ATT: share of job durations up to 4 months	33.2%	34.9%	–1.7%	–0.54	0.589
Unmatched: share of job durations at least 13 months	49.1%	40.9%	8.2%	4.02	0.000
ATT: share of job durations at least 13 months	48.9%	44.5%	4.4%	1.40	0.162
Entry to employment at 151–240 days from the beginning of benefit period (model no. 3)					
Unmatched: share of job durations up to 4 months	29.8%	37.4%	–7.6%	–2.72	0.007
ATT: share of job durations up to 4 months	29.8%	40.4%	–10.6%	–2.37	0.018
Unmatched: share of job durations at least 13 months	47.2%	35.9%	11.3%	3.88	0.000
ATT: share of job durations at least 13 months	47.1%	36.7%	10.4%	2.27	0.023
Entry to employment at 271–360 days from the beginning of benefit period, latest in April 2010 (model no. 4)					
Unmatched: share of job durations up to 4 months	33.0%	42.0%	–9.0%	–2.76	0.006
ATT: share of job durations up to 4 months	33.2%	43.1%	–9.9%	–1.93	0.054
Unmatched: share of job durations at least 13 months	45.3%	36.4%	8.9%	2.65	0.008
ATT: share of job durations at least 13 months	45.2%	35.5%	9.7%	1.92	0.055

4.2.5. Estimation results of piecewise-constant proportional hazard model

Alongside the Kaplan-Meier estimates and propensity score matching, a piecewise-constant proportional hazard model is applied to estimate the impact of benefit generosity on post-unemployment job duration (see Subsection 1.2.1 for a description of the method). A more general model is used in that individual specific unobserved heterogeneity is introduced following a gamma distribution with mean 1 and variance θ. However, unobserved heterogeneity does not turn out to be significant at the 0.1 level in any of the estimated models as θ approaches 0, so the estimated hazard functions reduce to hazard functions without unobservable heterogeneity.

Besides the variables for benefit type, the estimated models also include variables for the personal characteristics of gender, age, being a native speaker of Estonian, being disabled, living in a town or countryside and education; the previous occupation characteristics of previous profession and tenure on the last job; the labour market situation of monthly regional registered unemployment rate, monthly change in registered unemployment rate and monthly inflow of registered vacancies; and duration of unemployment before acceptance of a job.

The estimated hazard ratios[83] for benefit effects on post-unemployment job duration are presented in Table 20 (full results by unemployment duration are reported in Appendix 28 and by unemployment insurance record in Appendix 29[84]). Results are reported for the whole sample in the last column, and for samples that are constrained by previous record of unemployment insurance contributions. For all these four samples by insurance record there are estimation results provided by unemployment period before job acceptance and also results from samples that are not constrained by unemployment period, presented in the first row of the results. In this way every reported hazard ratio in the table is estimated by a different model that uses a differently constrained sample.

[83] The hazard ratio for dummy variables shows the hazard rate of the group under study divided by the hazard rate of the comparison group. A hazard ratio smaller than 1 shows that the group under study has a lower hazard rate than the comparison group.

[84] The models for which estimations are presented in this thesis include a control variable for previous tenure as dummies with previous tenure of less than 1 year, 1 to 5 years, 5 to 10 years, or more than 10 years. The inclusion of previous tenure in this way also controls for income during the unemployment period as the severance payments depend on the previous tenure discontinuously. However, to diminish the possible problem of correlation between the duration of previous job duration and post-unemployment job duration, the regressions were additionally estimated with the inclusion of a continuous variable for tenure. The results turned out to be very similar to the results with dummy variables for tenure. These alternative estimations even show a slightly greater effect of benefit generosity on post-unemployment job duration. The hazard ratio for 270-day-UIB recipients compared to 180-day-UIB recipients including all observations turned out to be 0.822 instead of 0.831; at 1–150 days it was 0.870 instead of 0.878; at 151–240 days it was 0.801 instead of 0.805; at 271-360 days it was 0.726 instead of 0.737, and so forth.

Table 20. Estimation results for 270-day-UIB eligibility covariates in piecewise-constant proportional hazard models

Sample restriction on unemployment insurance record:		**54–58 months**		**50–62 months**		**32–79 months**		**12+ months (all)**	
Covariate	Compared to	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z
UIB 270 (all)	UIB 180 (all)	0.861	0.214	0.918	0.231	0.900	0.003	0.831	0.000
UIB 270, accept job day 1–150	UIB 180, accept job day 1–150	0.734	0.108	0.990	0.928	0.929	0.159	0.878	0.002
UIB 270, accept job day 151–240	UIB 180, accept job day 151–240	1.101	0.751	0.745	0.062	0.858	0.048	0.805	0.001
UIB 270, accept job day 271–361	UIB 180, accept job day 271–361	1.123	0.768	1.064	0.735	0.855	0.087	0.737	0.000

Only those people are considered who entered employment by April 2010 at the latest.

The estimations on the whole sample that is not constrained by insurance record and job acceptance period show that 270-day-UIB recipients exit the accepted job at a significantly slower pace than 180-day-UIB recipients, with a hazard ratio of 0.831. The sample that is constrained to only people with 32–79 months of unemployment insurance contributions shows a similar result with a hazard ratio of 0.900. The even more constrained samples produce similar hazard ratios, but these are not significant at the 0.1 level.

The sample that is not constrained by previous insurance contributions reports that the hazard ratio decreases slowly with the time period of job acceptance, as the difference in hazard rates between 270-day-UIB and 180-day-UIB recipients is the greatest among those who were unemployed for longer before job acceptance. Similar estimations using the sample of people with 32–79 months of insurance record suggest that there might not even be a significant difference in the hazard rates among people with a short unemployment period, as the hazard ratio is 0.929 and not significant at the 0.1 level. During the period when 180-day-UIB recipients are finishing their benefit, a significant difference in hazard rates also appears, with a hazard ratio of 0.858 for people with 151–240 days of unemployment period that remains at a similar level later on. The more constrained sample with an insurance record of 50–62 months suggests similarly that there is no significant difference among those who leave unemployment early, but the difference quickly appears when 180-day-UIB recipients are finishing their benefit period. The most constrained sample of 54–58 months of insurance record does not reveal significant differences among benefit recipients, though the samples here are also very small.

In addition, the estimations are conducted separately for the first four months of employment, which is the usual probationary period, and for the later stage of employment duration (see Table 21). The estimations on the whole sample do not show much difference in hazard ratios between the beginning and the later part of the employment period, with a hazard ratio of 0.845 during the first four months and 0.823 later on. In general, the same conclusion also applies to estimation results gained from samples constrained by unemployment duration and unemployment insurance period as the hazard ratio is similar over the employment period. The only exceptions are the results from the sample most constrained by insurance contributions at 54–58 months. These results indicate that there is a large difference in the hazard rates during the first four months with a hazard ratio of 0.630 significant at the 0.05 level, and that there might not be any difference in hazard rates later on as the hazard ratio is 0.908 and not significant at the 0.1 level. The differences in different employment periods might be also reasons why the results for this group in Table 20 are not statistically significant.

In conclusion, estimations using piecewise-constant proportional hazard models indicate that 270-day-UIB recipients are about 15% less likely to exit the accepted job than 180-day-UIB recipients. The estimations do not provide

strong evidence that the difference in the hazard rates of these two groups of benefit recipients changes much during the employment period. However, the results indicate that the hazard rates might not be different for the people who accepted the job early in the unemployment period. The difference emerges with those jobs that were accepted during the period when 180-day-UIB recipients were exhausting their benefit.

In all the estimated models, other covariates besides eligibility for 270-day-UIB are also included (see also Appendixes 28 and 29). The estimations for duration of unemployment show that jobs that are accepted very early during the unemployment period might not last as long as jobs that are searched for over some time. The estimation results also show that men tend to quit the accepted job sooner than women. Very young people and older people leave the accepted job quicker than people in the middle age group (aged 25–54). People who speak the national language, the disabled and people living in towns rather than the countryside also tend to leave the job sooner.

In general, a longer tenure in the previous job also incurs a longer duration in the accepted job. However, the results for the previous occupation are not too clear-cut and often not significant at the 0.1 level. The estimations for level of education show that people with very low and people with relatively high levels of education tend to leave the accepted job sooner than other groups.

The covariates for labour market situation show that both a higher unemployment rate and a higher number of vacancies tend to increase the hazard of leaving a job. The results for the labour market situation and for socio-economic variables reflect the fact that employment termination can be initiated from both sides, by employers and employees. A higher hazard of terminating an employment relationship can be caused by a worse economic situation in which the employer initiates the termination, or equally by an improved economic situation in which the employee initiates the termination as there is a larger choice of jobs available on the labour market. For similar reasons, the hazard of leaving a job can be higher for people in a weaker position on the labour market such as disabled people or people with a very low level of education, and also for people in a relatively strong position on the labour market such as the highly educated and native speakers of the national language.

Table 21. Estimation results for 270-day-UIB eligibility covariates in piecewise-constant proportional hazard models by employment duration

Covariate	**Employment duration:** Compared to	**1–4 months** Hazard ratio	P>z	**5–33 months** Hazard ratio	P>z	***1–33 months*** *Hazard ratio*	*P>z*
UIB 270 (all)	UIB 180 (all)	0.845	0.000	0.823	0.000	*0.831*	*0.000*
UIB 270, accept job day 1–150	UIB 180, accept job day 1–150	0.929	0.243	0.848	0.004	*0.878*	*0.002*
UIB 270, accept job day 151–240	UIB 180, accept job day 151–240	0.815	0.028	0.806	0.012	*0.805*	*0.001*
UIB 270, accept job day 271–361	UIB 180, accept job day 271–361	0.734	0.002	0.741	0.006	*0.737*	*0.000*
UIB 270, insurance record 54–55 months	UIB 180, insurance record 56–58 months	0.630	0.011	1.172	0.340	*0.861*	*0.214*
UIB 270, insurance record 50–55 months	UIB 180, insurance record 56–62 months	0.949	0.610	0.908	0.327	*0.918*	*0.231*
UIB 270, insurance record 32–55 months	UIB 180, unemployment insurance 56–79 months	0.912	0.071	0.889	0.018	*0.900*	*0.003*

Only those people are considered who entered employment by April 2010 at the latest.
Estimation results in the last column repeat the results provided in Table 20 in first row of results and in the last column of results.

4.2.6. Conclusion

The current section studies post-unemployment job duration using Estonian data from the period of the last global economic crisis. Previous studies using the same data (Sections 3.2 and 4.1) have shown that even during a serious economic crisis the behaviour of the unemployed is significantly affected by the receipt of unemployment benefits. On the one hand, more generous benefits incur disincentive effects and prolong the unemployment duration, but on the other hand, people can search for longer for a better matching job and might start earning a higher post-unemployment wage. The study presented in this section shows that people who receive more generous benefits in the form of benefits with a longer potential duration also stay longer in the accepted job.

In the current study, the labour market behaviour of two groups of unemployment benefit recipients is compared – the unemployed entitled to 180-day unemployment insurance benefit and the unemployed entitled to 270-day unemployment insurance benefit. Non-parametric estimations show that 270-day-UIB recipients always have a higher job survival rate and lower hazard of leaving the job than 180-day-UIB recipients. This applies even when very small samples around the cut-off point of 270-day-UIB eligibility are compared. The non-parametric estimations establish that the difference between the hazard rates is largest in the earlier period of employment, meaning there are relatively more employees among former 180-day-UIB recipients who leave their new job relatively quickly. The difference in the hazard rates in the earlier stage of employment is especially pronounced among people who accepted the job at 151–240 days of their unemployment spell, but also stays relatively high among people who exit unemployment even later.

Non-parametric methods suggest that the difference in job duration emerges among those jobs that are accepted when 180-day-UIB recipients are finishing their benefit period and are experiencing a higher hazard of leaving unemployment. A similar finding that jobs accepted very quickly within five weeks of the benefit exhaustion date tend to have a higher dissolution rate is also reached by, for example, Belzil (2001).

The estimation results gained by propensity score matching are largely similar to the non-parametric results. These estimations confirm that the difference in post-unemployment job quality might not be very big for those people who accepted the job early in their unemployment period. Recipients of 180-day-UIB who accept a job only when their benefit is finishing experience 10% more bad matches and very short employment periods than do 270-day-UIB recipients. The difference between the two groups of benefit recipients also remains similar among those who accepted a job after both groups had exhausted the benefit, so on average, if the job acceptance time is ignored, 270-day-UIB recipients have more than 6% fewer badly matching jobs in terms of people who leave the job during the first four months or the usual probationary period. The differences between the two groups of benefit recipients also turn out to be similar with regards to people who keep their job for more than one

year. These results suggest that a large part of the difference in employment duration already emerges earlier in the employment period.

The estimation results from piecewise-constant proportional hazard models indicate that 270-day-UIB recipients are about 15% less likely to leave the accepted job than 180-day-UIB recipients. In contrast to the non-parametric and matching methods however, the estimations from duration models do not provide strong evidence that the difference in the hazard rates for benefit recipients changes a lot during the employment period. However, the results do confirm that there might not be a difference in job match quality for those who accept the job earlier in their unemployment period and that the significant difference develops for those jobs that are accepted when 180-day-UIB recipients are running out of benefits.

The results of the study indicate that at the end of the benefit period people become less selective when accepting a job. On the one hand, the hazard rate for leaving unemployment for employment rises and more of the unemployed are accepting a job. On the other hand, the accepted job is of lower quality for them and matches them worse than would have been the case had the benefit receipt continued giving them more time to look for a better job. In consequence, the unemployed with a longer potential benefit period have longer post-unemployment job duration.

CONCLUSIONS

The most recent global economic downturn raised the level of unemployment in all the countries of the European Union, and also elsewhere. This in turn led to discussions about the effects of active and passive labour market policies on the level of unemployment and the economic situation in general. For example, one of the more debated issues has been the effect of unemployment benefits on the behaviour of the unemployed – the extent to which these benefits hinder their return to employment, the extent to which they assist the job search, and whether these benefits could be more generous in times of crisis. This thesis studies the effects of the generosity of unemployment benefits on labour market outcomes using data about unemployment benefit recipients in Estonia. The Estonian labour market was affected by the global economic crisis more than that of any other country in the European Union, so Estonian data allow the benefit effects to be explored in an extreme recession.

The main theory used to describe the effects of unemployment benefits on labour market outcomes is search theory. The most straightforward conclusion about unemployment benefits from search theory is that more generous benefits with either longer potential duration or a higher level hinder the exit from unemployment to employment and hence increase unemployment duration through the so-called disincentive effect. In addition, if the potential period of unemployment benefits is limited, there should be a spike in the hazard rate for leaving unemployment prior to the exhaustion date of benefits. As the exhaustion date approaches it becomes more and more likely that a job will not be found during the benefit period, so the unemployed increase their job search intensity and decrease their reservation wage and in that way the hazard rate for exiting unemployment increases.

An economic slowdown in the search model has slightly ambiguous total effects on the labour market outcomes. On the one hand, the number of job offers decreases and there is a lower chance of exiting unemployment, and thus the unemployment duration increases. On the other hand, people become less selective when there are fewer job offers and that increases the hazard rate and decreases unemployment duration. There is very little theoretical literature about whether the disincentive effect could also be different during the business cycle. The few existing studies argue that the disincentive effect could be rather smaller in economic difficulties, but it still remains an empirical issue.

While the basic search model predicts that unemployment benefits motivate people to stay in unemployment, some extensions of the theory argue that benefits can also support job search. Unemployment benefits relax the restrictions on job search, as for example longer benefit allows more time for looking for a job, so more generous benefits allow the unemployed to find a job that suits them better with a higher wage, longer potential employment duration, better skills and knowledge match and so forth. Thus more generous unemployment benefits could increase the post-unemployment job quality.

It is empirically substantiated that the disincentive effect of unemployment benefits does exist. In addition, it is often found that the hazard of leaving unemployment increases during the benefit period and that there is a spike in the hazard rate at the end of benefit period. However, empirical literature on whether the disincentive effect is different in different economic situations is scarce. The few existing studies suggest that the disincentive effect might be rather slightly smaller in a worse economic situation. However, no empirical studies have been conducted for an extremely bad economic situation, and hence this thesis investigates whether the disincentive effect still occurs during a very deep crisis, using the Estonian data from the latest global economic crisis period. In addition, the results for the crisis period are compared with the results for the Estonian pre-crisis period.

Another issue the thesis deals with is the post-unemployment job quality. Some empirical studies have been conducted on this matter only in recent years, but the results are rather mixed and only some of the studies find a positive effect from unemployment benefits on post-unemployment job quality. This dissertation investigates the effect of the generosity of unemployment benefits on post-unemployment job quality during a crisis period using Estonian data. The effect on the post-unemployment wage and post-unemployment job duration is studied as these are the usual proxies for post-unemployment job quality.

The aim of this thesis is to study the effects of the generosity of unemployment benefits on labour market outcomes during a period of deep recession in Estonia. So the aim is to study whether unemployment benefits have negative effects on labour market outcomes in a crisis through longer unemployment duration and whether unemployment benefits have positive effects on labour market outcomes through higher post-unemployment job quality. Two main sources are used for the data. The data about unemployment benefits and personal characteristics of the unemployed come from the database of the Estonian Unemployment Insurance Fund. The data about post-unemployment employment come from the database of the Estonian Tax and Customs Board. The spells of registered unemployment are combined with the spells of employment. Although the analysis uses only administrative data, the total spells of unemployment and employment are exceptionally precisely determined, and there is also very accurate data about wage levels.

The system of unemployment benefits in Estonia consists of unemployment insurance benefit that depends on the previous wage and of unemployment allowance that is a low means-tested benefit. The thesis focuses above all on studying the unemployment insurance benefit recipients. The main tools for the analysis of unemployment and employment duration in this thesis are Kaplan-Meier survival estimates and the piecewise-constant proportional hazard model. While Kaplan-Meier estimates describe well the behaviour of the unemployed, the piecewise-constant proportional hazard model enables the researcher to quantify the effects of unemployment benefits on their behaviour. Additionally,

the post-unemployment employment duration is analysed using propensity score matching. The same method is also used for the post-unemployment wage. In both cases people with longer potential unemployment insurance benefit are matched with people on shorter benefit to analyse the difference in post-unemployment job quality stemming from benefit generosity. Furthermore, these three methods are combined using a method similar to RDD, so the benefit effects are studied in more detail around the cut-off point of the eligibility criterion for benefits of a different level of generosity.

The effect of unemployment benefits on unemployment duration is analysed using data from both the crisis and the pre-crisis periods. For the pre-crisis period, unemployment insurance benefit recipients are studied whose unemployment insurance benefit period started in 2007. Data about their exit to employment are studied until the end of 2008. For the crisis period, those unemployment benefit recipients are studied who started their benefit period from the third quarter of 2008 up to the first quarter of 2009. Their exit to employment is analysed up to the first quarter of 2010 when unemployment reached its peak in Estonia; the period of crisis is defined in this thesis as the period of a sharp continuous rise in the unemployment rate in Estonia from the third quarter of 2008 up to the first quarter of 2010.

The pre-crisis data show that unemployment insurance benefits have a strong significant effect on unemployment duration. It is shown that people receiving unemployment benefits leave unemployment on average at less than half the rate of people currently not on benefits. The hazard rate for leaving unemployment is hindered even more for the unemployed receiving a higher level of benefits, though this effect might be affected by the fact that these people also earned a higher wage previously. So the difference in their labour market behaviour could be affected also by some other factors than unemployment benefits. In addition, the study reveals that there are significant spikes in the hazard of leaving unemployment for employment around the benefit exhaustion date. A significant disincentive effect of unemployment benefits and/or spike in the end of benefit period is found also in several other studies (for example by van Ours and Vodopivec (2006), Fujita (2011), Lalive *et al.* (2011)).

The study of the effects of unemployment benefits on unemployment duration using the crisis data reveals that the disincentive effect of benefits even occurs during an extremely severe recession. However, the size of the effect might be slightly smaller than during the pre-crisis period (similar result as for example by Kroft and Notowidigdo (2011), Schmieder *et al.* (2010)). The receipt of unemployment benefits hinders the exit to employment by on average about halving it, though the hazard rate is more hindered at the beginning of the benefit period and less later on. During the crisis period the disincentive effect is also more homogeneous among the different levels and potential lengths of benefits and the hazard of leaving unemployment is about halved during the benefit period irrespective of the benefit size. In addition, when both the benefit receipt and the spikes in the hazard rate are taken into account in the estimation

models, it is shown that the disincentive effect caused by UA is rather similar to that of UIB despite its very low level.

As there are many more observations to use from the crisis period than from the pre-crisis period, the crisis data enable the researcher to explore the disincentive effect stemming from the length and the size of the unemployment benefits in more detail. The analysis reveals that both higher benefit amounts and longer potential benefit durations increase unemployment duration during the crisis period.

In this way the crisis data indicate that significant disincentive effects occur in a quickly deteriorating labour market, though the disincentive effect might be slightly lower during a crisis than when the economic situation is better. However, comparing different economic situations is somewhat complicated as the unemployed can be different in different economic situations (incurring different behaviour) and accompanying active labour market policies might also be different in different economic situations, which might also have an effect on the labour market behaviour of the unemployed.

The effect of the generosity of unemployment benefits on post-unemployment job quality is studied in this thesis using the same observations from the crisis period as in the analysis of the unemployment benefit effects on unemployment duration. The data about post-unemployment wages are studied for these observations over a longer period to analyse two proxies for post-unemployment job quality – wage level and job duration. Analyses on both wage and job duration show that the spike in the hazard rate for entering employment at the end of the benefit period occurs at least partly because the unemployed become less selective at the end of the benefit period and are forced to accept jobs with lower quality. This means that less generous benefits at least in terms of the potential duration might incur lower post-unemployment job quality. Unfortunately it is not possible to estimate from the available data whether the intensity of the job search also changes during the unemployment period. In addition, the analyses show positive effects occurring from a longer potential benefit period. The question of whether a higher benefit level might also lead to similar effects needs further analysis.

In order to analyse the effect of unemployment benefits on the post-unemployment wage, 270-day-UIB recipients are matched with statistically similar 180-day-UIB recipients to estimate the average treatment effects on the treated. The estimations show that a significant difference in the accepted wage is found when those unemployed who accept a job at 151–240 days of their unemployment spell are compared. During this period, 180-day-UIB recipients are exhausting their benefit period and their hazard rate for exiting unemployment rises sharply but the accepted wage declines sharply. Recipients of 270-day-UIB can still continue their benefit receipt and their hazard rate does not rise, but the accepted wage also declines only slightly. This means that during this period, 270-day-UIB recipients accept a wage drop compared to their previous wage that is about 10% smaller than the drop accepted by the matched

180-day-UIB recipients, and this applies both to the starting wage and to the average wage over the first nine months of employment. These estimation results are similar to those of Gaure *et al.* (2008) who show that the accepted earnings decline by about 10% just prior to benefit exhaustion. The results also resemble those of Centeno and Novo (2011) who do not find an overall significant effect from unemployment benefits on re-employment wages, but the effect is somewhat exposed when matches formed around the potential benefit exhaustion dates are studied (benefit exhaustion dates before benefit extensions).

The estimations of accepted wage drops over the matched samples indicate that the accepted wage declines compared to the previous wage the longer a person is unemployed. However, there is a much sharper drop in the accepted wage when the benefit period lapses and the hazard of leaving unemployment spikes, so it is evident from the analysis that the hazard of leaving unemployment and the accepted wage are very tightly connected. The estimation results confirm that the reservation wage is higher during the benefit period, as proposed by search theory. At the end of the benefit period the reservation wage drops and the hazard of leaving unemployment rises. With a longer potential unemployment benefit period the job search can be prolonged to find a better matching job as unemployment benefit would continue to subsidise the job search.

The estimation results of this analysis are also in line with the studies that do not find support for the positive relationship between the potential benefit period and post-unemployment wage as they do not control for the time of job acceptance (for example van Ours and Vodopivec (2008) and Schmieder *et al.* (2012)). Also in this thesis the positive relationship appears only when studying the period when one group of the unemployed people is still eligible for UIB and the other one not. The effect of unemployment benefits working as a search subsidy might not appear as strongly over the overall period, because it is likely that the accepted wage is affected by the deterioration in the offer wage distribution as the unemployment spell lengthens.

The study on post-unemployment employment duration shows that longer potential unemployment benefit duration might also increase post-unemployment job duration. Jobs accepted by 270-day-UIB recipients tend to last longer than jobs accepted by 180-day-UIB recipients, even if otherwise statistically very similar people are compared.

Kaplan-Meier estimates show that 270-day-UIB recipients have a higher job survival rate and lower hazard rate for leaving a job than 180-day-UIB recipients even if only observations near the cut-off point of 270-day-UIB eligibility are considered. Like the analysis of the post-unemployment wage, the analysis of job duration suggests that the difference develops above all among jobs accepted at 151–240 days of unemployment, which is the period when 180-day-UIB recipients are exhausting their benefit, but 270-day-UIB recipients can still continue their benefit. However, the estimations on job duration indicate

that the difference between the two groups remains quite high even when both groups have exhausted their benefit.

The estimations of job duration using propensity score matching confirm the results of non-parametric methods. A major difference in job duration occurs among jobs accepted at 151–240 days of unemployment. From among these jobs, 180-day-UIB recipients accept about 10% more badly matching jobs with very short employment periods than do 270-day-UIB recipients. As the difference is also quite high for people accepting a job later in their unemployment period, 270-day-UIB recipients accept on average 6% fewer bad matches (jobs lasting up to four months, which is the maximum limit of the usual probationary period) than do 180-day-UIB recipients.

Results from both non-parametric methods and propensity score matching suggest that the difference in job duration to a large extent already develops in the very beginning of the employment spell, so bad matches between workers and jobs are often terminated straight away in the early stage of employment.

The estimation results gained by piecewise-constant proportional hazard models suggest that 270-day-UIB recipients are about 15% less likely to leave the accepted job than 180-day-UIB recipients. In addition, the results from these models also indicate that the significant difference in job duration develops for jobs accepted at 151–240 days of unemployment when 180-day-UIB recipients are finishing their benefit and 270-day-UIB recipients are not yet. This result is also similar to that of the estimations by Belzil (2001) who shows that jobs accepted within five weeks of benefit termination tend to have a higher dissolution rate. So again, the rise in the hazard rate for leaving unemployment is accompanied by a decline in post-unemployment job quality.

In conclusion, the analyses show that the hypotheses proposed in the thesis hold in large part. The estimations demonstrate that unemployment benefits do increase unemployment duration significantly as was posed by the first hypothesis. The second hypothesis suggested that this effect should be significantly milder during a crisis. While the disincentive effect appears to be milder during the crisis, the difference is bigger for some groups and much slighter for the others. This was the most unexpected result of the study, the discovery that the difference in the disincentive effect over the business cycle might be quite minor.

The third hypothesis proposed that more generous unemployment benefits incur higher post-unemployment job quality in Estonia and expected this effect to appear stronger on post-unemployment job duration than on wage. The thesis confirms that positive effects from more generous unemployment benefits do indeed occur on wage as well as on post-unemployment job duration while the latter effect appears to be somewhat stronger as the effect on wage occurs only during the period when one group of the unemployed has finished the benefit and the other group is continuing its benefit receipt.

In general, the results of this thesis are similar to the few existing studies on these issues. The scarce empirical literature on the effects of unemployment

benefits on unemployment duration over business cycles also suggests that the disincentive effects might be slightly milder in worse economic conditions (for example Kroft and Notowidigdo (2011), Schmieder *et al.* (2010), Jurajda and Tannery (2003)). In relation to post-unemployment job quality, the positive effect of unemployment benefits on post-unemployment employment duration is found more often than the positive effect on post-unemployment wage (studies finding only minor effects on wage are for example Lalive (2007) and Fitzenberger and Wilke (2007); stronger effects on employment for example Tatsiramos 2009 and Caliendo *et al.* (2009)). In this thesis the positive effect on job duration also proves to be very significant and strong. The positive effect on post-unemployment wages appears only when the job acceptance period is considered in more detail.

The result that the positive effects of unemployment benefits on post-unemployment job duration usually appear to be stronger than on wages might be caused by the deteriorating wage offer distribution over the unemployment spell. The accepted wage declines quickly as the unemployment spell lengthens because the reservation wage declines, but might also decline somewhat because of a decline in the offered wage. In post-unemployment job duration, no such rapid decline is visible, meaning people might still find a suitable job after a longer unemployment spell, but they will at least start the job earning a lower wage. Job duration is sometimes argued to be a better proxy for job quality than wage (see for example Centeno 2004).

The analysis of the effects of unemployment benefits on labour market outcomes during a period of crisis indicates that it might be reasonable to introduce more generous benefits during an economic recession. The analyses of unemployment duration show that unemployment benefits increase unemployment duration even during a very severe economic slowdown. However, this effect is slightly milder than in somewhat better economic circumstances. In addition, studies of post-unemployment job quality confirm that this longer unemployment and job search duration might also incur higher post-unemployment job quality. This suggests that more generous benefits prolong the job search period and unemployment spell, but the accepted jobs will match the workers' skills and needs better, which is shown above all by job duration as a proxy for match quality.

The need for a longer potential unemployment benefit duration during the crisis is also seen when looking at the ratio of unemployment benefit recipients among the registered unemployed. During the period of recovery from the recent crisis, there was a larger share of registered unemployed without any unemployment benefits than ever before. These people probably lacked the means to look for employment and they were probably not covered by any adequate level of social security. Longer potential periods of unemployment benefits would prevent there being such a large share of the unemployed without benefits to some extent; two thirds of the registered unemployed were without any unemployment benefits in 2011.

However, Estonia is among the countries with relatively low expenditures on unemployment benefits per unemployed person compared to the other EU countries even when the economy is doing well. So it follows that the post-unemployment job quality and hence better matching between jobs and workers in the labour market might be hindered more in Estonia by its unemployment benefit system than is the case in the other EU countries. The current thesis showed more explicitly the positive dependence of post-unemployment job quality on the potential duration of unemployment benefits, and it can be argued that the potential unemployment benefit duration could also be longer in favourable economic conditions to decrease the scarring effects of unemployment. Nevertheless, if only the potential duration is increased and nothing else in the system changes, such as the introduction of monitoring and sanctions, it would also increase the average unemployment spell and increase the unemployment rate in the economy.

As the unemployment benefit system matures in Estonia, the share of the unemployed with longer potential unemployment insurance benefit increases and the system should resemble more those in the other EU countries even without any changes in the system. Since 2007 there has basically been a growing trend of registered unemployed who qualify for 270-day unemployment insurance benefit. As the necessary prior insurance contributions of 56 months are not limited to a certain number of years, but are always counted from the beginning of the system in 2002, the number of people who accumulate the necessary amount of contributions over a longer time is still growing slowly. In addition, since March 2011 there are more and more people who have already gathered 111 months of contributions and become eligible for unemployment insurance benefit for 360 days. So due to the maturity of the system, the average potential unemployment benefit duration is gradually increasing, which *ceteris paribus* could also lead to longer unemployment spells and a higher unemployment rate, but also to better matches in the labour market. However, as the Estonian economy is recovering from the crisis at the same time, these changes will probably not be visible in the macro level indicators as the unemployment rate will still continue to decrease.

In addition, the level of social security provided by unemployment benefits in Estonia would be increased and become slightly closer to the EU average if the amendments to the system come into force in 2013. One of the amendments is supposed to more than double the level of unemployment allowance from the current level so that basically it would provide the same level of benefits to those unemployed who are eligible for UA (but not for UIB) as is provided by the minimum amount of UIB. People who receive the minimum amount of UIB have had a longer previous working record and left their job on the employer's initiative, but their previous wage was very low (lower than the minimum wage). UA recipients could have previously earned an even higher wage, but their employment record was too short or they had to quit their job voluntarily.

Additionally, the second amendment in the system foresees that basically those UA recipients who quit their job voluntarily but have a long previous employment record will be eligible for unemployment insurance benefit from 2013[85]. To avoid the consequences of possible moral hazard, the criterion regarding the record of unemployment insurance contributions is much stricter for them than it is for those UIB recipients whose employment contract was terminated at the initiative of the employer. Currently the criterion is at least 12 months of contributions during the previous 36 months, but the voluntarily unemployed will have to have at least 48 months of contributions during the last 60 months. In addition, the replacement rate of unemployment insurance benefit for the voluntarily unemployed will be slightly lower at 40% throughout the benefit period.

So if these amendments come into force, only the unemployed with a shorter previous employment record will receive unemployment allowance, though at a higher rate than currently, and all other previously employed unemployed will qualify for unemployment insurance benefit. However, in reality the criterion for previous employment for the voluntarily unemployed is rather harsh and many unemployed will still have to survive on unemployment allowance. What is more, in the countries of the EU and the OECD, it is much more common for the risk of moral hazard to be tempered by a waiting period for unemployment benefits for the voluntarily unemployed rather than by a lowering of the level of benefit or imposition of tougher criteria for eligibility in other aspects (see Venn (2012)). It is believed that a waiting period prevents people giving up working too easily as they would have to manage without income for some time. In Estonia, this risk is dealt with instead through lower benefits in the form of low unemployment allowance or in the future a slightly lower unemployment insurance benefit. Although, given that the coverage of the voluntarily unemployed with unemployment insurance is justified above all because some of these unemployed were in reality forced to quit their job because the employer forced them to quit, their family moved, they had health problems or bad working conditions or a similar reason, it cannot be very well argued why these people should have a lower replacement rate or stricter criteria for eligibility. So a system of unemployment benefits that imposed a higher replacement rate for the voluntarily unemployed and also a waiting period could lower the risk of people using the system for a vacation from working life and might be better at ensuring adequate post-unemployment job quality.

The problem of moral hazard for benefit recipients in Estonia might also be to some degree smaller than the data indicate. Some part of the disincentive effect of unemployment benefits in the estimation results might be caused by the shadow economy, as the thesis uses only administrative data and officially declared wages. Some people might start working without a formal contract

[85] However, during the time of writing this thesis it is discussed in the parliament whether to abolish this amendment.

during the benefit period so that they can continue collecting benefits and formalise the contract only when the benefit period is exhausted. This would explain why the spike in the hazard rate for leaving unemployment at the end of the benefit period is so high and why is there a sharp drop in the hazard rate afterwards. If this is the case, then the effect of unemployment benefits on prolonging the unemployment period is milder than the formal data reveal.

The increase in the share of the shadow economy during the crisis is also suggested by the difference in the data for employment between the data of the Estonian Tax and Customs Board and the data gathered in the Labour Force Survey by Statistics Estonia. During the period of recovery the statistics for employed people show the increase in employment is higher than the increase in the administrative data for declared wages. According to the Labour Force Survey, the number of employed people in Estonia increased by 34,000 between 2009 and 2011, while the number of people for whom a wage was declared increased by 15,000 when only Estonian residents in LFS data are considered, and an even bigger difference otherwise[86]. Though there are also some other methodological differences between these data, a major part of this is probably caused by the shadow economy, so this might indeed be reflected as a disincentive effect in the data for unemployment benefits. This shows it is necessary for the country to combat the shadow economy to save costs on unemployment benefits and increase its tax revenues. While it is mostly the job of the Estonian Tax and Customs Board, a role could also be found for the Unemployment Insurance Fund. For example stricter monitoring of job search and increased activation could lessen the risk of the system being exploited by workers in the shadow economy, specifically people who receive unemployment benefits while working in the shadow economy.

Nevertheless, a rather significant spike in the hazard rate in the end of benefit period is also found in many other studies from several other countries (for example Meyer (1990), Cockx and Ries (2004), Røed and Zhang (2005), and others). Grubb (2011) argues that the spike is only not evident in exceptional countries like Austria, Finland and Sweden where there is very extensive management of unemployment spells by the public employment service. These organisations of the public employment service tend to follow the principle that job vacancies have to be filled by the best candidate available regardless of their benefit duration and that the unemployed approaching benefit exhaustion should be placed in an active labour market programme.

Indeed, some previous research has shown that the disincentive effect of unemployment benefits might be milder if there were more monitoring of the job search by the public employment service and if sanctions were imposed for a lack of effort in job search (for example Boone *et al* (2009), Svarer (2011)). During the period under study in this thesis the monitoring of job search activity was not very thorough in Estonia. However, there are no data available on the

[86] This difference in the data is discussed also for example by Viilmann and Soosaar (2012).

monitoring and it is not possible to estimate the effect of monitoring on unemployment duration. In addition, sanctions are also not used very often, being imposed mostly only for no-shows, and the range of sanctions is very limited. For unemployment insurance benefit, the only applicable sanction is the termination of benefit. However, if a benefit is terminated due to a no-show, it is not possible to see in the data whether a person did not come to the public employment service because they had already entered employment or whether it was really the sanction that gave the person the push to accept the job. This means it is not possible to use the Estonian data to estimate the effects of monitoring and sanctions in the unemployment benefit system on unemployment duration. However, the experience of other countries shows that it is likely that more effective monitoring and sanctioning in the unemployment benefit system would shorten the unemployment duration in Estonia too. Nevertheless, as some studies have also shown, more sanctioning could also incur a decline in post-unemployment job quality (for example Arni *et al.* (2009), van den Berg and Vikström (2009)). On the other hand, shortening the length of unemployment by imposing monitoring and sanctions might help to increase post-unemployment quality with respect to post-unemployment wage as the distribution of offer wage might deteriorate when unemployment spell lengthens.

The effects of monitoring and sanctions on labour market outcomes also depend on how they are regulated and imposed. Van den Berg and Vikström (2009) argue that monitoring should focus on job search effort, not on job offer rejection/acceptance. This might indeed encourage people to increase their job search activity. If only rejections are punished, the unemployed might decrease their job search activity in order not to receive those job offers that do not suit them. In the Estonian unemployment benefit system, there are sanctions for rejecting a suitable job offer. A suitable job offer is defined in terms of distance, education, occupation, work experience and wage. The criteria for a suitable job are wider after 20 weeks so that jobs that match worse and might incur lower post-unemployment job quality should also be accepted. However, this sanction is almost never imposed in Estonia and the impact of this sanction on job search activity and post-unemployment job quality is probably more or less non-existent. Following van den Berg and Vikström (2009) it might also not be sensible to impose this sanction much more often.

The criteria for job search effort and sanctions for lack of effort are fairly unregulated in Estonia. The activity criteria and sanctions mostly concern meetings with a job search counsellor or case manager and these regulations do not say much about the quantity or quality of job search. In this respect Estonia could indeed set further regulations for job search effort and monitor it much more strictly in order to decrease the disincentive effects of unemployment benefits.

One more point identified by van den Berg and Vikström (2009) with regards to monitoring and sanctioning is that monitoring could be carried out by a different person in the public employment service than the job mediation

consultant of the unemployed person. The job mediation consultant might feel uncomfortable imposing punishments on their clients as they have a personal relationship with them to a certain degree as they meet them regularly. This might be the reason why the level of sanctions is at quite a low level in many countries (see for example Gray (2003)) besides Estonia. However, this proposition might be hard to implement in Estonia, where many employees in the public employment service in smaller local offices have some level of personal contacts with many of their clients for reasons from outside the work of public employment service. On the one hand, the employees of the public employment service tend to have more information about the real search activity of their clients and about whether any of them has picked up a job in the shadow economy, but on the other hand, they might indeed feel too intimidated to impose real sanctions on them.

Another observation made in previous empirical studies is that active labour market policies might work better as a stick rather than a carrot, as an *ex ante* threat effect might occur and make people leave unemployment when they learn that they will have to participate in an active measure. However, this effect seems to apply only when participation in an active measure is compulsory. In Estonia, where the unemployed are encouraged to participate in active measures rather than forced with the threat of sanction of their benefit, active measures still tend to work as a carrot and the opposite effect applies. The unemployment duration analysis conducted on the crisis data indicates that the hazard of leaving unemployment tends to decrease just before and during the participation in active measures, meaning a locking-in effect also occurs. Thus, it still remains a question as to whether active labour market policies could also work as a stick in Estonia if more widely used and in a more compulsory manner. Most probably, compulsory participation in active measures would decrease registered unemployment spells and the spike at the end of benefit period would appear smaller. However, as with the effects of sanctions, some people might accept jobs with lower post-unemployment job quality when threatened with compulsory active measures or could indeed exit registered unemployment into inactivity.

A more reasonable approach to active measures and imposing sanctions for non-participation seems to be the principle that has been more and more straightforwardly implemented in the Estonian Unemployment Insurance Fund since 2010, after the period studied in the current thesis. Since 2010, active measures are provided on the basis of individual needs, not the wishes of the unemployed or the length of the unemployment and benefit period. This principle of service provision has already provided positive results (see Lauringson *et al.* (2011)). In addition, there is the principle that if a need for an active measure for an unemployed person is detected, the participation in this measure for this unemployed person is indeed compulsory. This means that if an unemployed person does not participate in a measure that they need, a sanction on their unemployment benefit will follow. As a result, the

unemployed are not made to participate after a certain period of unemployment regardless of whether they actually need an active measure to exit to employment or not. In this system there should be fewer people than in the system of compulsory measures for all unemployed who then de-register just because they are forced to participate in measures that might not incur higher post-unemployment job quality for them, and it should increase the post-unemployment job quality for the participants and ensure that the people who need measures really do participate in them.

However, these regulations of service provision and sanctions are not explicit in the legal system and most of the package of active labour market policies delivered is not regulated by law. This means it might be necessary to make quite big changes in the Labour Market Services and Benefits Act so that it would support better the system of unemployment benefits; on top of the provision of active measures, questions of monitoring and sanctions should also be dealt with.

In addition to a seemingly quite high spike at the end of the benefit period compared to the other countries, it is also quite unusual that the hazard of leaving unemployment for employment drops very fast after the spike. Search theory would rather expect that the hazard rate should stabilise at a higher level as the search intensity and the job search environment stay the same, so search theory would assume that income and leisure are complements (Meyer (1990)). However, the Estonian data suggest that income and leisure are substitutes, and hence after the period of unemployment benefits people are not driven towards a new income, but increasingly devote their time to leisure. However, a more likely explanation for this phenomenon is to be found in the model proposed by Boone and van Ours (2009). They argue that the spike at the end of benefit period could at least partly be explained by optimised timing of job starting dates. If this is the case, it is expected that there should be a fall in the hazard rate for leaving unemployment for employment after the benefit period, as a large share of exits to employment have been accumulated in one period. As the Estonian labour market is quite small and it is often hard for employers to find employees whose skills match the job well, it is likely that employers are indeed willing to wait for the employee and basically agree beforehand that the employee will start the job in one or two months. This is especially likely with more highly qualified specialists.

If it is the case that the unemployed negotiate with the employer to postpone their employment period in order to first exhaust their benefit, it is still to be considered as a disincentive effect of unemployment benefits. It still means that people do not have an incentive to take up a job before the end of the benefit period. However, it is probably not too easy to change this behaviour by regulation of the unemployment benefit system. It might be lessened to some extent by better monitoring of job search and sanctioning, because if it is harder to prove their eligibility for benefits, a person could decide to start working sooner. Another concern is the attitude of people that they are willing to live on

benefits even though a job is waiting. This however, cannot be changed by the system.

In conclusion, the results of this thesis indicate that on the one hand, it might be quite difficult to become eligible for unemployment benefits particularly for the unemployment insurance benefit that has a higher level. This is reflected in the data for spending on unemployment benefits per unemployed person when Estonia is compared with other EU countries. On the other hand, once a person becomes eligible for unemployment benefits, it seems quite easy to stay on the benefit. This is reflected in the estimation results for the disincentive effects as well as in the relatively high spikes in the hazard rates for leaving unemployment for employment at the end of the benefit period.

It can be argued that this kind of system might not incur very good results in labour market outcomes. On the one hand there is a large proportion of the unemployed who do not have income or have a very low income during their unemployment period and so lack any subsidy for job search and might lose in their post-unemployment job quality. On the other hand there are some unemployed who have a higher level of income and can prolong their job search. It is shown in this thesis that at least some part of this prolonging takes place because people wait for a more suitable job offer during their benefit period and thus are more selective about the job offers received. However, there might still be a lower job search intensity during the unemployment benefit period due to the disincentive effect as the monitoring of job search is at rather a low level.

This all suggests that the level of post-unemployment job quality and the level of job search intensity in the Estonian unemployment benefit system could be increased. This could be achieved by covering more unemployed with unemployment insurance benefits while increasing the job search monitoring and job search activation during the benefit period. In this way more people would have access to a job search subsidy, but in order to keep the subsidy, they have to make more effort to look for a new job.

The increase in the coverage rate of the unemployed with unemployment benefits is especially important in times of crisis as there tends to be an increase in the share of the unemployed without benefits that emerges during a crisis and the match quality between jobs and workers tends to be worse during economic difficulties. This means that unemployed people without a job search subsidy are willing to take any of the few job offers available regardless of whether it matches their skills. This is reflected in the estimation results of this thesis that unemployment benefits have less impact on unemployment duration during a crisis period. In addition, it is reflected in the results that the job match quality (post-unemployment job quality) drops significantly just at the end of benefit period. When there are no or very low unemployment benefits the match quality of jobs and workers in the economy can suffer and incur a welfare loss. The current system can be improved in this respect by extending the potential unemployment benefit period when economic conditions are worse, although in

order to limit a fall in job search activity due to longer unemployment benefit periods, proper monitoring and activation should accompany the benefit extensions.

In short, the analyses presented in the thesis suggest that there might be welfare effects if the system of unemployment benefits in Estonia were made more generous, particularly in terms of the potential benefit period, which was analysed more thoroughly. However, from previous studies conducted in other countries, it can be concluded that it might be reasonable to increase monitoring and sanctioning in the Estonian unemployment benefit system too, so that instead of the current situation where it is hard to start receiving benefits and easy to stay on benefits, the system should be changed so that it would be easier to start receiving benefits, but harder to stay on benefits.

This thesis studies the effects of unemployment benefits on labour market outcomes. However, when assessing the overall effects of unemployment benefit systems on the economy, several other important aspects have to be considered. The most important aspect of unemployment benefits is the reason why unemployment benefit systems are created in the first place – to provide some level of social security during periods of unemployment. This implies that unemployment benefits are intended to smooth out somewhat the fluctuations in income and hence also the fluctuations in internal demand, and thus unemployment benefits are particularly important in times of crisis to maintain the level of consumption and internal demand, to prevent a rise in poverty, to restrict a rise in inequality in the society, to preserve social cohesion, to avoid social exclusion, and for much more.

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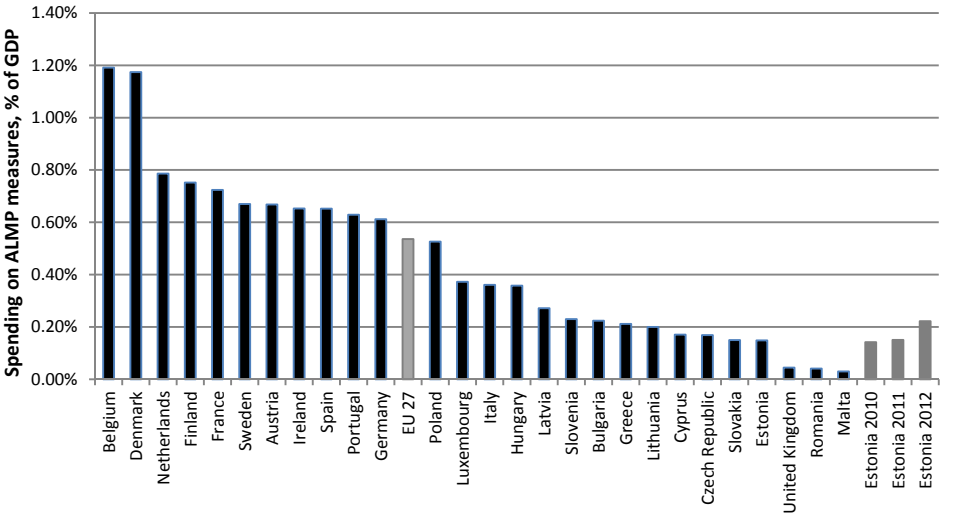
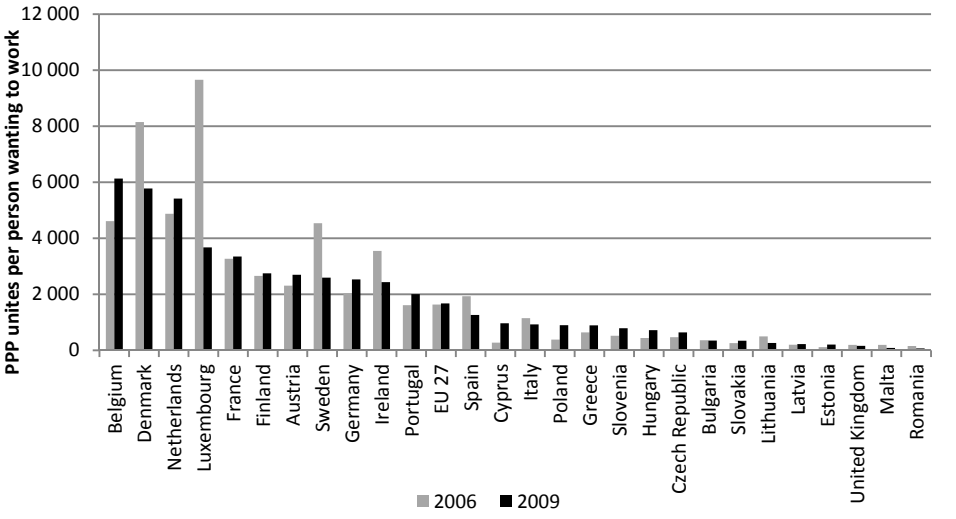
APPENDICES

Appendix 1. Spending on active labour market measures in the EU in 2009



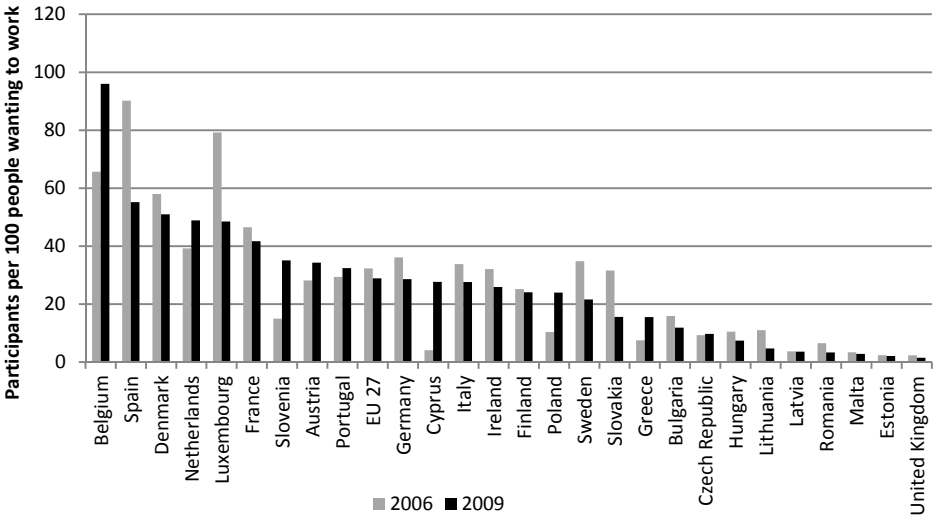
Source: Eurostat, Estonian Unemployment Insurance Fund
Note: categories 2–7 from the classification of labour market policies considered.

Appendix 2. Spending on ALMP in PPP units per person wanting to work in the EU in 2006 and 2009



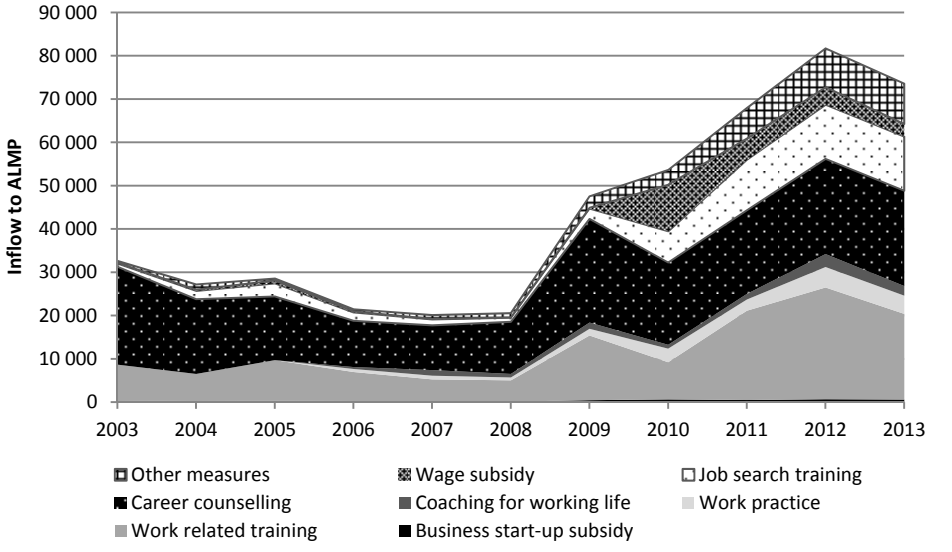
Source: Eurostat
Note: categories 2–7 from the classification of labour market policies considered. Persons wanting to work include unemployed (according to the ILO definition) and the labour reserve (inactive persons wanting to work i.e. discouraged unemployed).

Appendix 3. Participants in ALMP per 100 persons wanting to work in the EU in 2006 and 2009



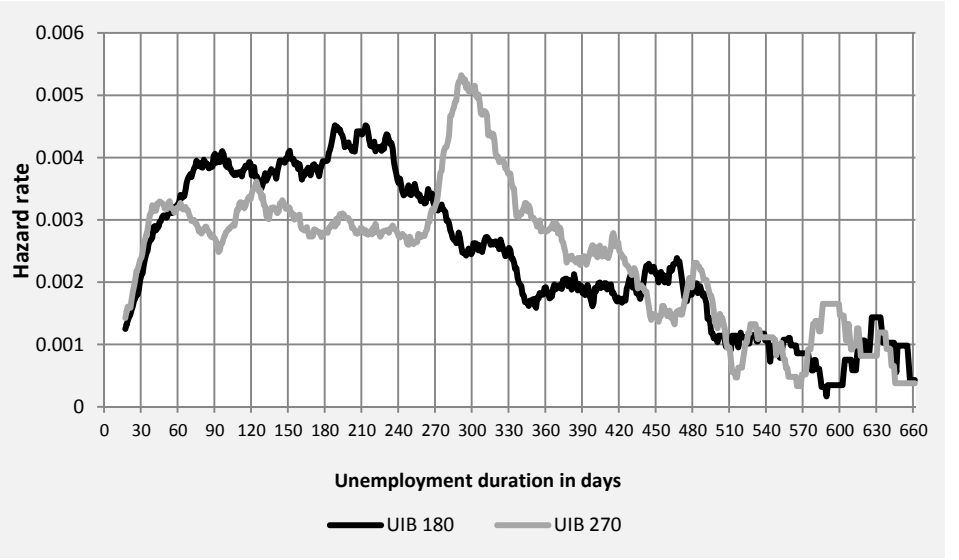
Source: Eurostat
Note: categories 2–7 from the classification of labour market policies considered. Persons wanting to work include unemployed (according to the ILO definition) and the labour reserve (inactive persons wanting to work i.e. discouraged unemployed).

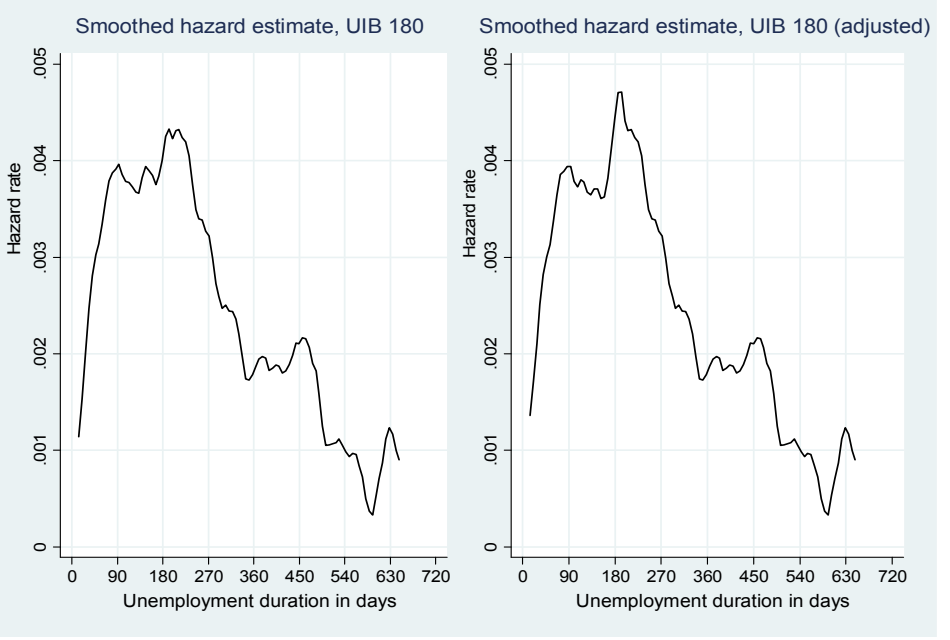
Appendix 4. Inflow to active labour market measures in Estonia 2003–2013



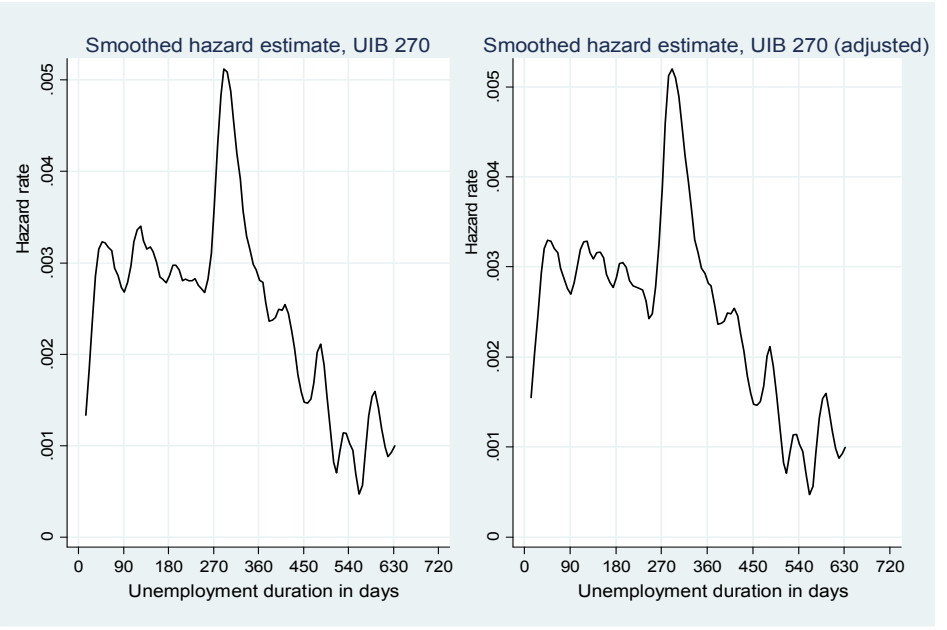
Source: Estonian Unemployment Insurance Fund
Note: inflow depicts different entries to measures, not different people (one person can receive several measures).

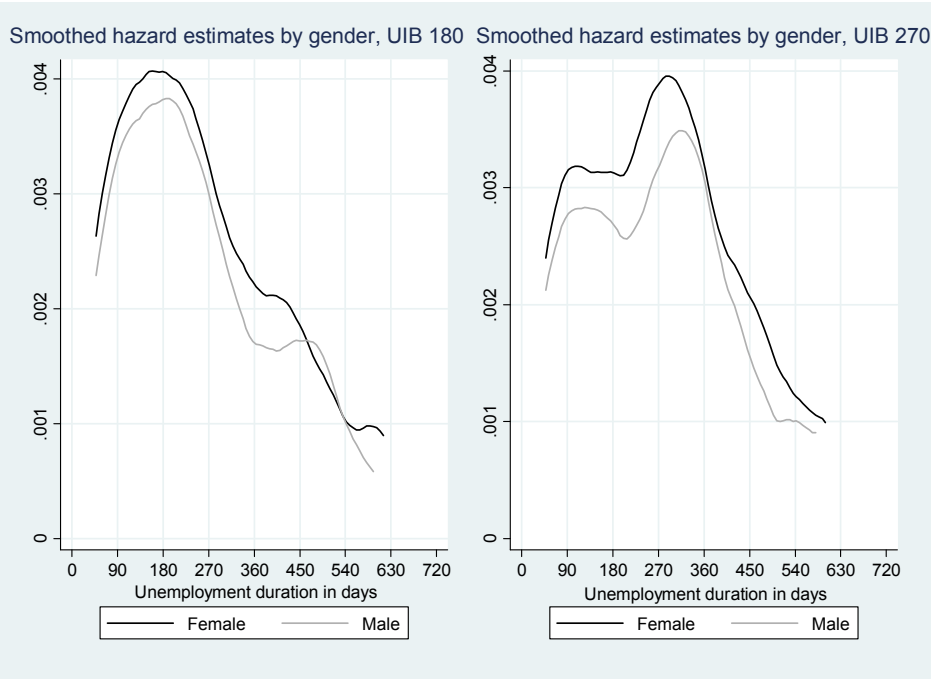
Appendix 5. Smoothed hazard rates for exiting into employment (pre-crisis period)



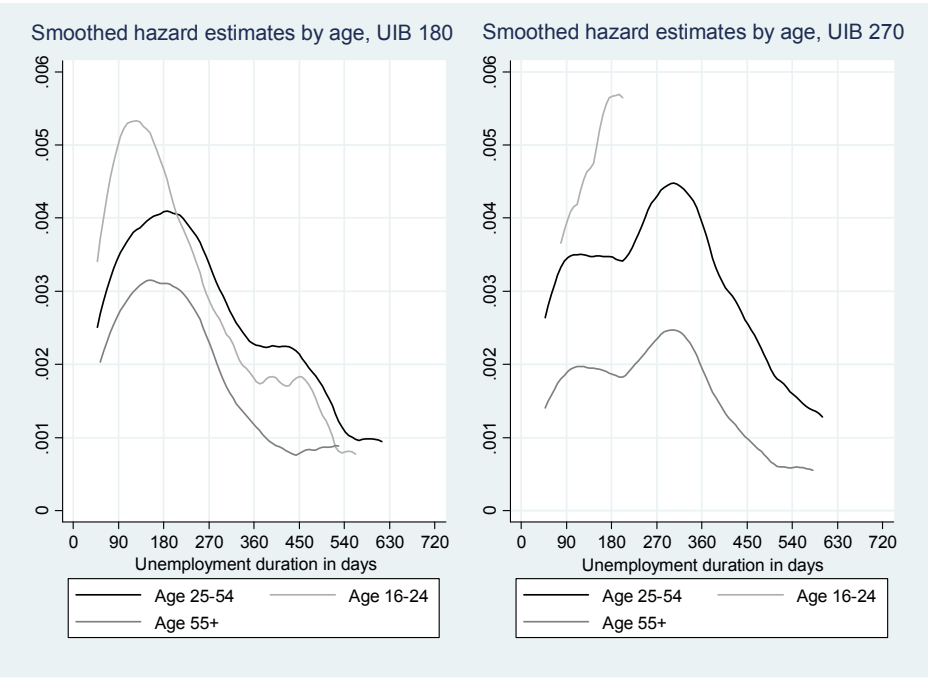


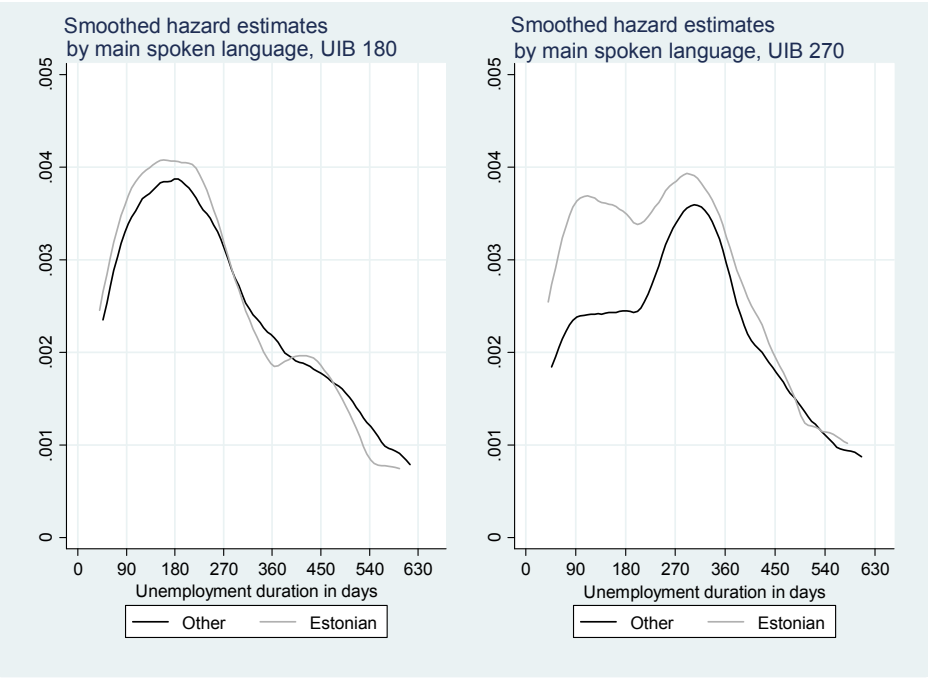
Appendix 5 (*continued*)



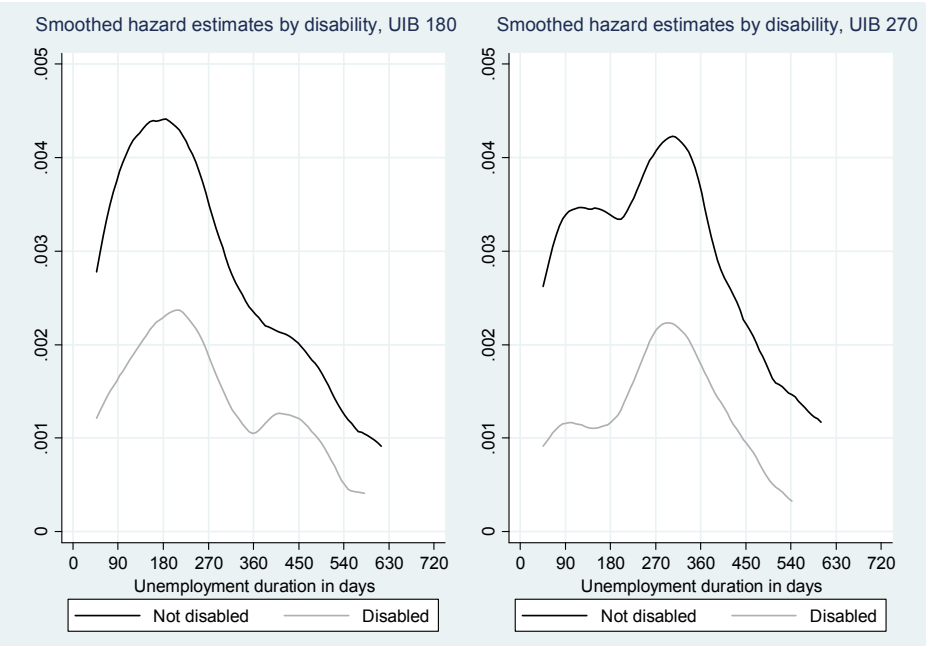


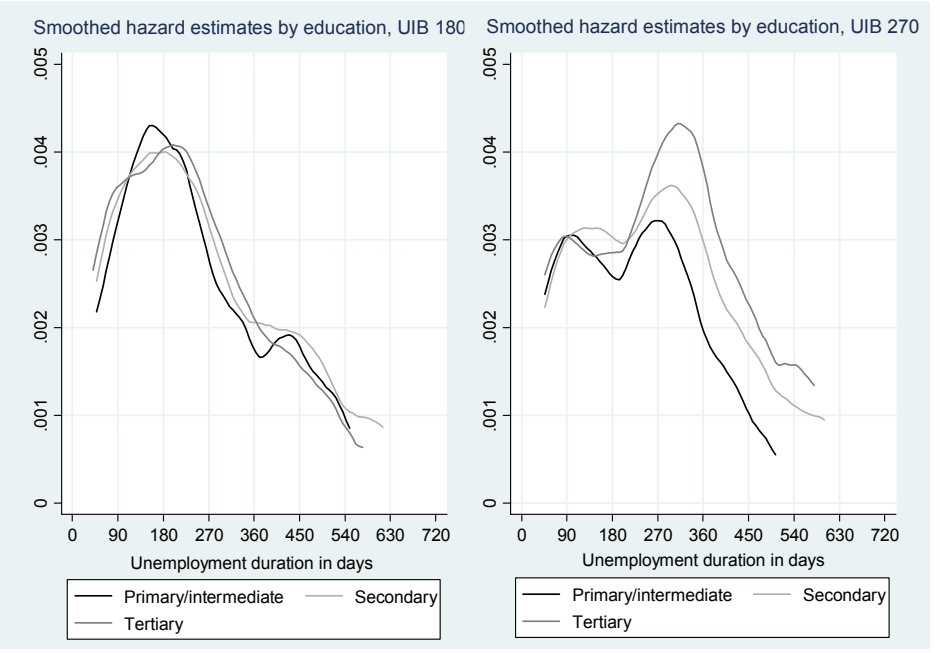
Appendix 5 (*continued*)



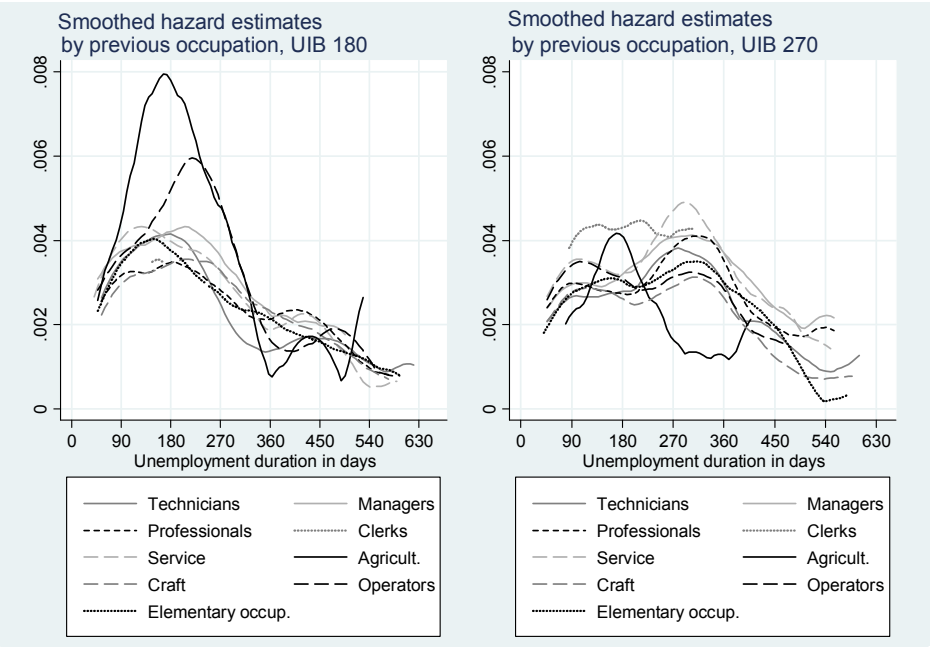


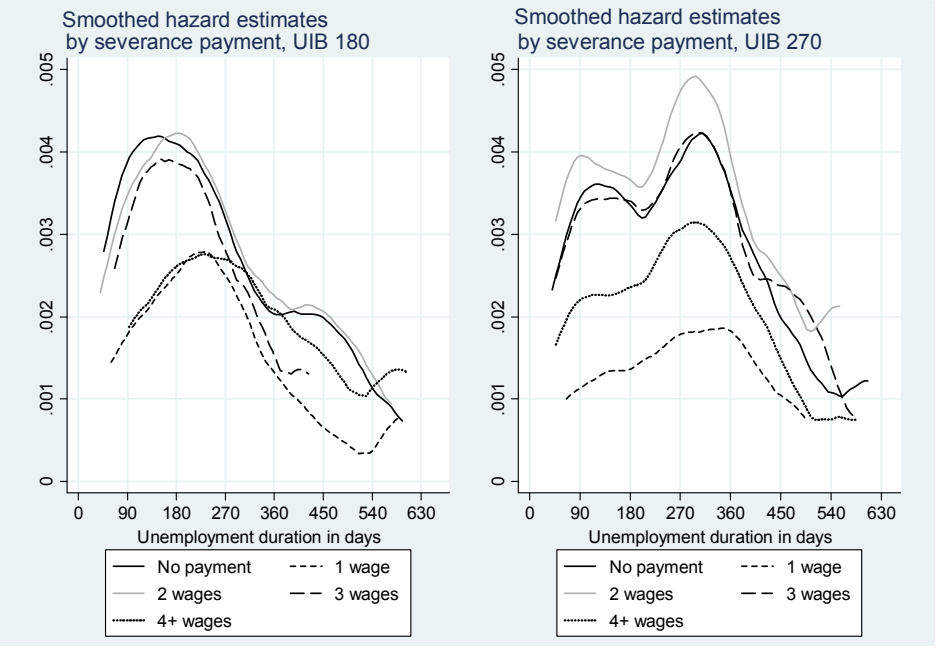
Appendix 5 (*continued*)



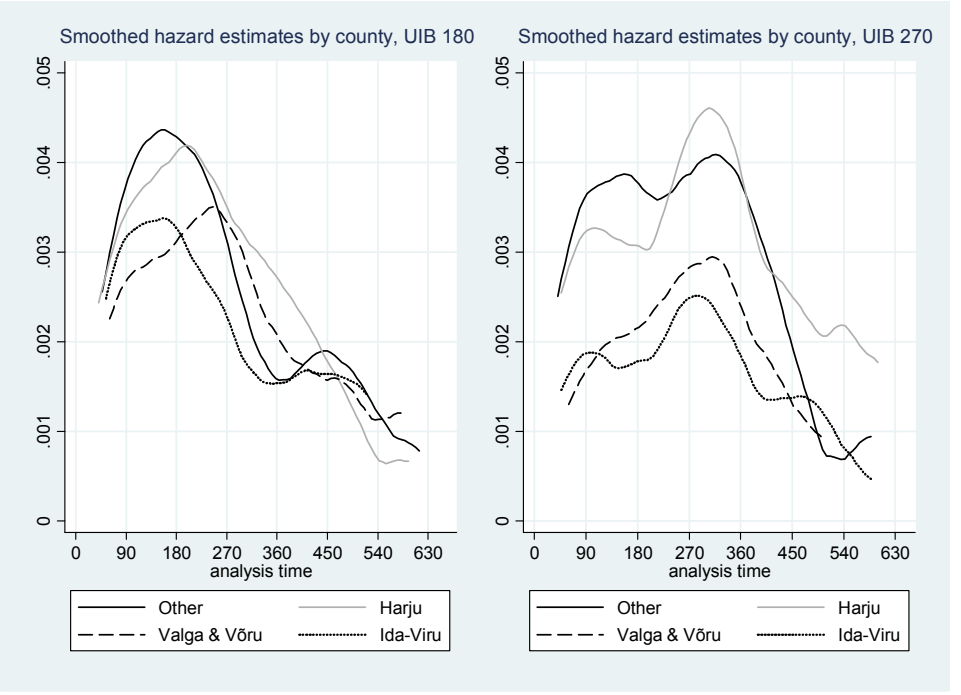


Appendix 5 (*continued*)





Appendix 5 (*continued*)



Appendix 6. Estimation results of piecewise-constant proportional hazard models (pre-crisis period)

Covariate	Compared to	UIB 180		UIB 270		All UIB	
		Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z
Any amount of benefit	No benefit	0.260	0.000	0.665	0.280	0.401	0.000
60 days before UIB exhaustion	All other periods	1.672	0.000	0.877	0.674	1.304	0.000
60 days before UA exhaustion		2.623	0.000	2.351	0.262	1.740	0.000
60 days after UIB exhaustion		0.995	0.975	1.340	0.389	1.083	0.278
60 days after UA exhaustion		0.957	0.760	0.000	1.000	0.705	0.003
Male	Female	0.830	0.006	0.823	0.000	0.838	0.000
Age 16–24	Age 25–54	1.172	0.126	1.038	0.908	1.031	0.736
Age 55+		0.741	0.002	0.538	0.000	0.598	0.000
Main language Estonian	Other language	1.158	0.038	1.350	0.000	1.284	0.000
Disabled	Not disabled	0.410	0.000	0.504	0.000	0.445	0.000
Living in a town	Countryside	1.006	0.935	1.093	0.129	1.049	0.319
Previous occupation:							
Managers	Technicians	0.933	0.657	0.955	0.637	0.952	0.572
Professionals		0.968	0.838	1.053	0.639	1.005	0.960
Clerks		0.764	0.065	0.971	0.769	0.882	0.146
Service and sales workers		0.983	0.886	1.177	0.080	1.060	0.434
Agriculturists		0.887	0.606	1.136	0.610	1.020	0.904
Craft and related trades workers		0.856	0.210	1.042	0.660	0.961	0.601
Plant and machine operators		1.252	0.094	1.179	0.074	1.210	0.015
Elementary occupations		0.885	0.298	1.104	0.263	0.996	0.954
Education:							
Elementary or less	General secondary education	0.787	0.474	1.771	0.055	1.174	0.483
Basic		0.857	0.127	1.064	0.493	0.934	0.321
Vocational secondary		1.058	0.478	1.188	0.007	1.125	0.020
Professional secondary		1.023	0.834	1.145	0.108	1.089	0.213
Vocational higher		1.329	0.088	1.277	0.062	1.325	0.008
Bachelor's studies		1.116	0.376	1.096	0.307	1.101	0.200
Master's or doctoral studies		1.374	0.116	1.249	0.098	1.239	0.067
Tenure 1–5 years	Tenure <1 year	0.737	0.000	0.993	0.934	0.809	0.000
Tenure 5–10 years		0.550	0.002	0.840	0.056	0.828	0.012
Tenure 10+ years		0.473	0.000	0.657	0.000	0.618	0.000
Prev. job in Estonian public sector	Estonian private sector	0.697	0.122	1.268	0.042	1.109	0.344
Prev. job abroad		0.217	0.000	0.383	0.011	0.254	0.000
Reason for unemployment:							
Unsuitability for the job	End of fixed-term contract	0.727	0.031	0.771	0.050	0.721	0.001
Long-term incapacity for work		0.522	0.015	0.731	0.291	0.557	0.003
Unsatisfactory results of a probationary period		1.143	0.327	1.212	0.182	1.158	0.136
Violation by employer		0.946	0.699	1.100	0.452	1.031	0.749
Bankruptcy		1.206	0.331	1.350	0.060	1.209	0.126
Liquidation of the organisation		0.848	0.326	1.486	0.002	1.166	0.136
Lay-off		1.009	0.919	1.146	0.123	1.071	0.259

Appendix 6 (*continued*)

Covariate	UIB 180		UIB 270		All UIB	
	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z
Anticipation period of training	0.086	0.001	0.089	0.000	0.089	0.000
Anticipation period of job search training	0.000	0.999	0.166	0.073	0.098	0.020
Anticipation period of Estonian course	0.352	0.145	0.000	1.000	0.158	0.009
Anticipation period of counselling	0.168	0.000	0.205	0.000	0.189	0.000
Training period	0.117	0.000	0.099	0.000	0.106	0.000
Job search training period	0.158	0.068	0.225	0.010	0.199	0.001
Estonian course period	0.037	0.001	0.195	0.000	0.131	0.000
Work practice period	0.242	0.000	0.219	0.000	0.221	0.000
Post-training	1.153	0.159	1.257	0.001	1.244	0.000
After job search training	0.854	0.472	1.182	0.175	1.071	0.542
After Estonian course	1.092	0.727	0.924	0.668	0.993	0.962
After work practice	1.883	0.007	1.574	0.020	1.643	0.001
Post-counselling	0.845	0.022	0.968	0.562	0.911	0.040
Monthly regional registered unemployment rate (in percentage points)	0.958	0.061	0.889	0.000	0.913	0.000
Monthly change in registered unemployment rate (in percentage points)	0.403	0.000	0.790	0.220	0.602	0.000
Monthly inflow of registered vacancies (in hundreds)	0.988	0.022	0.978	0.000	0.982	0.000
day 1–10	0.013	0.000	0.004	0.000	0.008	0.000
day 11–20	0.016	0.000	0.006	0.000	0.010	0.000
day 21–30	0.015	0.000	0.007	0.000	0.011	0.000
day 31–40	0.024	0.000	0.009	0.000	0.016	0.000
day 41–50	0.036	0.000	0.011	0.000	0.022	0.000
day 51–60	0.029	0.000	0.011	0.000	0.020	0.000
day 61–70	0.029	0.000	0.008	0.000	0.017	0.000
day 71–80	0.044	0.000	0.011	0.000	0.024	0.000
day 81–90	0.053	0.000	0.010	0.000	0.026	0.000
day 91–100	0.031	0.000	0.007	0.000	0.016	0.000
day 101–110	0.056	0.000	0.009	0.000	0.025	0.000
day 111–120	0.045	0.000	0.015	0.000	0.028	0.000
day 121–130	0.026	0.000	0.011	0.000	0.020	0.000
day 131–140	0.028	0.000	0.011	0.000	0.021	0.000
day 141–150	0.038	0.000	0.011	0.000	0.025	0.000
day 151–160	0.030	0.000	0.012	0.000	0.023	0.000
day 161–170	0.031	0.000	0.009	0.000	0.020	0.000
day 171–180	0.038	0.000	0.010	0.000	0.024	0.000
day 181–190	0.023	0.000	0.013	0.000	0.020	0.000
day 191–200	0.038	0.000	0.012	0.000	0.025	0.000
day 201–210	0.035	0.000	0.010	0.000	0.022	0.000
day 211–220	0.026	0.000	0.011	0.000	0.017	0.000
day 221–230	0.037	0.000	0.014	0.000	0.024	0.000
day 231–240	0.025	0.000	0.014	0.000	0.019	0.000
day 241–250	0.018	0.000	0.012	0.000	0.015	0.000
day 251–260	0.026	0.000	0.011	0.000	0.019	0.000
day 261–270	0.026	0.000	0.014	0.000	0.020	0.000
day 271–280	0.025	0.000	0.007	0.000	0.014	0.000
day 281–290	0.018	0.000	0.011	0.000	0.018	0.000

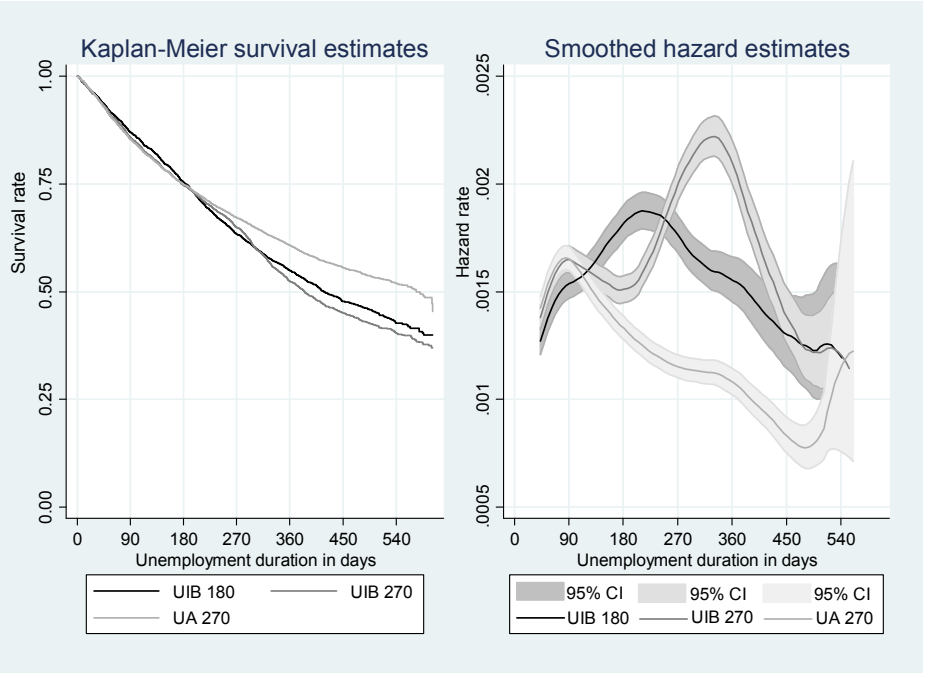
Appendix 6 (*continued*)

Covariate	UIB 180		UIB 270		All UIB	
	Hazard ratio	**P>z**	**Hazard ratio**	**P>z**	**Hazard ratio**	**P>z**
day 291–300	0.015	0.000	0.014	0.000	0.021	0.000
day 301–310	0.014	0.000	0.009	0.000	0.015	0.000
day 311–320	0.017	0.000	0.011	0.000	0.018	0.000
day 321–330	0.020	0.000	0.010	0.000	0.019	0.000
day 331–340	0.012	0.000	0.007	0.000	0.012	0.000
day 341–350	0.013	0.000	0.006	0.000	0.009	0.000
day 351–360	0.013	0.000	0.016	0.000	0.017	0.000
day 361–370	0.016	0.000	0.008	0.000	0.012	0.000
day 371–380	0.016	0.000	0.007	0.000	0.011	0.000
day 381–390	0.018	0.000	0.012	0.000	0.016	0.000
day 391–400	0.013	0.000	0.005	0.000	0.008	0.000
day 401–410	0.014	0.000	0.009	0.000	0.012	0.000
day 411–420	0.019	0.000	0.013	0.000	0.017	0.000
day 421–430	0.012	0.000	0.008	0.000	0.011	0.000
day 431–440	0.012	0.000	0.003	0.000	0.007	0.000
day 441–450	0.023	0.000	0.009	0.000	0.015	0.000
day 451–460	0.024	0.000	0.004	0.000	0.012	0.000
day 461–470	0.008	0.000	0.005	0.000	0.007	0.000
day 471–480	0.028	0.000	0.006	0.000	0.014	0.000
day 481–490	0.010	0.000	0.009	0.000	0.011	0.000
day 491–500	0.013	0.000	0.009	0.000	0.012	0.000
day 501–530	0.011	0.000	0.002	0.000	0.005	0.000
day 531–560	0.010	0.000	0.005	0.000	0.007	0.000
day 561–590	0.009	0.000	0.004	0.000	0.006	0.000
day 591–620	0.010	0.000	0.005	0.000	0.007	0.000
day 621–692	0.013	0.000	0.004	1.000	0.007	0.000
θ (variance of gamma shared frailty; Likelihood-ratio test of θ =0)	0.796	0.260	0.294	0.001	0.570	0.001
Wald test	21830.76	0.000	33025.96	0.000	52224.41	0.000
No. of observations	73299		83969		157268	
No. of subjects	2942		3304		6172	
No. of failures	2306		2477		4783	

Note: The results for 270-day-UIB recipients might be influenced by the fact that there are very few observations with UA after UIB.

There is no anticipation period for work practice included in the model due to too few observations.

Appendix 7. Kaplan-Meier survival estimates and smoothed hazard rates for exiting into employment (crisis period)



Appendix 8. Estimation results from piecewise-constant proportional hazard models (crisis period)

Covariate	Com-pared to	UIB 180		UIB 270		All UIB		UA	
		Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z
Any amount of benefit	No benefit	0.268	0.000	0.507	0.000	0.437	0.000	0.421	0.000
60 days before UIB exhaustion	All other periods	1.022	0.891	1.520	0.004	1.225	0.000	x	x
60 days before UA exhaustion		2.953	0.000	0.796	0.652	1.413	0.000	1.496	0.000
60 days after UIB exhaustion		0.835	0.206	1.221	0.207	1.122	0.007	x	x
60 days after UA exhaustion		1.194	0.023	0.985	0.967	0.840	0.004	0.693	0.002
Male	Female	0.825	0.000	0.819	0.000	0.831	0.000	0.984	0.571
Age 16–24	Age 25–54	1.190	0.000	1.192	0.283	1.002	0.958	1.142	0.000
Age 55+		0.638	0.000	0.572	0.000	0.587	0.000	0.643	0.000
Main language Estonian	Other language	1.520	0.000	1.414	0.000	1.504	0.000	1.444	0.000
Disabled	Not disabled	0.744	0.000	0.688	0.000	0.689	0.000	0.407	0.000
Living in a town	Country-side	1.080	0.045	0.992	0.778	1.036	0.142	1.080	0.007
Previous job:	Technician								
Manager		1.042	0.623	1.027	0.640	1.037	0.459	1.102	0.187
Professional		0.980	0.824	1.054	0.408	1.035	0.520	1.141	0.063
Clerk		0.975	0.765	1.009	0.891	1.000	0.993	0.997	0.960
Service and sales worker		1.003	0.962	1.193	0.002	1.099	0.037	1.051	0.344
Agriculturist		1.304	0.093	0.940	0.632	1.057	0.588	1.066	0.588
Craft and related trades worker		0.802	0.001	0.964	0.464	0.892	0.005	0.855	0.004
Plant and machine operator		0.884	0.110	1.037	0.497	0.988	0.786	1.049	0.427
Elementary occupation		0.852	0.020	1.068	0.210	0.971	0.499	0.901	0.051
Education:	General secondary education								
Elementary or less		0.873	0.297	0.833	0.258	0.808	0.037	0.629	0.000
Basic		0.921	0.105	0.916	0.058	0.889	0.001	0.809	0.000
Vocational secondary		1.076	0.085	1.049	0.140	1.066	0.016	1.022	0.477
Professional secondary		1.153	0.037	1.076	0.143	1.102	0.020	1.016	0.763
Vocational higher		1.260	0.019	1.264	0.002	1.267	0.000	1.254	0.002
Bachelor		1.189	0.010	1.168	0.002	1.173	0.000	1.231	0.000
Master or doctor		1.560	0.000	1.207	0.004	1.312	0.000	1.222	0.029
Tenure 1–5 years	Tenure <1 year	0.827	0.000	0.901	0.010	0.850	0.000	0.802	0.000
Tenure 5–10 years		0.867	0.458	0.773	0.000	0.836	0.000	0.748	0.000
Tenure 10+ years		0.891	0.589	0.646	0.000	0.680	0.000	0.805	0.003

Appendix 8 (*continued*)

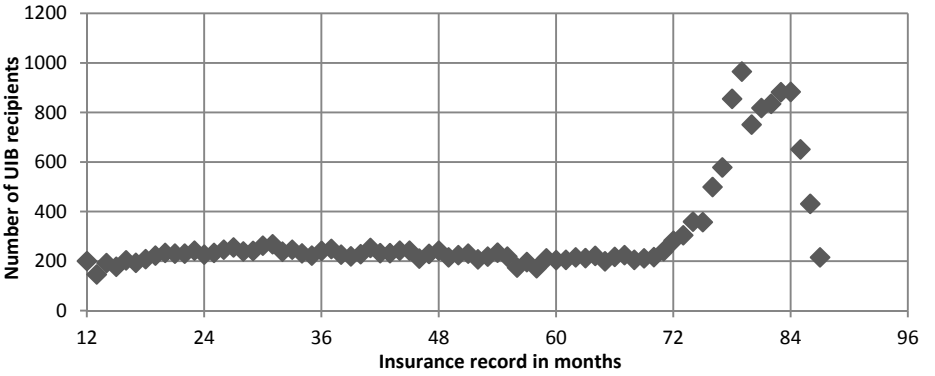
Covariate	Com-pared to	UIB 180		UIB 270		All UIB		UA	
		Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z
Prev. job in Estonian public sector	Estonian private sector	1.535	0.007	1.163	0.070	1.228	0.007	x	x
Prev. job abroad		0.452	0.000	0.526	0.000	0.467	0.000	x	x
Reason for unempl.:									
Unsuitability		0.747	0.004	0.725	0.000	0.728	0.000	x	x
Long-term incapacity		0.675	0.062	0.511	0.001	0.578	0.000	x	x
Unsatisfactory results of a probationary period	End of fixed-term	0.854	0.010	1.070	0.258	0.951	0.254	x	x
Violation by employer	contract	0.988	0.848	1.132	0.022	1.092	0.035	x	x
Bankruptcy		0.871	0.195	1.083	0.293	1.018	0.773	x	x
Liquidation		0.753	0.071	1.004	0.968	0.921	0.348	x	x
Lay-off		0.975	0.565	1.012	0.778	1.009	0.769	x	x
Reason for unempl.:									
Mutual agreement	All other	x	x	x	x	x	x	1.506	0.000
Initiative of employee	reasons	x	x	x	x	x	x	1.468	0.000
Employee's breach of duties	(involunt. unempl.)	x	x	x	x	x	x	1.018	0.816
Anticipation of training		0.199	0.000	0.097	0.000	0.132	0.000	0.155	0.000
Anticipation of job search training		0.108	0.026	0.198	0.001	0.172	0.000	0.166	0.002
Anticipation of Estonian course		0.145	0.054	0.082	0.012	0.105	0.001	0.224	0.010
Anticipation of work practice		0.104	0.024	0.115	0.002	0.110	0.000	0.418	0.021
Anticipation of counselling		0.279	0.000	0.274	0.000	0.276	0.000	0.304	0.000
Training period		0.210	0.000	0.215	0.000	0.212	0.000	0.211	0.000
Job search training period		0.286	0.078	0.307	0.009	0.306	0.002	0.144	0.006
Estonian course period		0.086	0.001	0.117	0.000	0.105	0.000	0.311	0.000
Work practice period		0.243	0.000	0.432	0.000	0.364	0.000	0.427	0.000
Post-training		1.201	0.001	1.244	0.000	1.243	0.000	1.368	0.000
After job search training		0.924	0.560	0.919	0.310	0.939	0.386	0.874	0.158
After Estonian course		1.329	0.118	1.028	0.839	1.096	0.407	1.495	0.001
After work practice		2.010	0.000	3.003	0.000	2.700	0.000	2.844	0.000
Post-counselling		0.991	0.842	1.137	0.000	1.070	0.022	0.993	0.828
Monthly regional registered unemployment rate (in percentage points)		0.988	0.060	0.975	0.000	0.979	0.000	0.962	0.000
Monthly change in registered unemployment rate (in percentage points)		0.445	0.000	0.534	0.000	0.499	0.000	0.492	0.000
Monthly inflow of registered vacancies (in hundreds)		1.027	0.000	1.045	0.000	1.039	0.000	1.024	0.000
day 1–10		0.011	0.000	0.004	0.000	0.006	0.000	0.004	0.000
day 11–20		0.009	0.000	0.005	0.000	0.005	0.000	0.005	0.000
day 21–30		0.010	0.000	0.005	0.000	0.005	0.000	0.006	0.000
day 31–40		0.011	0.000	0.005	0.000	0.006	0.000	0.007	0.000
day 41–50		0.013	0.000	0.006	0.000	0.007	0.000	0.008	0.000
day 51–60		0.010	0.000	0.006	0.000	0.006	0.000	0.007	0.000
day 61–70		0.010	0.000	0.005	0.000	0.006	0.000	0.007	0.000

Appendix 8 (*continued*)

Covariate	UIB 180		UIB 270		All UIB		UA	
	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z
day 71–80	0.011	0.000	0.006	0.000	0.007	0.000	0.007	0.000
day 81–90	0.011	0.000	0.006	0.000	0.007	0.000	0.006	0.000
day 91–100	0.009	0.000	0.004	0.000	0.005	0.000	0.005	0.000
day 101–110	0.009	0.000	0.005	0.000	0.005	0.000	0.006	0.000
day 111–120	0.010	0.000	0.005	0.000	0.006	0.000	0.005	0.000
day 121–130	0.007	0.000	0.004	0.000	0.004	0.000	0.005	0.000
day 131–140	0.011	0.000	0.005	0.000	0.005	0.000	0.006	0.000
day 141–150	0.011	0.000	0.005	0.000	0.006	0.000	0.005	0.000
day 151–160	0.009	0.000	0.004	0.000	0.005	0.000	0.005	0.000
day 161–170	0.012	0.000	0.005	0.000	0.006	0.000	0.005	0.000
day 171–180	0.012	0.000	0.005	0.000	0.006	0.000	0.005	0.000
day 181–190	0.006	0.000	0.004	0.000	0.004	0.000	0.004	0.000
day 191–200	0.009	0.000	0.004	0.000	0.005	0.000	0.004	0.000
day 201–210	0.010	0.000	0.005	0.000	0.006	0.000	0.004	0.000
day 211–220	0.009	0.000	0.003	0.000	0.005	0.000	0.004	0.000
day 221–230	0.005	0.000	0.003	0.000	0.004	0.000	0.003	0.000
day 231–240	0.006	0.000	0.003	0.000	0.005	0.000	0.002	0.000
day 241–250	0.004	0.000	0.002	0.000	0.003	0.000	0.002	0.000
day 251–260	0.004	0.000	0.004	0.000	0.005	0.000	0.003	0.000
day 261–270	0.005	0.000	0.004	0.000	0.006	0.000	0.002	0.000
day 271–280	0.004	0.000	0.002	0.000	0.003	0.000	0.002	0.000
day 281–290	0.003	0.000	0.003	0.000	0.003	0.000	0.002	0.000
day 291–300	0.003	0.000	0.004	0.000	0.004	0.000	0.002	0.000
day 301–310	0.003	0.000	0.002	0.000	0.003	0.000	0.002	0.000
day 311–320	0.003	0.000	0.003	0.000	0.003	0.000	0.002	0.000
day 321–330	0.003	0.000	0.003	0.000	0.004	0.000	0.002	0.000
day 331–340	0.001	0.000	0.002	0.000	0.002	0.000	0.002	0.000
day 341–350	0.002	0.000	0.003	0.000	0.003	0.000	0.002	0.000
day 351–360	0.003	0.000	0.003	0.000	0.003	0.000	0.001	0.000
day 361–370	0.002	0.000	0.002	0.000	0.002	0.000	0.001	0.000
day 371–380	0.003	0.000	0.003	0.000	0.003	0.000	0.002	0.000
day 381–390	0.003	0.000	0.003	0.000	0.003	0.000	0.001	0.000
day 391–400	0.002	0.000	0.002	0.000	0.002	0.000	0.001	0.000
day 401–430	0.003	0.000	0.002	0.000	0.002	0.000	0.001	0.000
day 431–460	0.002	0.000	0.001	0.000	0.002	0.000	0.001	0.000
day 461–490	0.001	0.000	0.002	0.000	0.002	0.000	0.001	0.000
day 491–520	0.002	0.000	0.001	0.000	0.002	0.000	0.001	0.000
day 521–550	0.002	0.000	0.001	0.000	0.002	0.000	0.001	0.000
day 551–602	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000
θ (variance of gamma shared frailty; Likeli-hood-ratio test of θ =0)	0.466	0.006	0.193	0.000	0.400	0.000	0.053	0.085
Wald test	75508.1	0.000	118508.72	0.000	184010.14	0.000	141012.17	0.000
No. of observations	300890		393615		694505		542067	
No. of subjects	10148		13232		23380		17645	
No. of failures	5076		7107		12183		7594	

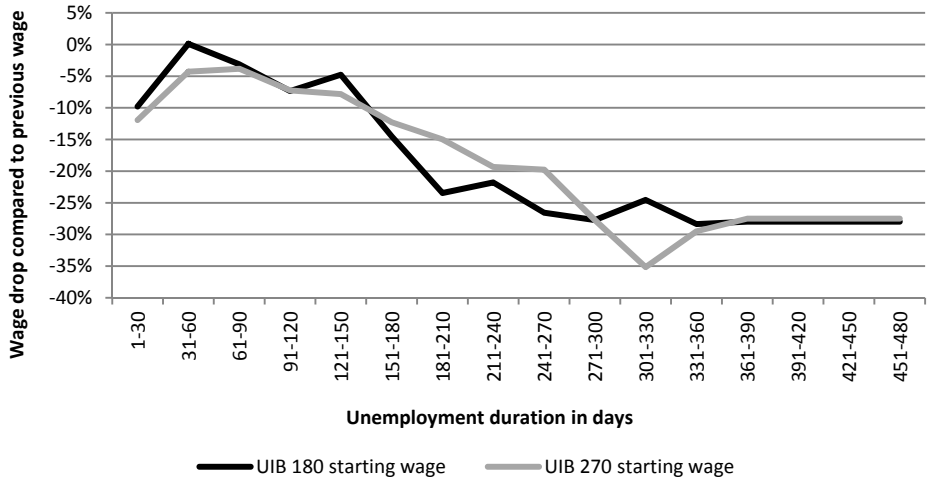
Note: The results for 270-day-UIB recipients might be influenced by the fact that there are very few observations with UA after UIB.

Appendix 9. Number of UIB recipients on the basis of their previous UI contributions (crisis period)



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.

Appendix 10. The change in the starting wage compared to the previous wage for UIB recipients with previous record of UI contributions of 32–79 months



Appendix 11. Description of UIB recipients with previous record of UI contributions of 32–79 months who entered employment

Variable	UIB 270, contributions of 56–79 months	UIB 180, contributions of 32–55 months	% bias	p>|t|
Beginning of benefit:				
IV Q 2008	0.236	0.246	–2.1	0.455
III Q 2008	0.275	0.124	38.5	0.000
I Q 2009	0.462	0.587	–25.2	0.000
Male	0.548	0.527	4.1	0.148
Age	41.4	35.3	57.1	0.000
Previous wage (EEK)	12571	11423	15.1	0.000
Education:				
General secondary	0.299	0.303	–0.8	0.770
Elementary or less	0.005	0.014	–8.6	0.002
Basic	0.130	0.155	–6.9	0.015
Vocational secondary	0.314	0.301	2.8	0.328
Professional secondary	0.083	0.069	5.3	0.066
Vocational higher	0.031	0.040	–4.8	0.088
Bachelor	0.098	0.092	2	0.477
Master or doctor	0.039	0.026	7	0.014
Previous occupation:				
Technician	0.093	0.099	–2.2	0.435
Manager	0.109	0.089	6.9	0.016
Professional	0.064	0.057	3.1	0.271
Clerk	0.052	0.063	–4.5	0.113
Service and sales worker	0.113	0.137	–7.3	0.010
Agriculturist	0.012	0.010	2.4	0.404
Craft and related trades worker	0.268	0.289	–4.7	0.096
Plant and machine operator	0.134	0.098	11.2	0.000
Elementary occupation	0.156	0.160	–1.1	0.693
Main language Estonian	0.610	0.575	7.2	0.011
Living in a town	0.686	0.719	–7.2	0.012
Tenure on previous job less than 1 year	0.311	0.388	–16.2	0.000
Regional registered unemployment rate	5.3	5.9	–24.5	0.000

Appendix 12. Probit model for matching (starting wage)

Variable	Model no. 1 (all)		Model no. 2 (exit 1–150)		Model no. 3 (exit 151–240)		Model no. 4 (exit 271–360)	
	Coef.	P>z	Coef.	P>z	Coef.	P>z	Coef.	P>z
Beginning of benefit period: IV Q 2008								
III Q 2008	0.135	0.010	0.138	0.046	0.206	0.107	0.045	0.735
I Q 2009	0.096	0.030	0.000	0.998	0.042	0.642	0.163	0.050
Male	0.163	0.000	0.182	0.001	0.135	0.079	0.040	0.649
Age	0.269	0.000	0.291	0.000	0.310	0.000	0.167	0.000
Age square	–0.003	0.000	–0.003	0.000	–0.003	0.000	–0.001	0.000
Previous wage (EEK) / 1000	0.033	0.000	0.036	0.000	0.033	0.000	0.050	0.000
Education: general secondary								
Elementary or less	–0.143	0.351	–0.063	0.780	–0.592	0.080	0.206	0.597
Basic	0.022	0.649	–0.015	0.850	0.011	0.919	0.065	0.592
Vocational secondary	0.045	0.236	0.105	0.076	–0.004	0.957	0.077	0.423
Professional secondary	–0.141	0.019	–0.083	0.361	0.070	0.601	–0.446	0.003
Vocational higher	–0.108	0.210	–0.108	0.370	–0.290	0.184	–0.146	0.517
Bachelor	–0.115	0.060	–0.049	0.589	–0.174	0.193	–0.421	0.010
Master or doctor	–0.092	0.307	–0.155	0.228	–0.046	0.832	–0.122	0.635
Previous occupation: technician								
Manager	0.089	0.199	0.120	0.256	–0.037	0.800	0.156	0.396
Professional	0.173	0.032	0.178	0.126	0.129	0.502	0.120	0.580
Clerk	0.134	0.083	0.237	0.038	0.117	0.507	–0.020	0.921
Service and sales worker	–0.098	0.130	–0.040	0.682	–0.053	0.711	–0.372	0.027
Agriculturist	–0.312	0.039	–0.507	0.019	–0.188	0.565	–0.694	0.064
Craft worker	–0.030	0.615	0.018	0.850	0.016	0.901	–0.358	0.016
Plant and machine operator	0.129	0.054	0.229	0.034	0.204	0.140	–0.291	0.090
Elementary occupation	–0.010	0.872	0.043	0.665	0.025	0.851	–0.277	0.082
Main language Estonian	0.172	0.000	0.183	0.003	0.240	0.006	0.055	0.563
Reason for unemployment: end of fixed-term contract								
Unsuitability for the job	0.187	0.074	0.265	0.094	–0.244	0.385	0.103	0.655
Unsatisfactory results of a probationary period	0.231	0.000	0.143	0.113	0.398	0.010	0.120	0.479
Bankruptcy	0.520	0.000	0.692	0.000	0.173	0.337	0.603	0.002
Liquidation	0.549	0.000	0.652	0.000	0.498	0.141	0.349	0.241
Lay-off	0.461	0.000	0.480	0.000	0.458	0.000	0.517	0.000
Long-term incapacity	0.001	0.998	0.685	0.079	–0.160	0.767	–1.133	0.037
Violation by employer	0.474	0.000	0.648	0.000	0.463	0.000	0.567	0.000
Living in a town	0.064	0.071	–0.003	0.955	0.156	0.038	0.007	0.937
Region: Central and Western								
Northern	–0.026	0.491	0.010	0.869	–0.044	0.598	–0.099	0.283
Southern	–0.015	0.847	0.039	0.704	–0.263	0.128	–0.025	0.907
North-Eastern	0.123	0.097	0.130	0.138	–0.101	0.522	0.222	0.132
Disabled	–0.150	0.026	–0.204	0.056	–0.186	0.198	–0.044	0.785
Tenure on prev. job < 1 year	–0.133	0.001			–0.154	0.081		
Regional registered unemployment rate	–0.011	0.337			0.003	0.892		
Knowledge of English					–0.143	0.144		
Constant	–6.663	0.000	–7.176	0.000	–7.552	0.000	–4.630	0.000
Pseudo R2	0.199		0.208		0.207		0.225	
LR chi2	2404.9	0.000	1091.5	0.000	548.5	0.000	444.0	0.000
Number of observations	8834		3851		1913		1526	

Appendix 13. Unmatched and matched variables (starting wage)

Variable	Model no. 1 (all)					
	Unmatched			Matched		
	Treated (270)	Controls (180)	% bias	Treated (270)	Controls (180)	% bias
Beginning of benefit:						
IV Q 2008	0.239	0.264	–5.9	0.239	0.245	–1.3
III Q 2008	0.170	0.125	12.7	0.170	0.170	0.0
I Q 2009	0.555	0.568	–2.7	0.555	0.551	0.7
Male	0.559	0.524	7.1	0.559	0.554	1.1
Age	42.5	34.5	74.5	42.5	42.5	0.0
Previous wage (EEK)	13698	10592	38.6	13651	13852	–2.5
Education:						
General secondary	0.298	0.302	–0.9	0.299	0.297	0.3
Elementary or less	0.006	0.016	–9.5	0.006	0.009	–2.5
Basic	0.120	0.177	–16.1	0.120	0.124	–1.2
Vocational secondary	0.320	0.294	5.5	0.320	0.336	–3.5
Professional secondary	0.078	0.067	4.3	0.078	0.083	–2.0
Vocational higher	0.035	0.034	0.4	0.035	0.027	4.5
Bachelor	0.093	0.087	2.2	0.093	0.088	1.5
Master or doctor	0.050	0.023	14.7	0.050	0.036	7.8
Previous occupation:						
Technician	0.102	0.094	2.8	0.102	0.101	0.4
Manager	0.122	0.074	16.2	0.122	0.108	4.8
Professional	0.064	0.050	6.1	0.064	0.052	4.8
Clerk	0.061	0.065	–1.8	0.061	0.062	–0.7
Service and sales worker	0.101	0.157	–16.7	0.101	0.096	1.5
Agriculturist	0.010	0.013	–3.2	0.010	0.009	0.8
Craft and related trades worker	0.255	0.278	–5.2	0.255	0.303	–10.8
Plant and machine operator	0.136	0.097	12.2	0.136	0.115	6.6
Elementary occupation	0.148	0.172	–6.4	0.148	0.152	–1.1
Main language Estonian	0.626	0.588	7.7	0.625	0.599	5.5
Living in a town	0.674	0.698	–5.1	0.674	0.687	–3.0
Tenure on previous job less than 1 year	0.262	0.444	–38.8	0.262	0.293	–6.6
Regional registered unemployment rate	5.7	5.9	–7.0	5.7	5.8	–2.7

Appendix 13 (*continued*)

Variable	Model no. 2 (exit 1–150)					
	Unmatched			Matched		
	Treated (270)	Controls (180)	% bias	Treated (270)	Controls (180)	% bias
Beginning of benefit:						
IV Q 2008	0.230	0.229	0.3	0.230	0.228	0.5
III Q 2008	0.213	0.159	14.0	0.214	0.223	–2.5
I Q 2009	0.525	0.571	–9.4	0.524	0.520	0.9
Male	0.511	0.472	7.7	0.510	0.515	–1.0
Age	41.9	34.1	73.7	41.9	42.2	–3.1
Previous wage (EEK)	13655	10362	39.4	13035	13184	–1.8
Education:						
General secondary	0.286	0.294	–1.6	0.288	0.301	–2.7
Elementary or less	0.006	0.018	–10.9	0.006	0.005	1.2
Basic	0.106	0.170	–18.4	0.107	0.111	–0.9
Vocational secondary	0.318	0.283	7.7	0.321	0.299	4.9
Professional secondary	0.082	0.069	4.7	0.081	0.103	–8.6
Vocational higher	0.046	0.044	0.7	0.045	0.036	4.0
Bachelor	0.101	0.094	2.2	0.099	0.092	2.1
Master or doctor	0.055	0.028	13.8	0.053	0.053	0.0
Previous occupation:						
Technician	0.099	0.091	2.9	0.098	0.097	0.6
Manager	0.125	0.078	15.6	0.120	0.106	4.8
Professional	0.076	0.060	6.4	0.074	0.073	0.5
Clerk	0.069	0.075	–2.4	0.069	0.045	9.5
Service and sales worker	0.123	0.186	–17.5	0.124	0.122	0.5
Agriculturist	0.009	0.016	–6.7	0.009	0.007	1.2
Craft and related trades worker	0.232	0.246	–3.3	0.234	0.256	–5.2
Plant and machine operator	0.123	0.079	14.6	0.124	0.128	–1.4
Elementary occupation	0.146	0.170	–6.8	0.147	0.166	–5.2
Main language Estonian	0.660	0.621	8.1	0.657	0.589	14.1
Living in a town	0.657	0.703	–9.9	0.656	0.685	–6.3
Tenure on previous job less than 1 year	0.295	0.473	–37.2	0.297	0.317	–4.2
Regional registered unemployment rate	5.6	5.9	–10.6	5.6	5.6	1.3

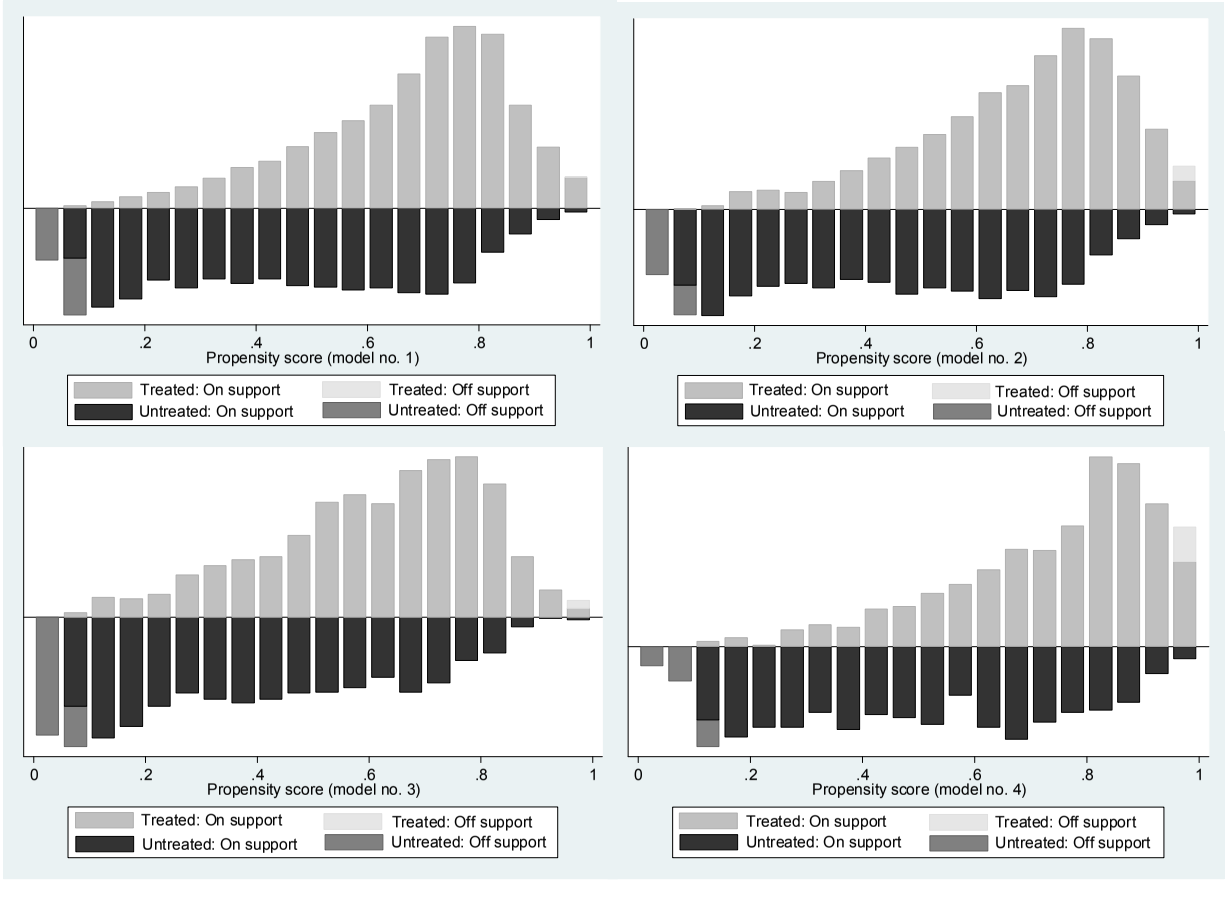
Appendix 13 (*continued*)

Variable	Model no. 3 (exit 151–240)					
	Unmatched			Matched		
	Treated (270)	Controls (180)	% bias	Treated (270)	Controls (180)	% bias
Beginning of benefit:						
IV Q 2008	0.237	0.285	–10.9	0.236	0.235	0.2
III Q 2008	0.122	0.073	16.4	0.123	0.120	1.1
I Q 2009	0.598	0.588	2.1	0.598	0.599	–0.2
Male	0.602	0.566	7.3	0.600	0.588	2.4
Age	41.8	34.3	70.2	41.8	42.2	–2.9
Previous wage (EEK)	13684	11173	33.6	13447	13447	0.0
Education:						
General secondary	0.301	0.299	0.5	0.301	0.331	–6.6
Elementary or less	0.005	0.017	–11.3	0.005	0.009	–3.1
Basic	0.129	0.184	–15.2	0.129	0.126	0.9
Vocational secondary	0.340	0.312	5.9	0.341	0.329	2.5
Professional secondary	0.081	0.052	11.8	0.082	0.075	2.6
Vocational higher	0.019	0.028	–5.5	0.019	0.015	2.8
Bachelor	0.085	0.089	–1.5	0.084	0.087	–1.1
Master or doctor	0.040	0.019	12.0	0.039	0.028	6.4
Previous occupation:						
Technician	0.100	0.104	–1.5	0.100	0.124	–7.8
Manager	0.117	0.088	9.6	0.115	0.110	1.8
Professional	0.047	0.042	2.6	0.046	0.034	5.7
Clerk	0.047	0.053	–2.7	0.047	0.031	7.4
Service and sales worker	0.094	0.129	–10.9	0.095	0.075	6.2
Agriculturist	0.011	0.014	–3.2	0.011	0.002	7.8
Craft and related trades worker	0.260	0.277	–3.6	0.260	0.300	–9.0
Plant and machine operator	0.170	0.114	16.1	0.171	0.179	–2.2
Elementary occupation	0.153	0.180	–7.1	0.154	0.144	2.6
Main language Estonian	0.640	0.608	6.5	0.638	0.584	11.1
Living in a town	0.674	0.661	2.7	0.673	0.704	–6.4
Tenure on previous job less than 1 year	0.255	0.436	–38.7	0.255	0.305	–10.6
Regional registered unemployment rate	6.0	6.2	–7.5	6.0	6.1	–2.4

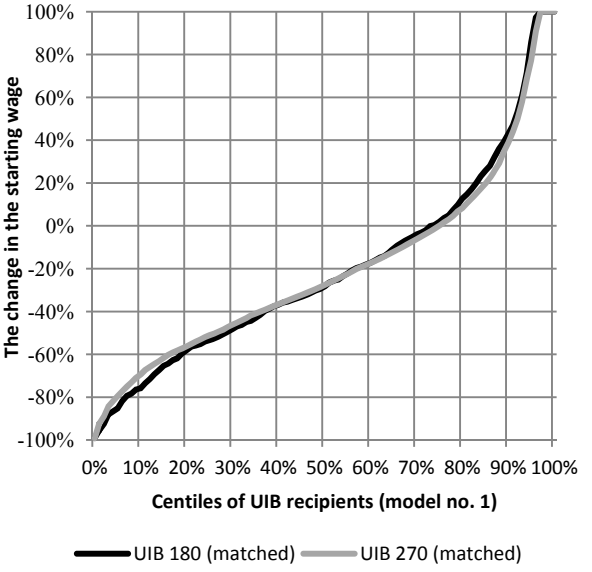
Appendix 13 (*continued*)

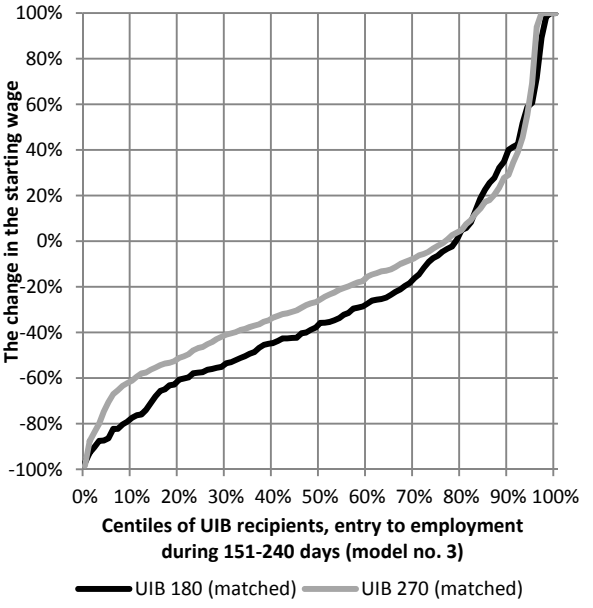
Variable	Model no. 4 (exit 271–360)					
	Unmatched			Matched		
	Treated (270)	Controls (180)	% bias	Treated (270)	Controls (180)	% bias
Beginning of benefit:						
IV Q 2008	0.246	0.308	–13.8	0.248	0.263	–3.5
III Q 2008	0.117	0.109	2.5	0.119	0.148	–9.1
I Q 2009	0.584	0.532	10.5	0.581	0.575	1.2
Male	0.586	0.558	5.6	0.578	0.580	–0.4
Age	43.6	35.0	81.3	43.5	43.2	3.1
Previous wage (EEK)	14082	10153	50.7	13190	13013	2.3
Education:						
General secondary	0.294	0.323	–6.2	0.296	0.256	8.7
Elementary or less	0.007	0.011	–4.5	0.007	0.003	4.3
Basic	0.127	0.170	–12.2	0.130	0.102	7.9
Vocational secondary	0.328	0.294	7.3	0.336	0.400	–13.8
Professional secondary	0.074	0.083	–3.2	0.076	0.088	–4.2
Vocational higher	0.037	0.028	5.0	0.036	0.029	4.1
Bachelor	0.082	0.075	2.5	0.077	0.092	–5.4
Master or doctor	0.050	0.015	19.8	0.040	0.030	5.8
Previous occupation:						
Technician	0.118	0.079	13.2	0.119	0.136	–5.9
Manager	0.136	0.055	27.8	0.118	0.111	2.1
Professional	0.057	0.042	7.3	0.056	0.052	1.9
Clerk	0.063	0.049	6.2	0.065	0.057	3.6
Service and sales worker	0.078	0.162	–26	0.081	0.068	3.8
Agriculturist	0.011	0.011	–0.3	0.011	0.007	3.9
Craft and related trades worker	0.273	0.323	–10.8	0.281	0.294	–2.9
Plant and machine operator	0.110	0.108	0.9	0.114	0.112	0.3
Elementary occupation	0.153	0.172	–5.2	0.157	0.162	–1.4
Main language Estonian	0.593	0.545	9.7	0.584	0.580	0.8
Living in a town	0.672	0.728	–12.4	0.672	0.671	0.2
Tenure on previous job less than 1 year	0.216	0.411	–43.1	0.217	0.244	–5.9
Regional registered unemployment rate	5.9	6.0	9.5	5.9	5.8	6.6

Appendix 14. Propensity score distribution (starting wage)



Appendix 15. The percentiles of the change in the starting wage compared to the previous wage (matched 270-day-UIB recipients and 180-day-UIB recipients)





Appendix 16. Probit model for matching (average wage)

Variable	Model no. 5 (all)		Model no. 6 (exit 1–150)		Model no. 7 (exit 151–240)		Model no. 8 (exit 271–360)	
	Coef.	P>z	Coef.	P>z	Coef.	P>z	Coef.	P>z
Beginning of benefit period: IV Q 2008								
III Q 2008	0.172	0.012	0.033	0.732	0.332	0.026	0.234	0.183
I Q 2009	0.133	0.030	0.072	0.415	0.046	0.624	0.327	0.013
Male	0.140	0.004	0.146	0.039	0.094	0.332	0.063	0.656
Age	0.291	0.000	0.309	0.000	0.324	0.000	0.202	0.000
Age square	–0.003	0.000	–0.003	0.000	–0.003	0.000	–0.002	0.001
Previous wage (EEK) / 1000	0.043	0.000	0.041	0.000	0.041	0.000	0.056	0.000
Education: general secondary								
Elementary or less	–0.045	0.840	–0.121	0.690	–0.430	0.423	0.430	0.443
Basic	–0.043	0.556	–0.078	0.450	0.046	0.755	–0.002	0.991
Vocational secondary	0.036	0.503	0.107	0.159	0.047	0.655	–0.010	0.946
Professional secondary	–0.150	0.072	–0.135	0.245	0.017	0.919	–0.579	0.018
Vocational higher	–0.039	0.721	–0.037	0.801	–0.399	0.123	–0.103	0.755
Bachelor	–0.233	0.003	–0.183	0.093	–0.269	0.089	–0.564	0.024
Master or doctor	–0.190	0.104	–0.238	0.122	–0.122	0.636	–0.172	0.672
Previous occupation: technician								
Manager	0.030	0.732	0.039	0.758	–0.064	0.715	–0.006	0.984
Professional	0.146	0.149	0.116	0.400	0.098	0.661	0.073	0.820
Clerk	0.188	0.062	0.191	0.167	0.153	0.479	0.108	0.732
Service and sales worker	–0.076	0.372	–0.100	0.401	–0.109	0.531	–0.417	0.109
Agriculturist	–0.269	0.198	–0.479	0.084	0.002	0.996	–0.614	0.277
Craft worker	0.075	0.362	0.029	0.809	0.228	0.145	–0.348	0.133
Plant and machine operator	0.191	0.037	0.312	0.022	0.212	0.224	–0.453	0.079
Elementary occupation	0.025	0.773	0.005	0.968	0.076	0.657	–0.382	0.117
Main language Estonian	0.180	0.001	0.108	0.169	0.299	0.006	–0.018	0.907
Reason for unemployment: end of fixed-term contract								
Unsuitability for the job	0.246	0.093	0.289	0.178	0.084	0.795	0.257	0.555
Unsatisfactory results of a probationary period	0.197	0.031	0.074	0.538	0.439	0.028	0.320	0.231
Bankruptcy	0.588	0.000	0.625	0.001	0.399	0.083	0.644	0.056
Liquidation	0.296	0.062	0.285	0.181	0.361	0.476	0.378	0.300
Lay-off	0.439	0.000	0.371	0.000	0.505	0.000	0.669	0.000
Long-term incapacity	0.420	0.284	1.493	0.032				
Violation by employer	0.468	0.000	0.584	0.000	0.435	0.003	0.612	0.008
Living in a town	0.007	0.878	–0.058	0.395	0.087	0.363	0.121	0.393
Region: Central and Western								
Northern	–0.056	0.286	0.007	0.928	–0.083	0.420	–0.224	0.126
Southern	–0.012	0.914	0.078	0.588	–0.469	0.033	0.546	0.277
North-Eastern	0.221	0.036	0.222	0.130	–0.084	0.601	0.290	0.230
Disabled	–0.191	0.055	–0.107	0.473	–0.236	0.267	–0.298	0.226
Tenure on prev. job < 1 year	–0.050	0.371	–0.049	0.524				
Regional registered unemployment rate	–0.023	0.146	–0.021	0.348				
Knowledge of English	–0.021	0.724						
Constant	–7.064	0.000	–7.158	0.000	–8.108	0.000	–5.362	0.000
Pseudo R2	0.210		0.217		0.219		0.245	
LR chi2	1341.0	0.000	709.2	0.000	352.9	0.000	197.7	0.000
Number of observations	4761		2468		1168		638	

Appendix 17. Unmatched and matched variables (average wage)

Variable	Model no. 5 (all)					
	Unmatched			Matched		
	Treated (270)	Controls (180)	% bias	Treated (270)	Controls (180)	% bias
Beginning of benefit:						
IV Q 2008	0.254	0.276	–5.1	0.254	0.270	–3.5
III Q 2008	0.207	0.152	14.5	0.207	0.197	2.6
I Q 2009	0.510	0.528	–3.7	0.509	0.500	1.7
Male	0.502	0.451	10.1	0.495	0.500	–0.9
Age	42.2	34.3	75.3	42.2	42.2	0.0
Previous wage (EEK)	13994	10670	40.0	13064	13074	–0.1
Education:						
General secondary	0.297	0.305	–1.6	0.301	0.290	2.2
Elementary or less	0.006	0.014	–8.8	0.006	0.003	2.5
Basic	0.101	0.151	–15.3	0.103	0.121	–5.6
Vocational secondary	0.313	0.277	7.9	0.318	0.286	7.0
Professional secondary	0.076	0.067	3.6	0.077	0.083	–2.5
Vocational higher	0.045	0.040	2.4	0.043	0.045	–1.1
Bachelor	0.105	0.119	–4.4	0.101	0.115	–4.7
Master or doctor	0.058	0.028	15.1	0.053	0.056	–1.4
Previous occupation:						
Technician	0.111	0.110	0.2	0.110	0.112	–0.7
Manager	0.137	0.097	12.5	0.126	0.120	1.8
Professional	0.079	0.067	4.5	0.076	0.075	0.5
Clerk	0.067	0.075	–3.3	0.068	0.052	6.4
Service and sales worker	0.113	0.172	–16.8	0.116	0.110	1.5
Agriculturist	0.010	0.012	–1.5	0.010	0.012	–1.4
Craft and related trades worker	0.216	0.222	–1.5	0.221	0.247	–6.3
Plant and machine operator	0.136	0.091	14.4	0.139	0.138	0.4
Elementary occupation	0.131	0.155	–6.8	0.134	0.135	–0.2
Main language Estonian	0.668	0.627	8.6	0.661	0.647	3.1
Living in a town	0.658	0.702	–9.4	0.658	0.662	–0.8
Tenure on previous job less than 1 year	0.249	0.406	–33.9	0.252	0.259	–1.5
Regional registered unemployment rate	5.4	5.6	–7.7	5.4	5.4	0.2

Appendix 17 (*continued*)

Variable	Model no. 6 (exit 1–150)					
	Unmatched			Matched		
	Treated (270)	Controls (180)	% bias	Treated (270)	Controls (180)	% bias
Beginning of benefit:						
IV Q 2008	0.242	0.238	0.8	0.242	0.259	–4.2
III Q 2008	0.223	0.194	7.1	0.224	0.228	–0.8
I Q 2009	0.504	0.522	–3.7	0.503	0.484	3.9
Male	0.467	0.417	10.2	0.460	0.456	0.9
Age	41.7	33.9	75.0	41.7	41.9	–2.4
Previous wage (EEK)	13952	10447	40.0	12899	12872	0.3
Education:						
General secondary	0.287	0.295	–1.9	0.289	0.295	–1.3
Elementary or less	0.005	0.018	–12.1	0.005	0.011	–5.6
Basic	0.096	0.150	–16.7	0.098	0.092	1.6
Vocational secondary	0.309	0.262	10.4	0.315	0.293	4.7
Professional secondary	0.077	0.070	2.7	0.077	0.093	–6.4
Vocational higher	0.054	0.045	4.1	0.053	0.047	2.5
Bachelor	0.111	0.125	–4.1	0.107	0.106	0.2
Master or doctor	0.061	0.034	12.6	0.057	0.061	–1.9
Previous occupation:						
Technician	0.108	0.101	2.3	0.106	0.128	–7.4
Manager	0.137	0.100	11.4	0.128	0.133	–1.7
Professional	0.090	0.078	4.3	0.086	0.086	0.2
Clerk	0.074	0.086	–4.6	0.075	0.049	9.8
Service and sales worker	0.128	0.193	–18.0	0.130	0.122	2.2
Agriculturist	0.008	0.015	–6.1	0.009	0.013	–4.3
Craft and related trades worker	0.198	0.202	–0.9	0.203	0.206	–0.7
Plant and machine operator	0.131	0.072	19.8	0.134	0.134	0.2
Elementary occupation	0.126	0.153	–7.8	0.128	0.129	–0.2
Main language Estonian	0.695	0.665	6.4	0.689	0.645	9.4
Living in a town	0.640	0.696	–11.9	0.641	0.647	–1.3
Tenure on previous job less than 1 year	0.277	0.435	–33.6	0.281	0.282	–0.3
Regional registered unemployment rate	5.5	5.6	–5.2	5.5	5.4	3.0

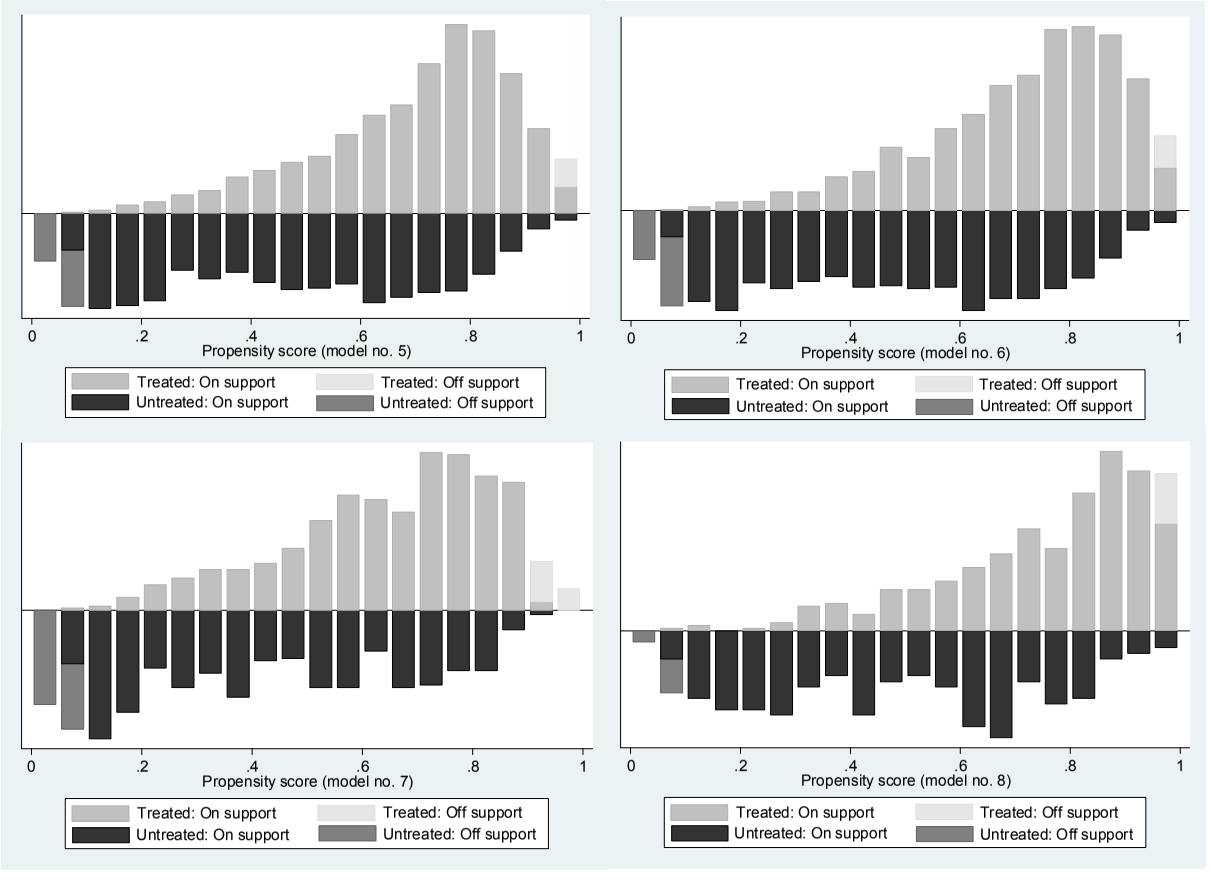
Appendix 17 (*continued*)

Variable	Model no. 7 (exit 151–240)					
	Unmatched			Matched		
	Treated (270)	Controls (180)	% bias	Treated (270)	Controls (180)	% bias
Beginning of benefit:						
IV Q 2008	0.211	0.249	–9.1	0.209	0.221	–2.8
III Q 2008	0.143	0.075	21.9	0.140	0.143	–1.1
I Q 2009	0.593	0.615	–4.5	0.595	0.568	5.5
Male	0.561	0.524	7.5	0.546	0.543	0.7
Age	42.0	33.9	76.8	41.9	42.0	–0.3
Previous wage (EEK)	14021	11481	33.7	12906	12839	0.9
Education:						
General secondary	0.305	0.321	–3.2	0.312	0.309	0.7
Elementary or less	0.003	0.011	–9.3	0.003	0.008	–6.0
Basic	0.101	0.139	–11.7	0.106	0.113	–2.1
Vocational secondary	0.341	0.295	9.9	0.344	0.320	5.1
Professional secondary	0.084	0.059	9.7	0.084	0.086	–0.7
Vocational higher	0.023	0.035	–7.4	0.022	0.027	–3.0
Bachelor	0.095	0.121	–8.4	0.094	0.089	1.6
Master or doctor	0.048	0.020	15.5	0.034	0.047	–7.4
Previous occupation:						
Technician	0.108	0.125	–5.2	0.110	0.096	4.2
Manager	0.138	0.110	8.6	0.120	0.118	0.5
Professional	0.055	0.055	–0.1	0.047	0.030	7.4
Clerk	0.050	0.060	–4.6	0.051	0.078	–11.8
Service and sales worker	0.103	0.150	–14.2	0.108	0.140	–9.7
Agriculturist	0.011	0.007	4.1	0.012	0.002	10.5
Craft and related trades worker	0.252	0.253	–0.1	0.261	0.243	4.3
Plant and machine operator	0.154	0.099	16.7	0.159	0.152	2.0
Elementary occupation	0.129	0.141	–3.6	0.133	0.142	–2.5
Main language Estonian	0.672	0.626	9.6	0.659	0.641	3.9
Living in a town	0.664	0.685	–4.5	0.663	0.710	–10.1
Tenure on previous job less than 1 year	0.240	0.366	–27.8	0.241	0.246	–1.1
Regional registered unemployment rate	5.9	6.2	–9.6	6.0	5.8	6.1

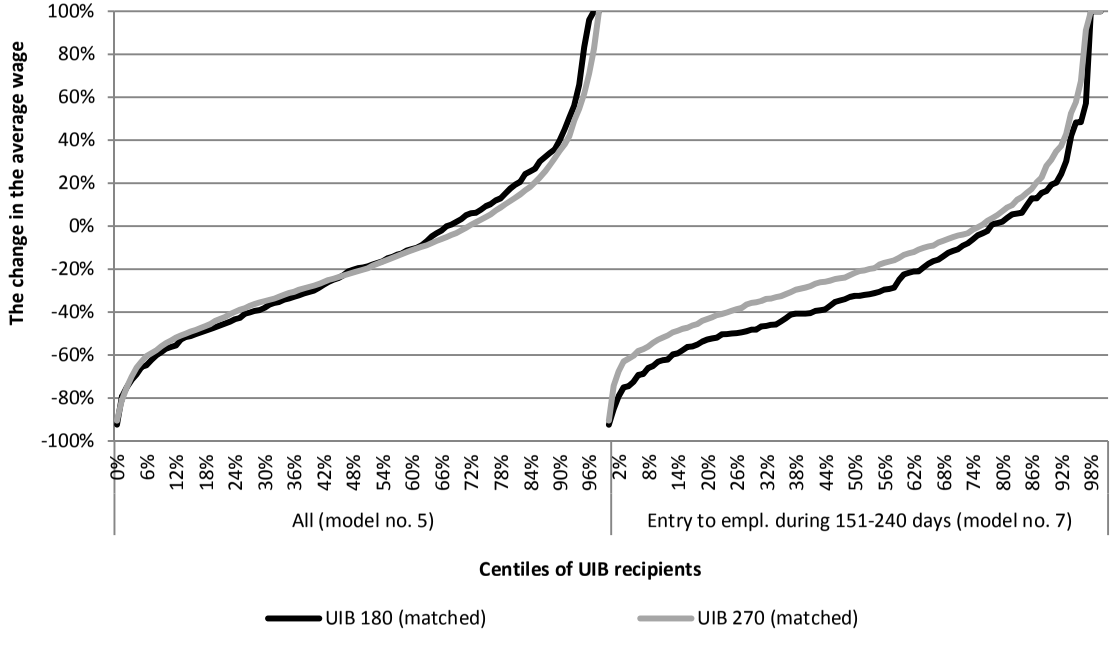
Appendix 17 (*continued*)

Variable	Model no. 8 (exit 271–360)					
	Unmatched			Matched		
	Treated (270)	Controls (180)	% bias	Treated (270)	Controls (180)	% bias
Beginning of benefit:						
IV Q 2008	0.383	0.510	–25.6	0.388	0.400	–2.5
III Q 2008	0.187	0.157	7.9	0.188	0.193	–1.3
I Q 2009	0.430	0.333	19.9	0.424	0.407	3.5
Male	0.521	0.467	10.9	0.507	0.644	–27.3
Age	43.6	35.4	75.2	43.6	42.6	8.7
Previous wage (EEK)	14401	9986	53.1	13076	13040	0.4
Education:						
General secondary	0.301	0.319	–3.8	0.307	0.344	–7.9
Elementary or less	0.009	0.014	–4.6	0.010	0.002	6.8
Basic	0.110	0.167	–16.5	0.115	0.137	–6.4
Vocational secondary	0.318	0.281	8.0	0.327	0.339	–2.7
Professional secondary	0.068	0.076	–3.3	0.071	0.085	–5.7
Vocational higher	0.049	0.038	5.4	0.046	0.037	4.8
Bachelor	0.089	0.090	–0.6	0.085	0.044	14.5
Master or doctor	0.056	0.014	22.8	0.039	0.012	14.6
Previous occupation:						
Technician	0.138	0.086	16.6	0.139	0.112	8.5
Manager	0.145	0.062	27.5	0.120	0.117	0.8
Professional	0.065	0.048	7.7	0.063	0.122	–25.3
Clerk	0.075	0.052	9.2	0.076	0.037	16.0
Service and sales worker	0.086	0.157	–21.7	0.090	0.054	11.2
Agriculturist	0.014	0.014	–0.2	0.015	0.005	8.2
Craft and related trades worker	0.224	0.252	–6.6	0.234	0.305	–16.6
Plant and machine operator	0.105	0.138	–10.1	0.110	0.098	3.7
Elementary occupation	0.147	0.190	–11.6	0.154	0.151	0.7
Main language Estonian	0.610	0.567	8.8	0.595	0.680	–17.3
Living in a town	0.678	0.710	–6.9	0.673	0.615	12.7
Tenure on previous job less than 1 year	0.199	0.414	–48.0	0.200	0.244	–9.8
Regional registered unemployment rate	4.8	4.4	16.6	4.8	5.0	–14.3

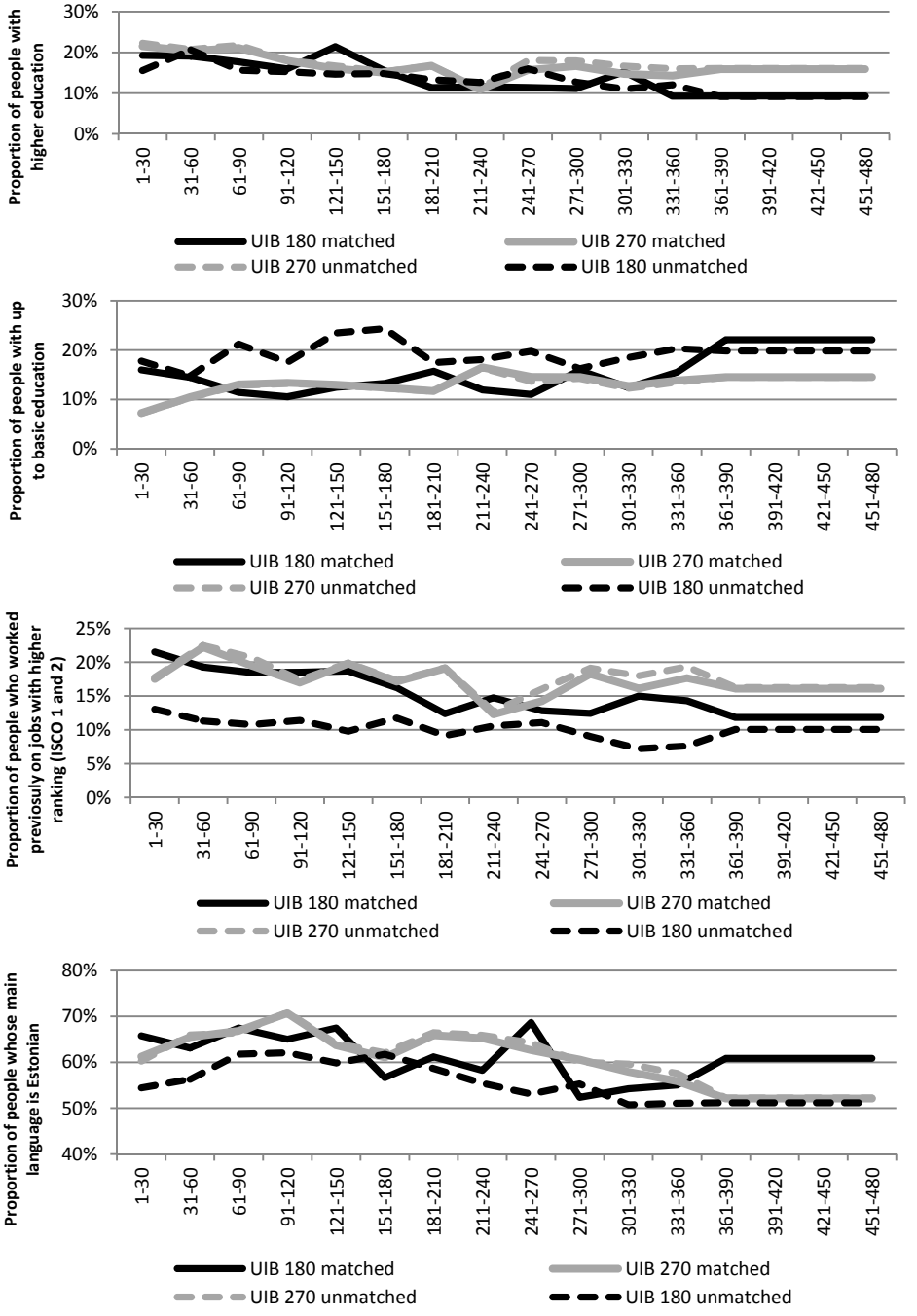
Appendix 18. Propensity score distribution (average wage)



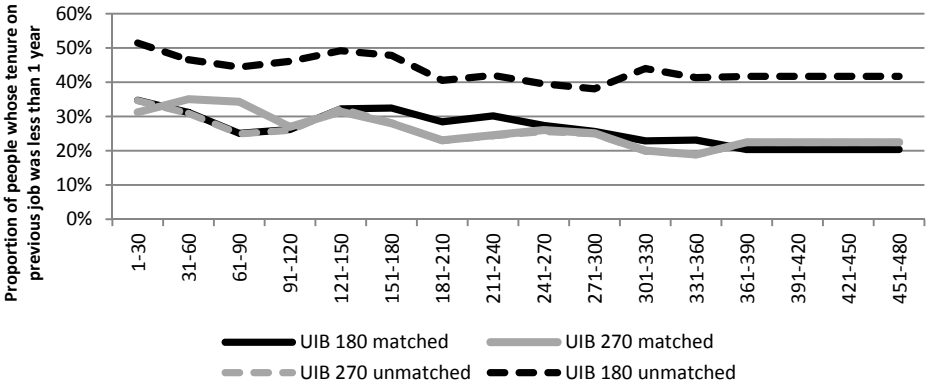
Appendix 19. The percentiles of the change in the average wage compared to the previous wage (for 270-day-UIB recipients and for the matched control group of 180-day-UIB recipients)

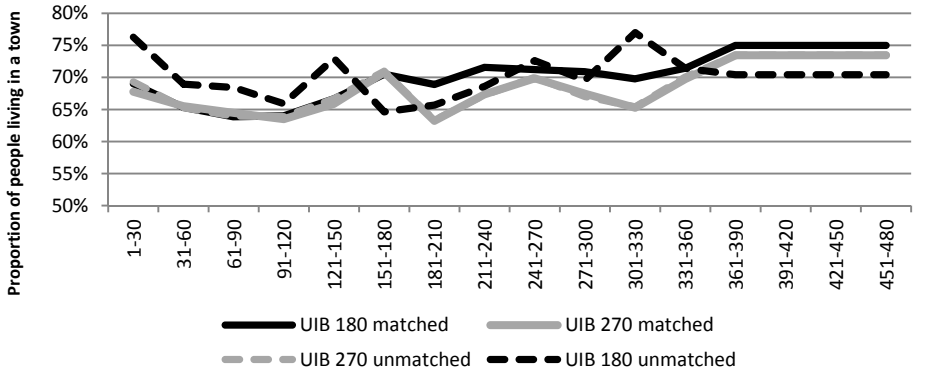


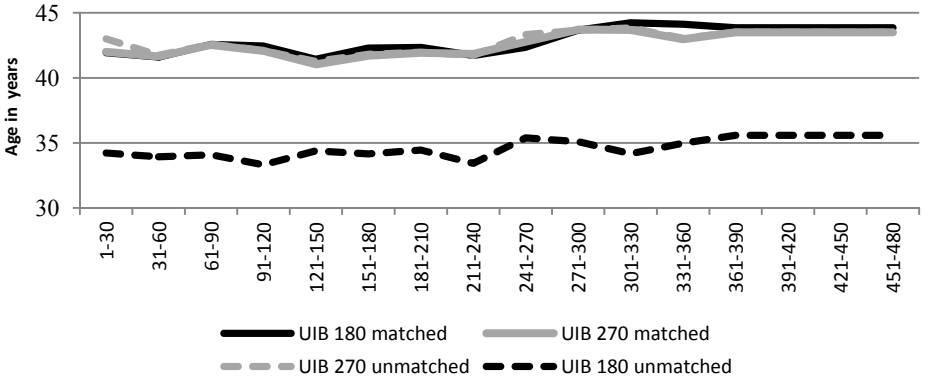
Appendix 20. Individual characteristics of unemployed exiting into employment during different unemployment spells



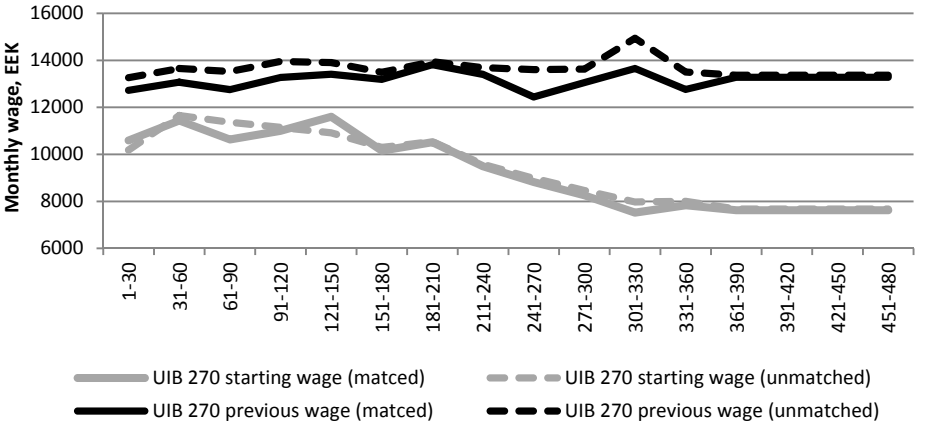
Appendix 20. Individual characteristics of unemployed exiting into employment during different unemployment spells *(continuous)*

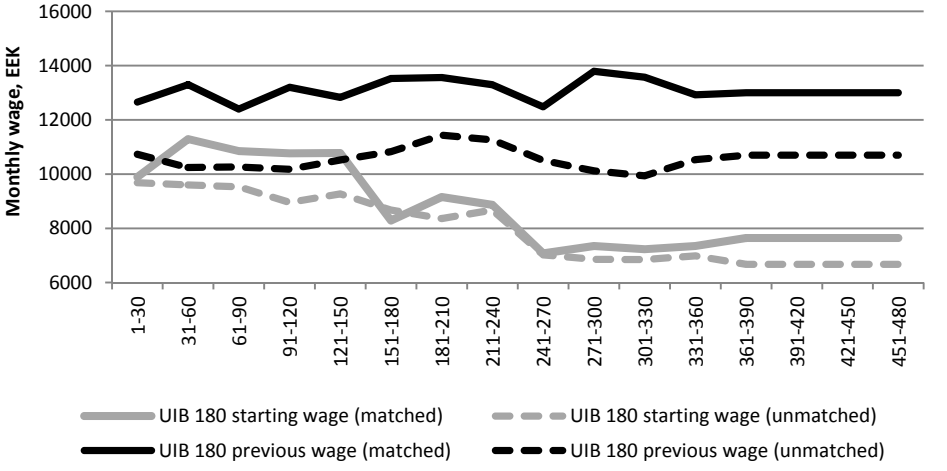




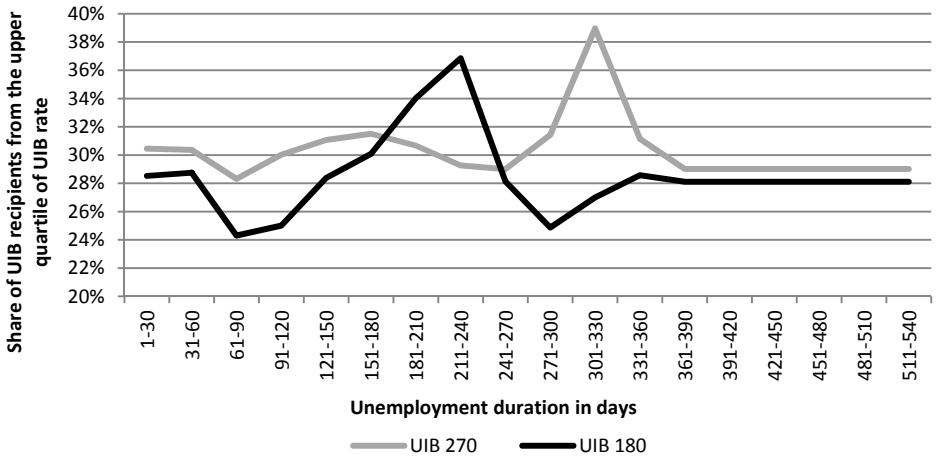


Appendix 21. The starting wage and the previous wage for 270-day-UIB recipients and for 180-day-UIB recipients

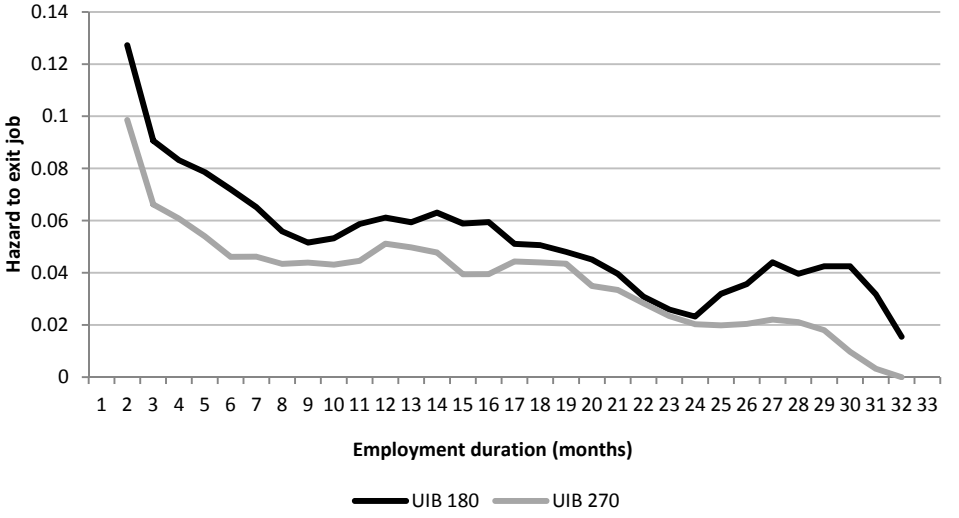




Appendix 22. Unemployed receiving UIB on the level of the upper quartile and exiting unemployment as a share of all UIB recipients exiting unemployment into employment during the interval (unmatched data)



Appendix 23. Smoothed hazard rates for exiting post-unemployment job



Appendix 24. Probit model for matching (job duration)

Variable	Model no. 1 (all)		Model no. 2 (exit 1–150)		Model no. 3 (exit 151–240)		Model no. 4 (exit 271–360)	
	Coef.	P>z	Coef.	P>z	Coef.	P>z	Coef.	P>z
Beginning of benefit period: IV Q 2008								
III Q 2008	0.130	0.010	0.117	0.077	0.206	0.075	0.082	0.545
I Q 2009	0.106	0.012	0.022	0.668	0.077	0.269	0.141	0.150
Male	0.147	0.000	0.140	0.008	0.171	0.022	0.036	0.670
Age	0.267	0.000	0.277	0.000	0.323	0.000	0.174	0.000
Age square	–0.003	0.000	–0.003	0.000	–0.003	0.000	–0.002	0.000
Previous wage (EEK) / 1000	0.032	0.000	0.034	0.000	0.032	0.000	0.048	0.000
Education: general secondary								
Elementary or less	–0.160	0.273	–0.116	0.596	–0.535	0.109	0.256	0.460
Basic	0.005	0.921	–0.039	0.600	0.031	0.757	–0.025	0.829
Vocational secondary	0.048	0.189	0.114	0.044	0.012	0.884	0.032	0.731
Professional secondary	–0.112	0.053	–0.061	0.487	0.153	0.241	–0.444	0.002
Vocational higher	–0.088	0.294	–0.076	0.515	–0.289	0.169	–0.127	0.554
Bachelor	–0.094	0.106	–0.018	0.835	–0.195	0.130	–0.296	0.059
Master or doctor	–0.021	0.810	–0.072	0.562	–0.049	0.819	0.042	0.867
Previous occupation: technician								
Manager	0.040	0.550	0.061	0.546	–0.057	0.696	0.134	0.450
Professional	0.117	0.129	0.124	0.262	0.125	0.497	–0.072	0.721
Clerk	0.097	0.193	0.191	0.084	0.147	0.391	–0.140	0.471
Service and sales worker	–0.115	0.064	–0.083	0.373	–0.037	0.788	–0.316	0.049
Agriculturist	–0.305	0.035	–0.496	0.019	–0.168	0.601	–0.667	0.056
Craft worker	–0.062	0.270	–0.012	0.891	0.019	0.874	–0.370	0.009
Plant and machine operator	0.110	0.090	0.189	0.066	0.203	0.129	–0.293	0.078
Elementary occupation	–0.025	0.683	0.026	0.783	0.011	0.929	–0.268	0.078
Main language Estonian	0.177	0.000	0.197	0.001	0.206	0.012	0.089	0.333
Reason for unemployment: end of fixed-term contract								
Unsuitability for the job	0.192	0.053	0.296	0.047	–0.110	0.673	–0.038	0.860
Unsatisfactory results of a probationary period	0.202	0.001	0.117	0.175	0.341	0.019	0.140	0.387
Bankruptcy	0.484	0.000	0.701	0.000	0.203	0.222	0.431	0.022
Liquidation	0.566	0.000	0.635	0.000	0.633	0.054	0.386	0.177
Lay-off	0.458	0.000	0.453	0.000	0.538	0.000	0.447	0.000
Long-term incapacity	0.121	0.538	0.598	0.085	0.231	0.629	–0.935	0.046
Violation by employer	0.477	0.000	0.590	0.000	0.530	0.000	0.559	0.000
Living in a town	0.059	0.086	0.019	0.712	0.135	0.065	0.004	0.967
Region: Central and Western								
Northern	–0.022	0.544	0.001	0.986	–0.035	0.661	–0.075	0.395
Southern	–0.019	0.806	0.055	0.579	–0.266	0.079	–0.065	0.756
North-Eastern	0.099	0.164	0.110	0.185	–0.084	0.477	0.197	0.259
Disabled	–0.158	0.011	–0.194	0.047	–0.204	0.141	–0.049	0.736
Tenure on prev. job < 1 year	–0.111	0.003					–0.144	0.132
Regional registered unemployment rate	–0.008	0.437					0.008	0.751
Knowledge of English							–0.125	0.243
Constant	–6.595	0.000	–6.878	0.000	–7.966	0.000	–4.578	0.000
Pseudo R2	0.194		0.199		0.204		0.220	
LR chi2	2531.6	0.000	1126.6	0.000	567.4	0.000	480.0	0.000
Number of observations	9523		4150		2013		1673	

Appendix 25. Unmatched and matched variables (job duration)

Variable	Model no. 1 (all)					
	Unmatched			Matched		
	Treated (270)	Controls (180)	% bias	Treated (270)	Controls (180)	% bias
Beginning of benefit:						
IV Q 2008	0.239	0.268	–6.6	0.240	0.249	–2.2
III Q 2008	0.167	0.126	11.8	0.167	0.171	–1.2
I Q 2009	0.556	0.564	–1.6	0.556	0.552	0.9
Male	0.562	0.534	5.7	0.562	0.572	–1.9
Age	42.7	34.7	73.7	42.7	42.7	–0.1
Previous wage (EEK)	13589	10585	37.4	13545	13702	–2.0
Education:						
General secondary	0.299	0.302	–0.7	0.299	0.295	1.0
Elementary or less	0.006	0.017	–10.4	0.006	0.006	0.3
Basic	0.121	0.181	–16.9	0.121	0.130	–2.5
Vocational secondary	0.318	0.293	5.3	0.318	0.332	–3.1
Professional secondary	0.078	0.065	5.3	0.078	0.078	0.1
Vocational higher	0.034	0.033	0.6	0.034	0.029	3.1
Bachelor	0.094	0.087	2.5	0.094	0.089	1.8
Master or doctor	0.050	0.021	15.3	0.050	0.042	4.0
Previous occupation:						
Technician	0.103	0.092	3.8	0.103	0.090	4.4
Manager	0.119	0.073	15.6	0.119	0.108	3.7
Professional	0.064	0.052	5.5	0.064	0.061	1.3
Clerk	0.059	0.063	–1.8	0.059	0.044	6.2
Service and sales worker	0.102	0.155	–16.1	0.102	0.107	–1.6
Agriculturist	0.010	0.013	–2.5	0.010	0.010	0.0
Craft and related trades worker	0.257	0.283	–5.9	0.257	0.279	–5.0
Plant and machine operator	0.134	0.095	12.2	0.134	0.136	–0.6
Elementary occupation	0.152	0.174	–5.9	0.153	0.165	–3.4
Main language Estonian	0.625	0.584	8.3	0.625	0.601	4.9
Living in a town	0.674	0.699	–5.4	0.674	0.665	2.0
Tenure on previous job less than 1 year	0.267	0.444	–37.8	0.267	0.289	–4.6
Regional registered unemployment rate	5.8	5.9	–6.5	5.8	5.8	–2.0

Appendix 25 (*continued*)

Variable	Model no. 2 (exit 1–150)					
	Unmatched			Matched		
	Treated (270)	Controls (180)	% bias	Treated (270)	Controls (180)	% bias
Beginning of benefit:						
IV Q 2008	0.231	0.232	–0.2	0.231	0.217	3.3
III Q 2008	0.210	0.161	12.5	0.210	0.185	6.4
I Q 2009	0.528	0.566	–7.8	0.527	0.569	–8.5
Male	0.514	0.487	5.4	0.513	0.541	–5.5
Age	42.2	34.4	72.8	42.1	42.1	0.1
Previous wage (EEK)	13551	10372	38.3	12993	12985	0.1
Education:						
General secondary	0.287	0.294	–1.6	0.289	0.284	1.0
Elementary or less	0.006	0.019	–11.5	0.006	0.008	–1.9
Basic	0.107	0.174	–19.2	0.108	0.115	–1.8
Vocational secondary	0.317	0.282	7.6	0.319	0.340	–4.6
Professional secondary	0.081	0.067	5.3	0.080	0.090	–3.9
Vocational higher	0.045	0.043	0.8	0.044	0.041	1.5
Bachelor	0.103	0.095	2.6	0.101	0.078	7.7
Master or doctor	0.055	0.026	14.3	0.052	0.044	4.6
Previous occupation:						
Technician	0.102	0.090	4.2	0.101	0.099	0.7
Manager	0.122	0.077	15.0	0.118	0.105	4.1
Professional	0.077	0.062	6.0	0.075	0.070	2.2
Clerk	0.065	0.071	–2.3	0.066	0.046	7.9
Service and sales worker	0.120	0.183	–17.5	0.122	0.120	0.5
Agriculturist	0.008	0.015	–6.2	0.009	0.011	–2.0
Craft and related trades worker	0.234	0.250	–3.6	0.236	0.279	–10.1
Plant and machine operator	0.121	0.081	13.5	0.122	0.114	2.7
Elementary occupation	0.150	0.172	–6.2	0.151	0.156	–1.3
Main language Estonian	0.655	0.615	8.3	0.652	0.623	6.2
Living in a town	0.661	0.699	–8.2	0.661	0.680	–4.1
Tenure on previous job less than 1 year	0.299	0.471	–35.9	0.300	0.314	–2.9
Regional registered unemployment rate	5.7	5.9	–9.7	5.7	5.9	–8.7

Appendix 25 (*continued*)

Variable	Model no. 3 (exit 151–240)					
	Unmatched			Matched		
	Treated (270)	Controls (180)	% bias	Treated (270)	Controls (180)	% bias
Beginning of benefit:						
IV Q 2008	0.235	0.288	–12.0	0.234	0.232	0.5
III Q 2008	0.119	0.073	15.6	0.118	0.104	4.9
I Q 2009	0.598	0.586	2.5	0.599	0.631	–6.5
Male	0.606	0.563	8.8	0.605	0.571	6.9
Age	41.9	34.4	69.2	41.9	41.4	4.2
Previous wage (EEK)	13621	11115	33.7	13350	12865	6.5
Education:						
General secondary	0.300	0.297	0.6	0.300	0.325	–5.4
Elementary or less	0.005	0.018	–12.2	0.005	0.003	1.9
Basic	0.129	0.190	–16.7	0.130	0.122	2.0
Vocational secondary	0.335	0.310	5.4	0.336	0.328	1.8
Professional secondary	0.088	0.050	15.0	0.088	0.103	–5.8
Vocational higher	0.020	0.028	–5.4	0.020	0.020	0.0
Bachelor	0.086	0.089	–1.3	0.086	0.077	3.3
Master or doctor	0.038	0.018	12.1	0.035	0.023	7.5
Previous occupation:						
Technician	0.099	0.102	–0.9	0.100	0.081	6.2
Manager	0.114	0.083	10.4	0.113	0.130	–5.6
Professional	0.049	0.042	3.5	0.048	0.036	5.5
Clerk	0.048	0.054	–2.4	0.049	0.054	–2.4
Service and sales worker	0.095	0.129	–11.0	0.095	0.099	–1.0
Agriculturist	0.010	0.013	–2.9	0.010	0.006	3.8
Craft and related trades worker	0.265	0.283	–4.0	0.265	0.286	–4.9
Plant and machine operator	0.166	0.112	15.6	0.167	0.145	6.3
Elementary occupation	0.153	0.181	–7.7	0.154	0.163	–2.5
Main language Estonian	0.645	0.609	7.6	0.643	0.633	2.1
Living in a town	0.674	0.663	2.3	0.674	0.704	–6.4
Tenure on previous job less than 1 year	0.262	0.436	–37.2	0.261	0.290	–6.2
Regional registered unemployment rate	6.0	6.2	–6.4	6.0	6.1	–1.8

Appendix 25 (*continued*)

Variable	Model no. 4 (exit 271–360)					
	Unmatched			Matched		
	Treated (270)	Controls (180)	% bias	Treated (270)	Controls (180)	% bias
Beginning of benefit:						
IV Q 2008	0.245	0.313	–15.1	0.247	0.251	–1.1
III Q 2008	0.117	0.104	4.0	0.118	0.128	–3.0
I Q 2009	0.585	0.534	10.3	0.582	0.586	–0.8
Male	0.588	0.571	3.4	0.580	0.600	–4.0
Age	43.6	35.0	80.0	43.5	43.8	–2.2
Previous wage (EEK)	13990	10188	48.5	13073	13137	–0.8
Education:						
General secondary	0.298	0.321	–5.0	0.299	0.266	7.2
Elementary or less	0.008	0.015	–6.3	0.009	0.013	–4.4
Basic	0.124	0.173	–13.7	0.128	0.127	0.3
Vocational secondary	0.327	0.297	6.5	0.336	0.358	–4.7
Professional secondary	0.071	0.079	–2.9	0.073	0.063	4.0
Vocational higher	0.036	0.027	5.3	0.035	0.038	–1.6
Bachelor	0.084	0.074	3.9	0.079	0.093	–5.3
Master or doctor	0.050	0.013	21.0	0.041	0.042	–0.5
Previous occupation:						
Technician	0.116	0.079	12.5	0.117	0.101	5.5
Manager	0.131	0.052	27.5	0.113	0.103	3.7
Professional	0.057	0.049	3.5	0.056	0.055	0.4
Clerk	0.060	0.050	4.3	0.060	0.077	–7.5
Service and sales worker	0.083	0.158	–23.0	0.086	0.074	3.5
Agriculturist	0.012	0.012	0.3	0.012	0.009	3.5
Craft and related trades worker	0.272	0.321	–10.8	0.279	0.323	–9.6
Plant and machine operator	0.107	0.101	1.9	0.110	0.095	4.7
Elementary occupation	0.162	0.178	–4.2	0.167	0.163	1.0
Main language Estonian	0.593	0.548	9.1	0.584	0.550	6.9
Living in a town	0.675	0.733	–12.6	0.675	0.704	–6.3
Tenure on previous job less than 1 year	0.224	0.420	–42.8	0.228	0.215	2.7
Regional registered unemployment rate	6.0	5.7	9.2	6.0	6.0	–2.0

Appendix 26. Probit model for matching of UIB recipients with previous record of UI contributions of 32–79 months (job duration)

Variable	Model no. 1 (all)		Model no. 2 (exit 1–150)		Model no. 3 (exit 151–240)		Model no. 4 (exit 271–360)	
	Coef.	P>z	Coef.	P>z	Coef.	P>z	Coef.	P>z
Beginning of benefit period: IV Q 2008								
III Q 2008	0.354	0.000	0.469	0.000	0.364	0.018	0.336	0.042
I Q 2009	0.104	0.055	–0.058	0.390	0.026	0.821	0.106	0.404
Male	0.154	0.000	0.173	0.011	0.050	0.615	–0.022	0.838
Age	0.199	0.000	0.195	0.000	0.267	0.000	0.117	0.001
Age square	–0.002	0.000	–0.002	0.000	–0.003	0.000	–0.001	0.017
Previous wage (EEK) / 1000	0.018	0.000	0.021	0.000	0.023	0.001	0.034	0.000
Education: general secondary								
Elementary or less	–0.408	0.032	–0.146	0.584	–0.667	0.113	–0.285	0.567
Basic	–0.002	0.977	–0.046	0.623	0.006	0.962	0.042	0.781
Vocational secondary	0.014	0.766	0.084	0.243	–0.082	0.419	0.128	0.277
Professional secondary	–0.046	0.535	0.012	0.915	0.157	0.365	–0.348	0.056
Vocational higher	–0.177	0.096	–0.198	0.171	–0.370	0.179	0.087	0.761
Bachelor	0.009	0.904	0.089	0.403	–0.123	0.459	–0.325	0.099
Master or doctor	–0.076	0.503	–0.157	0.331	–0.081	0.772	0.092	0.775
Previous occupation: technician								
Manager	0.034	0.688	–0.001	0.993	–0.106	0.577	0.239	0.269
Professional	0.072	0.454	0.025	0.854	0.072	0.761	–0.008	0.974
Clerk	0.003	0.976	0.124	0.385	0.177	0.430	–0.372	0.143
Service and sales worker	–0.020	0.804	0.021	0.858	0.007	0.971	–0.234	0.245
Agriculturist	–0.270	0.147	–0.531	0.053	–0.055	0.912	–0.495	0.238
Craft worker	–0.047	0.515	–0.082	0.469	0.029	0.857	–0.234	0.191
Plant and machine operator	0.095	0.252	0.081	0.544	0.285	0.116	–0.402	0.053
Elementary occupation	0.003	0.968	–0.010	0.936	0.038	0.827	–0.138	0.467
Main language Estonian	0.179	0.000	0.137	0.065	0.255	0.016	0.134	0.248
Reason for unemployment: end of fixed-term contract								
Unsuitability for the job	–0.030	0.812	–0.064	0.732	–0.548	0.086	–0.149	0.600
Unsatisfactory results of a probationary period	0.011	0.881	–0.101	0.345	0.195	0.289	–0.027	0.888
Bankruptcy	0.257	0.016	0.460	0.009	–0.132	0.559	0.081	0.729
Liquidation	0.376	0.012	0.213	0.326	0.516	0.307	0.305	0.363
Lay-off	0.207	0.000	0.106	0.124	0.214	0.067	0.118	0.375
Long-term incapacity	0.216	0.388	0.661	0.157	0.393	0.533	–0.807	0.118
Violation by employer	0.261	0.000	0.294	0.006	0.256	0.093	0.266	0.143
Living in a town	–0.005	0.901	–0.029	0.668	0.056	0.559	–0.018	0.870
Region: Central and Western								
Northern	–0.015	0.746	–0.007	0.927	–0.020	0.850	–0.098	0.377
Southern	0.236	0.016	0.122	0.339	0.063	0.768	0.136	0.624
North-Eastern	0.293	0.001	0.079	0.455	0.126	0.544	0.358	0.121
Disabled	–0.019	0.815	–0.014	0.914	–0.118	0.509	–0.010	0.959
Tenure on prev. job < 1 year	0.025	0.602			0.107	0.319	–0.121	0.315
Regional registered unemployment rate	–0.051	0.000			–0.047	0.106	–0.006	0.845
Knowledge of English							–0.055	0.686
Constant	–4.619	0.000	–4.714	0.000	–6.116	0.000	–2.895	0.000
Pseudo R2	0.110		0.118		0.135		0.117	
LR chi2	816.9	0.000	391.3	0.000	211.7	0.000	142.6	0.000
Number of observations	5437		2411		1135		928	

Appendix 27. Unmatched and matched variables of UIB recipients with previous record of UI contributions of 32–79 months (job duration)

Variable	Model no. 1 (all)					
	Unmatched			Matched		
	Treated (270)	Controls (180)	% bias	Treated (270)	Controls (180)	% bias
Beginning of benefit:						
IV Q 2008	0.236	0.251	–3.7	0.236	0.237	–0.2
III Q 2008	0.268	0.124	36.9	0.267	0.250	4.6
I Q 2009	0.467	0.579	–22.7	0.467	0.485	–3.6
Male	0.552	0.542	2.1	0.552	0.566	–2.8
Age	41.5	35.6	55.9	41.5	41.0	4.5
Previous wage (EEK)	12431	11404	13.6	12387	13068	–9.0
Education:						
General secondary	0.300	0.303	–0.6	0.300	0.312	–2.7
Elementary or less	0.006	0.017	–10.9	0.006	0.002	3.4
Basic	0.132	0.158	–7.6	0.132	0.131	0.1
Vocational secondary	0.313	0.302	2.5	0.314	0.307	1.5
Professional secondary	0.082	0.067	5.9	0.082	0.087	–1.9
Vocational higher	0.030	0.038	–4.0	0.030	0.028	1.3
Bachelor	0.098	0.091	2.5	0.098	0.095	1.0
Master or doctor	0.039	0.025	7.9	0.039	0.038	0.6
Previous occupation:						
Technician	0.092	0.097	–1.7	0.092	0.095	–0.9
Manager	0.105	0.087	6.1	0.104	0.112	–2.7
Professional	0.065	0.058	2.8	0.065	0.063	1.0
Clerk	0.050	0.061	–4.6	0.050	0.047	1.6
Service and sales worker	0.113	0.133	–6.0	0.113	0.128	–4.6
Agriculturist	0.013	0.010	2.4	0.013	0.012	0.6
Craft and related trades worker	0.271	0.298	–6.0	0.271	0.276	–1.2
Plant and machine operator	0.130	0.096	10.6	0.130	0.104	8.0
Elementary occupation	0.161	0.160	0.4	0.161	0.162	–0.3
Main language Estonian	0.611	0.573	7.7	0.610	0.614	–0.7
Living in a town	0.684	0.720	–7.9	0.684	0.696	–2.7
Tenure on previous job less than 1 year	0.318	0.387	–14.5	0.318	0.327	–2.0
Regional registered unemployment rate	5.3	5.9	–22.4	5.3	5.3	0.3

Appendix 27 (*continued*)

Variable	Model no. 2 (exit 1–150)					
	Unmatched			Matched		
	Treated (270)	Controls (180)	% bias	Treated (270)	Controls (180)	% bias
Beginning of benefit:						
IV Q 2008	0.206	0.217	–2.6	0.206	0.213	–1.7
III Q 2008	0.336	0.160	41.6	0.331	0.312	4.5
I Q 2009	0.435	0.582	–29.7	0.441	0.446	–1.1
Male	0.491	0.485	1.3	0.488	0.512	–4.8
Age	41.3	35.1	58.1	41.2	41.2	–0.2
Previous wage (EEK)	12307	11270	13.5	11846	11974	–1.7
Education:						
General secondary	0.286	0.293	–1.6	0.286	0.266	4.5
Elementary or less	0.007	0.016	–8.0	0.008	0.011	–3.5
Basic	0.116	0.151	–10.4	0.117	0.117	0.2
Vocational secondary	0.310	0.284	5.8	0.312	0.328	–3.5
Professional secondary	0.090	0.069	7.9	0.090	0.079	3.9
Vocational higher	0.039	0.053	–6.3	0.039	0.050	–5.4
Bachelor	0.109	0.103	1.9	0.108	0.098	3.2
Master or doctor	0.042	0.031	6.0	0.041	0.051	–5.6
Previous occupation:						
Technician	0.088	0.091	–1.0	0.090	0.086	1.3
Manager	0.106	0.094	4.1	0.097	0.102	–1.8
Professional	0.079	0.076	1.2	0.080	0.101	–7.9
Clerk	0.059	0.066	–3.0	0.058	0.068	–4.1
Service and sales worker	0.133	0.149	–4.8	0.135	0.134	0.2
Agriculturist	0.010	0.013	–3.3	0.010	0.002	7.1
Craft and related trades worker	0.249	0.267	–4.2	0.252	0.237	3.4
Plant and machine operator	0.112	0.081	10.6	0.112	0.111	0.3
Elementary occupation	0.164	0.163	0.4	0.166	0.158	2.2
Main language Estonian	0.627	0.613	3.0	0.623	0.583	8.2
Living in a town	0.682	0.720	–8.4	0.685	0.701	–3.5
Tenure on previous job less than 1 year	0.340	0.410	–14.4	0.343	0.336	1.6
Regional registered unemployment rate	5.2	5.9	–26.3	5.2	5.4	–5.1

Appendix 27 (*continued*)

Variable	Model no. 3 (exit 151–240)					
	Unmatched			Matched		
	Treated (270)	Controls (180)	% bias	Treated (270)	Controls (180)	% bias
Beginning of benefit:						
IV Q 2008	0.249	0.248	0.1	0.251	0.264	–3.0
III Q 2008	0.194	0.078	34.2	0.184	0.183	0.6
I Q 2009	0.517	0.612	–19.2	0.523	0.523	0.0
Male	0.598	0.609	–2.3	0.596	0.568	5.7
Age	40.8	34.9	55.8	40.8	39.7	10.4
Previous wage (EEK)	12949	11968	13.4	12553	12854	–4.1
Education:						
General secondary	0.314	0.301	2.9	0.315	0.324	–2.0
Elementary or less	0.005	0.020	–13.2	0.006	0.000	4.9
Basic	0.137	0.165	–7.8	0.140	0.127	3.6
Vocational secondary	0.318	0.327	–1.8	0.324	0.354	–6.4
Professional secondary	0.088	0.048	16.0	0.084	0.086	–0.7
Vocational higher	0.020	0.027	–4.7	0.019	0.011	4.9
Bachelor	0.088	0.090	–0.8	0.086	0.082	1.3
Master or doctor	0.029	0.022	4.5	0.028	0.017	7.1
Previous occupation:						
Technician	0.086	0.102	–5.5	0.086	0.076	3.2
Manager	0.104	0.100	1.3	0.102	0.089	4.3
Professional	0.049	0.044	2.4	0.047	0.047	0.0
Clerk	0.051	0.049	0.9	0.050	0.041	4.3
Service and sales worker	0.099	0.112	–4.4	0.101	0.130	–9.7
Agriculturist	0.011	0.005	6.6	0.011	0.009	2.1
Craft and related trades worker	0.280	0.320	–8.7	0.283	0.304	–4.5
Plant and machine operator	0.170	0.111	17.2	0.168	0.162	1.6
Elementary occupation	0.150	0.156	–1.8	0.153	0.142	3.1
Main language Estonian	0.654	0.587	14.0	0.650	0.663	–2.7
Living in a town	0.671	0.690	–4.2	0.670	0.710	–8.4
Tenure on previous job less than 1 year	0.335	0.364	–6.2	0.337	0.311	5.5
Regional registered unemployment rate	5.6	6.3	–26.2	5.7	5.6	2.7

Appendix 27 (*continued*)

Variable	Model no. 4 (exit 271–360)					
	Unmatched			Matched		
	Treated (270)	Controls (180)	% bias	Treated (270)	Controls (180)	% bias
Beginning of benefit:						
IV Q 2008	0.255	0.294	–8.9	0.259	0.216	9.7
III Q 2008	0.191	0.102	25.4	0.190	0.183	2.0
I Q 2009	0.508	0.548	–8.1	0.504	0.570	–13.2
Male	0.588	0.580	1.6	0.583	0.557	5.3
Age	41.9	36.3	52.4	41.8	41.5	2.8
Previous wage (EEK)	12627	10738	26.2	12174	11187	13.7
Education:						
General secondary	0.292	0.324	–6.8	0.294	0.277	3.8
Elementary or less	0.005	0.015	–9.6	0.005	0.005	0.0
Basic	0.128	0.149	–5.9	0.130	0.125	1.5
Vocational secondary	0.357	0.309	10.2	0.362	0.402	–8.5
Professional secondary	0.068	0.085	–6.1	0.070	0.073	–1.3
Vocational higher	0.032	0.026	3.7	0.030	0.037	–4.1
Bachelor	0.079	0.079	0.0	0.075	0.061	5.2
Master or doctor	0.038	0.015	14.5	0.035	0.021	8.7
Previous occupation:						
Technician	0.109	0.087	7.4	0.110	0.089	7.0
Manager	0.118	0.064	18.8	0.104	0.113	–3.0
Professional	0.056	0.044	5.8	0.057	0.064	–3.2
Clerk	0.039	0.055	–7.6	0.040	0.037	1.6
Service and sales worker	0.096	0.140	–13.7	0.097	0.096	0.5
Agriculturist	0.019	0.012	5.8	0.019	0.012	5.7
Craft and related trades worker	0.280	0.303	–5.0	0.285	0.310	–5.4
Plant and machine operator	0.106	0.122	–5.2	0.108	0.078	9.3
Elementary occupation	0.176	0.172	1.1	0.179	0.202	–6.0
Main language Estonian	0.591	0.534	11.7	0.584	0.551	6.7
Living in a town	0.677	0.738	–13.4	0.678	0.663	3.4
Tenure on previous job less than 1 year	0.277	0.394	–24.9	0.280	0.256	5.2
Regional registered unemployment rate	5.6	5.6	–1.5	5.6	5.8	–6.6

Appendix 28. Estimation results from piecewise-constant proportional hazard models of post-unemployment job duration by the time of exiting unemployment

Covariate	Compared to	All		Exit 1–150		Exit 151–240		Exit 271–360	
		Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z
UIB 270	UIB 180	0.831	0.000	0.878	0.002	0.805	0.001	0.737	0.000
Duration of unemployment		0.999	0.000	0.996	0.000	1.000	0.983	1.000	0.754
Male	Female	1.066	0.022	1.102	0.020	1.026	0.672	1.093	0.193
Age 16–24	Age 25–54	1.089	0.041	1.138	0.038	1.106	0.213	1.107	0.372
Age 55+		1.096	0.023	1.119	0.069	1.046	0.624	1.109	0.257
Main language Estonian	Other language	1.051	0.090	1.027	0.545	1.170	0.015	1.009	0.904
Disabled	Not disabled	1.259	0.000	1.425	0.000	1.266	0.041	1.169	0.201
Living in a town	Country-side	1.068	0.023	1.003	0.944	1.162	0.014	1.143	0.075
Previous job:									
Manager	Technician	1.009	0.880	1.088	0.315	0.941	0.630	0.926	0.583
Professional		1.056	0.402	1.111	0.256	1.067	0.672	1.051	0.763
Clerk		1.049	0.454	1.116	0.237	1.007	0.961	1.213	0.227
Service and sales worker		1.117	0.039	1.161	0.059	1.171	0.181	1.073	0.603
Agriculturist		1.201	0.125	1.215	0.266	1.377	0.189	1.570	0.101
Craft worker		1.026	0.603	1.075	0.339	1.056	0.603	0.991	0.936
Plant and machine operator		0.958	0.451	1.036	0.680	0.950	0.661	0.862	0.301
Elementary occupation		1.049	0.357	1.100	0.231	1.071	0.540	1.089	0.501
Education:									
Elementary or less	General secondary education	1.098	0.416	1.031	0.858	1.299	0.258	1.042	0.896
Basic		1.051	0.214	1.027	0.668	1.191	0.037	1.044	0.669
Vocational secondary		1.012	0.715	1.036	0.463	1.098	0.173	0.979	0.786
Professional secondary		1.008	0.880	1.165	0.041	0.901	0.385	0.920	0.525
Vocational higher		1.007	0.918	1.089	0.371	1.095	0.610	0.783	0.208
Bachelor		1.043	0.392	1.036	0.628	1.030	0.787	1.451	0.002
Master or doctor		1.028	0.698	1.213	0.050	1.062	0.742	0.813	0.282
Tenure 1–5 years	Tenure <1 year	0.835	0.000	0.872	0.001	0.807	0.000	0.821	0.006
Tenure 5–10 years		0.803	0.000	0.829	0.009	0.770	0.017	0.748	0.011
Tenure 10+ years		0.744	0.000	0.720	0.000	0.577	0.000	0.871	0.257

Appendix 28 (*continued*)

Covariate	All		Exit 1–150		Exit 151–240		Exit 271–360	
	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z
Monthly regional registered unemployment rate (in percentage points)	1.017	0.000	1.027	0.000	1.007	0.251	1.000	0.943
Monthly change in registered unemployment rate (in percentage points)	1.079	0.087	1.018	0.780	1.045	0.707	0.943	0.617
Monthly inflow of registered vacancies (in hundreds)	1.003	0.413	1.002	0.715	1.031	0.004	1.017	0.178
1. month of employment	0.137	0.000	0.178	0.000	0.070	0.000	0.148	0.000
2. month of employment	0.063	0.000	0.066	0.000	0.043	0.000	0.081	0.000
3. month of employment	0.065	0.000	0.060	0.000	0.051	0.000	0.091	0.000
4. month of employment	0.057	0.000	0.055	0.000	0.042	0.000	0.079	0.000
5. month of employment	0.045	0.000	0.045	0.000	0.031	0.000	0.073	0.000
6. month of employment	0.048	0.000	0.046	0.000	0.033	0.000	0.074	0.000
7. month of employment	0.037	0.000	0.031	0.000	0.034	0.000	0.052	0.000
8. month of employment	0.036	0.000	0.037	0.000	0.025	0.000	0.043	0.000
9. month of employment	0.033	0.000	0.035	0.000	0.023	0.000	0.046	0.000
10. month of employment	0.032	0.000	0.034	0.000	0.015	0.000	0.051	0.000
11. month of employment	0.034	0.000	0.032	0.000	0.029	0.000	0.035	0.000
12. month of employment	0.038	0.000	0.034	0.000	0.029	0.000	0.049	0.000
13. month of employment	0.040	0.000	0.034	0.000	0.034	0.000	0.063	0.000
14. month of employment	0.030	0.000	0.028	0.000	0.023	0.000	0.041	0.000
15. month of employment	0.036	0.000	0.023	0.000	0.044	0.000	0.050	0.000
16. month of employment	0.026	0.000	0.019	0.000	0.029	0.000	0.038	0.000
17. month of employment	0.028	0.000	0.024	0.000	0.023	0.000	0.038	0.000
18. month of employment	0.035	0.000	0.031	0.000	0.032	0.000	0.039	0.000
19. month of employment	0.024	0.000	0.024	0.000	0.018	0.000	0.015	0.000
20. month of employment	0.025	0.000	0.024	0.000	0.016	0.000	0.041	0.000
21. month of employment	0.022	0.000	0.021	0.000	0.017	0.000		
22. month of employment	0.017	0.000	0.014	0.000	0.015	0.000	0.000	0.979
23. month of employment	0.013	0.000	0.012	0.000	0.004	0.000		
24. month of employment	0.012	0.000	0.009	0.000	0.013	0.000		
25. month of employment	0.012	0.000	0.010	0.000	0.000	1.000	x	x
26. month of employment	0.017	0.000	0.014	0.000	0.014	0.000	x	x
27. month of employment	0.014	0.000	0.012	0.000	0.000	1.000	x	x
28. month of employment	0.018	0.000	0.014	0.000	0.000	1.000	x	x
29. month of employment	0.012	0.000	0.010	0.000	x	x	x	x
30. month of employment	0.010	0.000	0.007	0.000	x	x	x	x
31.–33. month of employment	0.004	0.000	0.002	0.000				
θ (variance of gamma shared frailty; Likelihood-ratio test of θ =0)	0.000	0.903	0.000	0.924	0.000	0.971	0.000	0.965
Wald test	48073	0.000	22524	0.000	10224	0.000	7405	0.000
No. of observations	106521		52266		22376		16327	
No. of subjects	9523		4150		2013		1673	
No. of failures	6647		3032		1439		1067	

Appendix 29. Estimation results from piecewise-constant proportional hazard models of post-unemployment job duration by the previous record of UI contributions

Unemployment insurance record:		**32–79 months**		**50–62 months**		**54–58 months**	
Covariate	**Compared to**	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z
UIB 270	UIB 180	0.900	0.003	0.918	0.231	0.861	0.214
Duration of unemployment		0.999	0.000	0.999	0.038	0.999	0.296
Male	Female	1.125	0.001	1.054	0.518	1.059	0.690
Age 16–24	Age 25–54	1.098	0.135	1.063	0.684	1.315	0.291
Age 55+		1.106	0.058	0.941	0.637	1.217	0.364
Main language Estonian	Other language	1.061	0.121	1.113	0.194	1.114	0.437
Disabled	Not disabled	1.271	0.000	1.124	0.467	1.182	0.479
Living in a town	Country-side	1.015	0.701	1.054	0.522	1.048	0.731
Previous job:							
Manager	Technician	1.019	0.807	1.260	0.160	0.886	0.665
Professional		1.079	0.370	1.163	0.400	1.275	0.441
Clerk		1.072	0.423	1.002	0.990	0.705	0.317
Service and sales worker		1.133	0.083	1.256	0.149	1.283	0.319
Agriculturist		1.262	0.136	1.210	0.749	1.579	0.659
Craft worker		1.058	0.387	1.282	0.081	1.045	0.855
Plant and machine operator		0.938	0.399	0.994	0.973	0.645	0.163
Elementary occupation		1.014	0.842	1.047	0.761	0.951	0.832
Education:							
Elementary or less	General secondary education	1.533	0.003	1.147	0.692	0.845	0.782
Basic		1.085	0.126	1.047	0.687	0.813	0.315
Vocational secondary		1.068	0.118	0.992	0.932	1.089	0.575
Professional secondary		1.020	0.763	1.072	0.653	0.953	0.866
Vocational higher		1.013	0.888	0.710	0.071	0.731	0.311
Bachelor		1.076	0.250	0.910	0.494	0.929	0.763
Master or doctor		1.038	0.706	1.113	0.639	1.112	0.764
Tenure 1–5 years	Tenure <1 year	0.832	0.000	0.825	0.009	0.903	0.416
Tenure 5–10 years		0.805	0.001	0.897	0.559	1.533	0.215
Tenure 10+ years		0.749	0.000	0.651	0.213	0.637	0.536

Appendix 29 (*continued*)

Unemployment insurance record:	**32–79 months**		**50–62 months**		**54–58 months**	
Covariate	Hazard ratio	P>z	Hazard ratio	P>z	Hazard ratio	P>z
Monthly regional registered unemployment rate (in percentage points)	1.018	0.000	1.014	0.055	1.015	0.249
Monthly change in registered unemployment rate (in percentage points)	1.037	0.533	1.082	0.536	1.024	0.912
Monthly inflow of registered vacancies (in hundreds)	1.010	0.074	1.003	0.818	1.023	0.261
1. month of employment	0.131	0.000	0.129	0.000	0.101	0.000
2. month of employment	0.061	0.000	0.062	0.000	0.058	0.000
3. month of employment	0.060	0.000	0.062	0.000	0.050	0.000
4. month of employment	0.050	0.000	0.054	0.000	0.036	0.000
5. month of employment	0.039	0.000	0.049	0.000	0.031	0.000
6. month of employment	0.042	0.000	0.049	0.000	0.036	0.000
7. month of employment	0.031	0.000	0.037	0.000	0.032	0.000
8. month of employment	0.034	0.000	0.039	0.000	0.043	0.000
9. month of employment	0.029	0.000	0.035	0.000	0.030	0.000
10. month of employment	0.026	0.000	0.028	0.000	0.024	0.000
11. month of employment	0.029	0.000	0.038	0.000	0.032	0.000
12. month of employment	0.031	0.000	0.047	0.000	0.043	0.000
13. month of employment	0.034	0.000	0.035	0.000	0.022	0.000
14. month of employment	0.025	0.000	0.031	0.000	0.010	0.000
15. month of employment	0.030	0.000	0.043	0.000	0.049	0.000
16. month of employment	0.022	0.000	0.024	0.000	0.021	0.000
17. month of employment	0.023	0.000	0.030	0.000	0.023	0.000
18. month of employment	0.033	0.000	0.033	0.000	0.036	0.000
19. month of employment	0.025	0.000	0.023	0.000	0.023	0.000
20. month of employment	0.024	0.000	0.028	0.000	0.026	0.000
21. month of employment	0.018	0.000	0.020	0.000	0.023	0.000
22. month of employment	0.017	0.000	0.018	0.000	0.018	0.000
23. month of employment	0.012	0.000	0.023	0.000	0.000	1.000
24. month of employment	0.013	0.000	0.022	0.000	0.025	0.000
25. month of employment	0.013	0.000	0.025	0.000	0.000	1.000
26. month of employment	0.016	0.000	0.035	0.000	0.000	1.000
27. month of employment	0.013	0.000	0.015	0.000	0.031	0.002
28. month of employment	0.016	0.000	0.000	1.000	0.000	1.000
29. month of employment	0.013	0.000	0.025	0.000	0.000	1.000
30. month of employment	0.007	0.000	0.000	1.000	0.000	1.000
31.–33. month of employment	0.000	1.000	0.000	1.000	0.000	1.000
θ (variance of gamma shared frailty; Likelihood-ratio test of θ =0)	0.000	0.953	0.000	0.961	0.000	0.973
Wald test	27353	0.000	5821	0.000	2125	0.000
No. of observations	60514		12564		4808	
No. of subjects	5437		1173		430	
No. of failures	3874		847		303	

SUMMARY IN ESTONIAN – KOKKUVÕTE

Töötushüvitiste helduse mõju Eesti tööturu väljunditele kriisiperioodil

Uurimistöö olulisus ja motivatsioon

Globaalne finantskriis mõjutas kõikide Euroopa Liidu riikide tööturge. Enamikes riikides hakkas töötuse määr tõusma 2008. aasta teisel poolel ning mõnedes riikides, nagu Iirimaa, Kreeka ja Hispaania, tõusis töötuse määr veel ka 2011. aasta lõpu seisuga. Kõrge töötuse määr sundis riike panustama tööturupoliitikasse, aktiivsete ja passiivsete tööturumeetmete pakkumisse. Enamik riike võttis kasutusele mõne konkreetsema kriisimeetme (töötushüvitise perioodi pikendamine, aktiivsete meetmete osutamise mahu suurendamine, uute aktiivsete meetmete väljatöötamine jne), et peatada töötuse määra kasvu, lühendada töötuseperioodi kestust, vähendada töötusest tingitud kvalifikatsiooni ja oskuste aegumist jne.

Majanduskriis mõjutas Eesti tööturgu rohkem kui teiste Euroopa Liidu riikide omi. 2010. aasta esimeseks kvartaliks kasvas töötuse määr Eestis võrreldes 2008. aasta teise kvartaliga viiekordselt (4,0%-lt 19,8%-ni). Samal perioodil oli töötuse määra tõus suhteliselt kiire ka teistes Balti riikides (Leedus tõusis töötus 4 korda kõrgemaks ning Lätis 3,3 korda kõrgemaks). Teistes EL riikides oli töötuse määra tõus aga oluliselt madalam. Samas oli ka tööturuolukorra paranemine aastatel 2010–2011 Eestis palju kiirem kui teistes EL riikides. Selline äärmuslik turbulents tööturul teeb Eestist huvipakkuva juhtumi, mida uurida. Eesti andmetel on võimalik uurida tööturupoliitikate mõju tööturu väljunditele[87] ja töötute tööturukäitumist äärmiselt raske tööturusituatsiooni tingimustes.

Üks rohkem arutluse all olnud teemasid kriisiperioodil on olnud töötushüvitiste süsteemi helduse küsimus, eelkõige küsimus, kas majanduslanguse tingimustes võiks töötushüvitiste süsteem olla heldem kui majanduskasvu ajal. Olulisim teooria, millega saab käsitleda töötushüvitiste mõju tööturu väljunditele, on otsimisteooria. Teema olulisus peegeldub ka selles, et 2010. aasta Nobeli preemia laureaadid Peter A. Diamond, Dale T. Mortensen ja Christopher A. Pissarides on olnud just otsimisteooria arendajad. 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, ning kokkuvõttes tõstab see töötuse määra. Samas võib otsimisteooria edasiarenduste kohaselt olla töötushüvitistel ka positiivseid mõjusid tööturu väljunditele. Samuti ei ole

[87] Dissertatsioon uurib tööturu väljundeid mikrotasandil, seejuures eelkõige tööturuseisundit (hõives olek või hõiveta olek) ja palka. Lisaks hõlmavad tööturu väljundid endas ka teisi näitajaid, nagu töötundide pakkumine, tööjõu tootlikkus jne.

otsimisteooria kontekstis üheselt selge, kuidas muutub töötute tööturukäitumine ja töötushüvitiste mõju erinevas majandusolukorras.

Kõige otsesem ja ka kõige rohkem empiiriliselt tõendatud töötushüvitiste mõju otsimisteooria kohaselt on hüvitiste mittestimuleeriv mõju, ehk et suuremad ja/või pikemad hüvitised vähendavad tõenäosust töötusest väljuda (vaata näiteks selliseid uurimusi: Meyer 1990; Katz ja Meyer 1990, Van Ours ja Vodopivec 2006). Lisaks tõuseb otsimisteooria kohaselt hüvitiseperioodi jooksul tööotsimise intensiivsus, reservatsioonipalk langeb ja töötusest tööle liikumine tõuseb. Seetõttu on hüvitiseperioodi lõpus töötusest tööle liikumises hüpe. Teisest küljest võib töötushüvitiste süsteemi helduse suurendamine julgustada hetkel ilma hüvitiseta töötuid tööle liikuma, et kvalifitseeruda hüvitisele tulevikus.

Majanduslangus tähendab otsimismudelis eelkõige madalamat tööpakkumiste saabumise määra. Siiski ei anna otsimisteooria ühest vastust majandustsükli mõjudele ei töötuse kestusele ega hüvitiste mittestimuleerivale mõjule. Ühest küljest majanduslanguse olukorras reservatsioonipalk langeb ning töötud muutuvad töökohtade suhtes vähem valivaks ning seega töötusest tööle liikumine suureneb. Teisest küljest on tööpakkumiste saabumise määr madalam ehk on vähem võimalusi töötusest väljuda ning seega töötusest tööle liikumine langeb. Samuti võivad töötud vähendada tööotsimise intensiivsust, sest piirtulu tööotsimiseks tehtud pingutustest võib langeda. Üheselt ei ole ka määratud, kuidas võib muutuda töötushüvitise perioodi lõpus toimuv hüpe töötusest tööle liikumises.

Seega on otsimisteooria-alases kirjanduses põhjalikult käsitletud nii töötushüvitiste kui majandusolukorra mõju töötuse kestusele (töötushüvitised pikendavad töötuse kestust ning majandusolukorra mõju pole üheselt määratletav). Mõne viimase aasta jooksul on hakatud uurima ka nende kahe teguri koosmõju. Ehk võib väita, et hüvitiste mittestimuleeriv mõju võib varieeruda majandustsükli jooksul. Mittestimuleerivat mõju puudutavas teaduskirjanduses eeldatakse, et kriisitingimistes on see mõju pigem väiksem, kuigi teooria ei anna selles küsimuses siiski päris ühest vastust (vaata näiteks Krueger ja Meyer 2002, Jurajda ja Tannery 2003, Landais *et al.* 2010, Kroft ja Notowidigdo 2011). Samas on ka empiirilisi uuringuid selles osas väga vähe tehtud. Üksikud uuringud, mis selles vallas tehtud, leiavad, et hüvitiste mittestimuleeriv mõju võib olla majanduskriisi olukorras pigem väiksem (vaata näiteks Bover *et al.* 2002, Jurajda ja Tannery 2003, Schmieder *et al.* 2010, Kroft ja Notowidigdo 2011). Seni aga ei ole tehtud empiirilisi uuringuid, mis vaataks mittestimuleerivat mõju väga sügava majanduskriisi olukorras.

Lühidalt kokkuvõttes eeldatakse otsimisteoorias töötushüvitistel olevat pigem negatiivne mõju tööturule, kuivõrd nad pikendavad töötuse kestust (vaatamata sellele, et see mõju võib olla kriisitingimustes väiksem). Samas toovad otsimisteooria edasiarendused välja, et heldemad töötushüvitised võivad leevendada piiranguid tööotsimisel ja niiviisi suurendada töötusjärgse töö

kvaliteeti[88] (kõrgem palk, pikem hõive kestus, parem sobivus töökoha nõuete ja töötaja oskuste vahel jne.). Seetõttu võivad töötushüvitised pigem toetada tööotsinguid kui motiveerida jääma töötusesse (Burdett 1979). Teoreetilises kirjanduses näitavad hüvitiste positiivset mõju töötusjärgse töö kvaliteedile näiteks Marimon ja Zilibotti (1999) ning Acemoglu ja Shimer (2000).

Samal ajal, kui töötushüvitiste mittestimuleerivat mõju on põhjalikult empiiriliselt tõendatud, on tähelepanu töötushüvitiste mõjule töötusjärgse töö kvaliteedile pööratud alles hiljuti. Lisaks on nende uuringute tulemused tihti vastakad ning ainult mõned neist kinnitavad töötushüvitiste positiivset mõju. Mõnevõrra rohkem on leitud töötushüvitiste positiivset mõju töötusjärgse hõive kestusele (näiteks Belzil 2001, Centeno 2004, Tatsiramos 2009, Caliendo *et al.* 2009) kui töötusjärgsele palgale (näiteks Gangl 2002, Gangl 2006, Fitzenberger ja Wilke 2007).

Kokkuvõttes on viimaste aastate tööturu olukord toonud kaasa suurema tähelepanu töötushüvitiste mõju uurimisele tööturu väljunditele. Kuigi on kinnitust leidnud, et töötushüvitised pikendavad töötuse kestust, on siiski nii teoreetiliselt kui empiiriliselt lahtine küsimus, kas selline mõju võib varieeruda koos majandusolukorraga. Samuti ei ole senini põhjalikku kinnitust leidnud, et töötushüvitised võivad suurendada töötusjärgse töö kvaliteeti.

Uurimistöö eesmärk, ülesanded ja hüpoteesid

Dissertatsiooni eesmärgiks on uurida, kuidas mõjutab töötushüvitiste heldus tööturuväljundeid sügava kriisi perioodil Eestis. Kuivõrd Eestis tõusis globaalse majanduskriisi tingimustes töötuse määr rohkem kui mujal Euroopa Liidus, on Eesti andmetel võimalik uurida hüvitiste mõjusid ekstreemses tööturu olukorras. Kriisiperiood on selles uurimistöös defineeritud kui periood, mil töötuse määr tõusis Eestis pidevalt ja kiiresti (2008. aasta kolmas kvartal kuni 2010. aasta esimene kvartal). Lisaks võimaldab töötushüvitise helduse mõjude uurimine Eesti töötushüvitiste süsteemis teha ettepanekuid süsteemi disaini parandamise kohta.

Dissertatsiooni eesmärgi saavutamiseks on püstitatud neli põhilist uurimisülesannet. Esimeseks ülesandeks on pakkuda välja teoreetiline taust läbiviidavaks uuringuks. Selleks on esitatud ülevaade otsimisteooriast, keskendudes eelkõige töötushüvitiste mõjule töötuse kestusele ja palgale, ning selle teooria järeldustele nende mõjude kohta majandusolukorra muutumisel. Samuti on esitatud diskussioon töötushüvitiste mõjude hindamiseks ning ülevaade varasematest teemakohastest uuringutest.

Teine uurimisülesanne hõlmab endas Eesti töötushüvitiste süsteemi ning uurimistööks kasutadaolevate andmete kirjeldamist. Ülejäänud kaks uurimis-

[88] Otsimisteooria alases kirjanduses kasutatakse mõistet „töö kvaliteet“, viitamaks töötaja jaoks olulistele vastuvõetud töökoha tunnustele (palk, töölepingu kestus, oskuste ja töö-ülesannete omavaheline sobivus jne).

ülesannet kätkevad töötushüvitiste mõjude hindamist. Esimeseks neist on hinnata töötushüvitiste mõju töötuse kestusele kriisieelsetel andmetel, kriisiaegsetel andmetel, ja võrrelda saadud tulemusi. Viimaseks uurimisülesandeks on hinnata töötushüvitiste helduse mõju töötusjärgse töö kvaliteedile, konkreetsemalt töötusjärgsele palgale ja töötusjärgse hõive kestusele.

Dissertatsioonis on püstitatud kolm hüpoteesi. Esimeseks hüpoteesiks on, et Eesti töötushüvitiste süsteem toob kaasa pikema töötuse kestuse. Sellist mõju eeldatakse otsimisteoorias ning selle mõju esinemist on empiiriliselt näidatud mitmete teiste riikide andmetel. Samuti viitavad sellistele mõjudele Eestis läbiviidud uuringud toimetulekutoetuse ja töötutoetuse kohta (Hinnosaar 2003, veidi vähem Kuddo *et al*. 2002). Kuivõrd praegu on Eesti töötushüvitiste süsteem heldem, peaksid töötushüvitiste mõjud veelgi tugevamalt avalduma.

Teiseks hüpoteesiks on, et töötushüvitiste mõju töötuse kestusele on kriisiperioodil väiksem kui paremas majandusolukorras. Vähene olemasolev teoreetiline ja empiiriline kirjandus mittestimuleeriva mõju ja majandustsüklite kohta eeldab pigem väiksemat hüvitiste mittestimuleerivat mõju halvemas majandusolukorras. Kuivõrd Eesti majandust tabas kriis ülisuures ulatuses, peaks avalduma selles olukorras oluliselt madalam mittestimuleeriv mõju.

Kolmandaks hüpoteesiks on, et heldemad töötushüvitised toovad kaasa kõrgema töötusjärgse töö kvaliteedi. Sellist positiivset mõju eeldatakse teoorias ja on näidatud ka mõnedes empiirilistes uuringutes. Seejuures võib eeldada töötusjärgse töö kestusele suuremat positiivset mõju kui palgale. Ka varasemates uuringutes on tihedamini leidnud kinnitust positiivne mõju töö kestusele. Positiivne mõju palgale võib olla tagasihoidlikum, sest eeldatakse, et töötushüvitised pikendavad töötuse kestust, aga pakutav palk (palgajaotus) võib töötusperioodi pikenedes langeda.

Kasutatud meetodid ja andmed

Dissertatsioonis kasutatavad andmed on pärit põhiliselt kahest allikast – Eesti Töötukassa andmebaasist ning Eesti Maksu- ja Tolliameti andmebaasist. Andmebaasid on ühendatud nii, et iga vaatluse jaoks on andmed olemas mõlemast andmebaasist. Töötukassa andmebaasist on pärit andmed registreeritud töötuse kohta, nagu näiteks info töötushüvitiste kohta ja aktiivsetes meetmetes osalemise kohta. Lisaks sisalduvad selles andmebaasis andmed eelneva hõive kohta ning andmed registreeritud töötute erinevate sotsiaal-demograafiliste tunnuste kohta.

Töötusjärgse töö uurimiseks tulevad andmed Maksu- ja Tolliametist. Selleks on kasutada kuised palgaandmed, mida tööandjad on töötajate eest deklareerinud. Seetõttu on tegelik töötuse kestus, hõive kestus ja ka palga tase andmetes väga hästi defineeritavad.

Uurimistöö keskendub Eesti tööturule hiljutise globaalse majanduskriisi perioodil. Seega on vaatluse all eelkõige kiire töötuse kasvu periood, mis leidis aset 2008. aasta kolmandast kvartalist kuni 2010. aasta esimese kvartalini.

Põhiline vaatlusalune grupp on uurimistöös need töötud, kelle töötushüvitise perioodi algus jäi vahemikku kolmas kvartal 2008 kuni esimene kvartal 2009 (ehk need inimesed, kes jäid töötuks kriisiperioodi alguses). Hõivesse liikumist on nende inimeste puhul vaadatud kuni 2010. aasta esimese kvartalini ehk ajani, kui töötuse tase jõudis kõrgeimasse punkti. Töötusjärgse töö kvaliteedi analüüsis on vaadatud pikemaid aegridu palgaandmete kohta, kuid siiski ainult nende isikute puhul, kes olid tööle liikunud hiljemalt 2010. aasta esimese kvartali lõpuks.

Lisaks on dissertatsioonis analüüsitud töötushüvitiste mõju töötuse kestusele kriisieelsetel andmetel, et võrrelda hüvitiste mittestimuleerivat mõju kriisiajal ja kriisieelsel perioodil. Kriisieelse perioodi puhul on vaadatud neid töötushüvitisi, mille algus jäi 2007. aastasse. Palgaandmed on nende vaatluste puhul ühendatud kuni 2008. aasta lõpuni. Kriisieelse perioodina on vaadatud ainult 2007. aastal määratud hüvitisi, sest enne seda aastat ei ole hüvitiste maksimaalses potentsiaalses perioodis varieeruvust. Tulenevalt Eesti töötuskindlustussüsteemi uudsusest hakati alles 2007. aastal maksma lisaks 180-päevastele töötuskindlustushüvitistele ka 270-päevaseid hüvitisi.

Uurimistöös on kasutatud põhiliselt kolme meetodit töötushüvitiste mõjude hindamiseks: Kaplan-Meieri ellujäämismäärasid (*Kaplan-Meier survival estimate*), tükiti konstantse proportsionaalse riskimäära mudelit (*piecewise-constant proportional hazard model*) ja tõenäosuse alusel sobitamist (*propensity score matching*). Lisaks kombineeritakse neid meetodeid sellise meetodiga, mis kasutab vaatlusi eelkõige selle kriteeriumi lõikepunkti ümber, mille alusel kvalifitseeruvad töötud kas lühemale või pikemale töötushüvitisele (*regression discontinuity design*). Selline metoodika vähendab potentsiaalset selektsiooniprobleemi.

Töötushüvitiste mõju analüüsimisel töötuse kestusele kasutatakse Kaplan-Meieri ellujäämismäärasid ning riskimäära mudelit. Kaplan-Meieri hinnangud võimaldavad heita esmase pilgu töötute tööturukäitumisele. Riskimäära mudeliga saab anda kvantitatiivse hinnangu hüvitiste mittestimuleeriva mõju suurusele, kasutades seejuures paindlikku mudelit, millega saab arvesse võtta ka ajas varieeruvaid muutujaid.

Töötusjärgse töö kvaliteeti on uurimistöös hinnatud läbi kahe lähendi: töötusjärgne palk ja töötusjärgse töö kestus. Töötusjärgse palga hindamisel on peamiseks kasutatud meetodiks tõenäosusel põhinev sobitamine. Pikema potentsiaalse hüvitiseperioodiga inimesed on sobitatud lühema hüvitiseperioodiga inimestega, et hinnata keskmist erinevust palgas.

Töötusjärgse hõive kestuse analüüsis on kasutatud nii kestusanalüüsi meetodeid (Kaplan-Meieri ellujäämismäärad ja tükiti konstantse proportsionaalse riskimäära mudel) kui ka tõenäosusel põhinevat sobitamist. Sarnaselt töötusjärgse palga analüüsile on pikemale hüvitiseperioodile kvalifitseerunud inimesed sobitatud lühema hüvitiseperioodiga inimestega.

Kuigi kasutadaolevaid administratiivandmeid võib pidada väga heaks, kuivõrd saab väga täpselt jälgida hõive ja töötuse perioode ja palgataset, ei ole nende andmete põhjal võimalik hinnangutesse kaasata varimajandust. Samuti puuduvad

andmed näiteks tööotsimise aktiivsuse ja tööotsingute monitooringu kohta. Ka töö kvaliteedi hindamise võimalused on piiratud, sest võimalik on vaadelda ainult palka ja töö kestust. Samas peetakse just töö kestust suhteliselt heaks näitajaks töö kvaliteedi (ja töö sobivuse) kohta.

Uurimistulemused

Töötushüvitised kriisieelsel perioodil: mõju töötuse kestusele

Töötushüvitiste kriisieelse mõju analüüsis töötuse kestusele 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.

Uuring näitab, et keskmise hüvitise saamine vähendab hõivesse liikumist rohkem kui kahekordselt. Nende inimeste tööturukäitumine, kes saavad kõrgemat töötushüvitist, on veelgi rohkem hüvitisesaamisest mõjutatud (samas võib seda efekti mõjutada lisaks hüvitise tasemele see, et nad on saanud eelnevalt ka kõrgemat palka). Samuti näitab analüüs, et töötusest tööle liikumises toimub hüpe töötushüvitise saamise potentsiaalse perioodi lõpus.

Uuringu tulemused näitavad, et baasriskimäär töötusest tööle liikumisel langeb vähehaaval töötuse perioodi jooksul. Samas toimub baasriskimääras mõningane tõus päris töötuseperioodi alguses. Tulemused viitavad sellele, et töötud ei pruugi hakata tööd otsima kohe töötuseperioodi alguses, olenemata sellest, kas nad saavad hüvitist või mitte. Hilisem langus baasriskimääras viitab sellele, et pikema töötuseperioodiga töötutele võidakse esitada vähem tööpakkumisi.

Seega näitab uurimus kriisieelsetel andmetel hüvitiste tugevat mittestimuleerivat mõju (enamus aega vaadeldavast perioodist oli suhteliselt kõrge majanduskasvu periood). Küsimuseks jääb siin, kas selline mittestimuleeriv mõju esineb ka sügava majanduskriisi korral. Teiseks jääb küsimus, kas töötushüvitised samas ka toetavad töö otsinguid, ehk kas pikemate tööotsingute tulemusel leiavad inimesed sobivama töö. Nende küsimustega tegelevad järgnevalt doktoritöös esitatud uurimused.

Töötushüvitised kriisiperioodil: mõju töötuse kestusele

Dissertatsioonis teisena esitatud 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 tingimustel, kuid see mõju võib olla veidi väiksem ja hüvitise tasemeti homogeensem 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 ka hüvitise pikem kestus omavad kriisiperioodil mittestimuleerivat mõju töötute tööle liikumisele.

Tulemused viitavad majanduslanguse olukorras pigem 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.

Uuringus hinnatud mudelid sisaldavad lisaks hüvitisi puudutavatele muutujatele ka aktiivsetes meetmetes osalemist (ja ka isikutunnuseid 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 suunatakse eelkõige neid, kellel on endil valmisolek teenuses osaleda. Samas ei ole töötusest tööle liikumise määr peale meedet alati suurem. Neid meetmeid on tarvis põhjalikumalt analüüsida, et teha järeldusi nende mõju kohta hõivele.

Töötushüvitised kriisiperioodil: mõju töötusjärgsele palgale

Dissertatsioonis kolmandana esitatud empiiriline uuring vaatleb Eesti kriisiaja andmetel töötushüvitiste mõju palgale. Uuring näitab, et hüvitiseperioodi lõpus toimuv hüpe töötusest tööle liikumises on vähemalt osaliselt põhjustatud sellest, et hüvitiseperioodi lõpus muutuvad inimesed töökohtade suhtes vähem valivaks ja on sunnitud vastu võtma ka väiksema kvaliteediga (madalama palgaga) töökohti. Seega hüpe tööle liikumises ei ole põhjustatud ainult suurenenud tööotsimise intensiivsusest[89].

Uurimuses on võrreldud kahte gruppi töötushüvitise saajaid – töötud, kes kvalifitseeruvad 270-päevasele töötuskindlustushüvitisele ning töötud, kes kvalifitseeruvad 180-päevasele töötuskindlustushüvitisele. Oluline erinevus aktsepteeritud palgas avaldub perioodil, mil 180-päevast hüvitist saavad inimesed on oma hüvitiseperioodi lõpetamas (ja tõuseb töötusest tööle liikumine), kuid 270-päevast hüvitist saavad inimesed saavad veel oma hüvitiseperioodi jätkata. Sellel perioodil on keskmine langus aktsepteeritud palgas võrreldes eelneva palgaga ligikaudu 10% võrra väiksem 270-päevast hüvitist saajate puhul. Need tulemused sarnanevad Gaure *et al.* (2008) tulemustele, kes

[89] Kahjuks ei ole kasutada olevate andmete pinnalt võimalik teha järeldusi tööotsimise intensiivsuse muutumise kohta.

näitavad, et vastuvõetav palk langeb umbes 10% just enne hüvitiseperioodi lõppu. Samuti sarnanevad uuringutulemused Centeno ja Novo (2011) tulemustele, kes ei leia üldist olulist töötushüvitiste mõju töötusjärgsele palgale, küll aga ilmneb see mõju töötushüvitise perioodi lõpu ümbruses vastu võetud töökohtade puhul.

Pikema hüvitiseperioodiga inimeste puhul on palga langus väiksem, sest nende hulgas on väiksem osakaal inimesi, kes aktsepteerivad väga suurt palgalangust. 180-päevase hüvitise saajate hulgas on 34% neid, kes aktsepteerivad palgalangust 50% ulatuses või rohkem. 270-päevase hüvitise saajate hulgas on selliseid inimesi aga 22%. Samas ei osutu palgalanguse erinevus statistiliselt oluliseks üle kõigi töötusest väljumiste, sest töötuse algusperioodil tööle liikujate puhul võtavad 180-päevase hüvitise saajad vastu suhteliselt väiksema palgalanguse, ning peale pikemat töötuseperioodi tööle liikujatel ei ole hüvitise liigiti erinevust aktsepteeritavas palgas.

Saadud hinnangud üle sobitatud valimite näitavad, et pikema potentsiaalse hüvitiseperioodiga inimesed aktsepteerival tasapisi järjest suuremat palgalangust, võrreldes nende eelneva palgaga üle hüvitiseperioodi, ning pärast seda palgalangus stabiliseerub. Kontrollgrupp lühema töötuskindlustushüvitisega inimestest aktsepteerib oma hüvitiseperioodi jooksul veidi väiksemaid langusi palgas. Hüvitiseperioodi lõpus aktsepteerivad nad aga väga suurt langust palgas ning samal ajal toimub hüpe nende töötusest tööle liikumises. Pärast seda nende aktsepteeritud palgalangus süveneb aeglasemalt ja stabiliseerub sarnasel tasemel nagu pikemat aega töötuskindlustushüvitist saanutel.

Uuring näitab, et töötusest tööle liikumise määr ning vastuvõetav palk on omavahel väga tihedalt seotud. Kõrgem töötusest tööle liikumine ilmneb andmetes alati suurema aktsepteeritava palgalanguse arvelt. Uurimistöö tulemusi saab tõlgendada kui tõestust otsimisteooriale, et töötushüvitised suurendavad reservatsioonipalka. Samal ajal töötavad töötushüvitised tööotsimise toetajana kuivõrd töötud saavad oma tööotsinguid pikendada, et leida enda jaoks kõrgema kvaliteediga töökoht.

Töötushüvitised kriisiperioodil: mõju töötusjärgse töö kestusele

Dissertatsioonis viimasena esitatud uuring näitab, et töötushüvitistel on positiivne mõju lisaks palgale ka töötusjärgse töö kestusele. Pikema potentsiaalse hüvitiseperioodiga inimesed jäävad vastuvõetud töökohale pikemalt töötama.

Sarnaselt palgauuringuga võrreldakse töötamise kestuse analüüsimiseks 270-päevast ja 180-päevast hüvitist saavaid inimesi. Mitteparameetriline hindamine näitab, et 270-päevast hüvitist saanutel on alati vastuvõetud töökohal kõrgem ellujäämismäär (suurem osakaal jääb töötama) ning madalam riskimäär töökohalt lahkuda kui 180-päevast hüvitist saanutel. Sama kehtib ka siis, kui vaadata ainult väikest osa hüvitisesaajatest ümber 270-päevasele hüvitisele kvalifitseerumise tingimuse punkti (eelneva töötuskindlustusstaaži alusel). Mitteparameetriliste hinnangute alusel on suurim erinevus riskimäärades töötamisperioodi algusfaasis (seega on endiste 180-päevase hüvitise saajate hulgas

rohkem inimesi, kes lahkuvad uuelt töökohalt suhteliselt kiiresti). Selline erinevus töötamise algusperioodil on eriti suur nende inimeste puhul, kes võtsid uue töökoha vastu oma 151.–240. töötuse päeval. Samas jääb see erinevus suhteliselt kõrgeks ka nende puhul, kes uue töö veelgi hiljem vastu võtsid. Seega kujuneb mitteparameetriliste hinnangute põhjal erinevus töötamise kestuses välja nende töökohtade puhul, mis võeti vastu siis, kui 180-päevast hüvitist saanud olid oma hüvitiseperioodi lõpetamas ja nende töötusest tööle liikumise määr tõusis (270-päevast hüvitist saanud aga said jätkata hüvitist).

Sobitamisega saadud tulemused sarnanevad suuresti mitteparameetrilise hindamise tulemustele. Need hinnangud kinnitavad, et erinevus töötusjärgse töö kvaliteedis ei pruugi olla väga suur nende inimeste jaoks, kes võtavad töö vastu juba peale väga lühikest töötuse perioodi. 180-päevast hüvitist saavad inimesed, kes võtavad töö vastu alles hüvitiseperioodi lõpus, aktsepteerivad 10% võrra rohkem halvasti sobivaid töökohti kui 270-päevast hüvitist saavad inimesed samal töötuseperioodil. Halvaks sobivuseks on loetud neid töösuhteid, mis kestavad kuni neli kuud, mis on Eestis tavaline katseaja kestus. Sarnane erinevus töökoha sobivuses jääb alles ka sellel perioodil, kui mõlema grupi hüvitiseperiood on läbi saanud. Seetõttu aktsepteerivad 270-päevast hüvitist saavad inimesed 6% vähem halvasti sobivaid töökohti kui 180-päevast hüvitist saavad inimesed (arvestamata siin aega, millal töötuseperioodi jooksul töökoht vastu võeti). Sarnane erinevus nende kahe grupi vahel ilmneb ka siis, kui vaadata osakaalu, kui paljud jäävad samale töökohale töötama üle ühe aasta. Seega võib ka sobitamisega saadud tulemuste põhjal väita, et erinevus töötamise kestuses ilmneb juba töösuhte algusperioodil.

Tükiti konstantse proportsionaalse riskimäära mudeli tulemused viitavad sellele, et 270-päevase hüvitise saajad lahkuvad vastuvõetud töölt 15% väiksema tõenäosusega kui 180-päevase hüvitise saajad. Saadud tulemused kinnitavad juba mitteparameetrilise hindamise ja sobitamisega saadud tulemusi, et erinevus vastuvõetud töö kvaliteedis ei pruugi ilmneda hüvitise saamise algusperioodil vastuvõetud töökohtade puhul. Küll aga ilmneb oluline erinevus siis, kui 180-päevase hüvitise saajad on lõpetamas hüvitiseperioodi, kuid 270-päevase hüvitise saajad saavad hüvitist veel jätkata. Selline tulemus sarnaneb Belzil (2001) uuringutulemustele, kes näitab, et 5 nädala jooksul peale hüvitise lõppu vastuvõetud töökohti kiputakse suurema tõenäosusega varem lõpetama.

Uuringu tulemused näitavad, et hüvitiseperioodi lõpus muutuvad inimesed töökohtade suhtes vähem valivaks. Ühelt poolt suureneb hüvitiseperioodi lõpus töötusest tööle liikumine ja suurem hulk inimesi võtab töökoha vastu. Teiselt poolt on vastuvõetud töökoht nende jaoks madalama kvaliteediga ja sobib neile vähem, võrreldes olukorraga, kui nende hüvitiseperiood oleks jätkunud ja neil oleks olnud seega rohkem aega sobivamat töökohta otsida. Seega on potentsiaalselt pikemat töötushüvitist saavatel inimestel pikem töötuse periood, aga ka pikem töötusjärgse hõive kestus.

Järeldused

Kokkuvõttes kinnitavad analüüsitulemused suuresti töös püstitatud hüpoteese. Hindamistulemused näitavad, et töötushüvitised pikendavad töötuse kestust oluliselt, nagu oli eeldatud esimese hüpoteesiga. Teine hüpotees eeldas, et selline mõju võiks kriisiperioodil olla oluliselt madalam. Kuigi mittestimuleeriv mõju osutus kriisiperioodil tõepoolest pigem madalamaks, osutus erinevus siiski suhteliselt väikeseks, mis oli ka dissertatsioonis kõige ootamatumaks hindamistulemuseks.

Kolmas hüpotees ootas, et heldemad hüvitised toovad kaasa kõrgema töötusjärgse töö kvaliteedi ja eeldas, et see mõju võiks olla tugevam töötusjärgse töö kestusele kui palgale. Uuringutulemused kinnitavad, et hüvitiste positiivne mõju töötusjärgsele töö kvaliteedile tõepoolest esineb ning on tugevam töö kestusele kui palgale (mõju palgale avaldub ainult perioodil, kui pikema hüvitiseperioodiga töötutel on võimalik jätkata hüvitise saamist, kuid lühema hüvitiseperioodiga töötutel enam mitte).

Uurimistöö tulemused on mõneti sarnased nende väheste uuringutega, mis seni sellel teemal on läbi viidud. Senised empiirilised uuringud töötushüvitiste mittestimuleeriva mõju kohta majandustsükli jooksul pigem arvavad samuti, et mittestimuleeriv mõju võib halvemas majandusolukorras olla väiksem (näiteks Kroft ja Notowidigdo 2011, Schmieder *et al.* 2010 ning Jurajda ja Tannery 2003). Töötushüvitiste mõju osas töötusjärgse töö kvaliteedile on leitud positiivset mõju rohkem töötusjärgse töö kestusele kui palgale (näiteks Lalive 2007 ning Fitzenberger ja Wilke 2007 leiavad, et esineb ainult väike mõju palgale; näiteks Tatsiramos 2009 ja Caliendo *et al.* 2009 leiavad aga olulise mõju hõive kestusele). Ka selles uuringus osutub töötushüvitiste mõju töötusjärgse töötamise kestusele kõrgeks ja statistiliselt oluliseks. Positiivne mõju palgale avaldub ainult siis, kui vaadata detailsemalt töökoha vastvõtmise aega.

Kokkuvõttes viitab analüüs töötushüvitise mõjude kohta tööturu väljunditele sellele, et majanduskriisi perioodil võib olla põhjendatud rakendada heldemat töötushüvitiste süsteemi. Töötuse kestuse analüüsid näitavad, et töötushüvitised pikendavad töötuse kestust isegi väga sügava majanduskriisi tingimustes. Samas võib selline mõju olla kriisiolukorras mõnevõrra väiksem kui paremas majandussituatsioonis. Lisaks kinnitavad uuringud töötusjärgse töö kvaliteedi kohta, et pikenenud töötuse (töö otsimise) periood toob kaasa kõrgema töötusjärgse töö kvaliteedi. Seega pikendavad heldemad hüvitised pikema tööotsimise perioodi, kuid see-eest sobivad vastuvõetavad töökohad paremini töötaja oskuste ja vajadustega.

Vajadus pikema potentsiaalse hüvitise kestuse järele kriisiperioodil ilmneb ka siis, kui vaadelda hüvitisesaajate osakaalu registreeritud töötute hulgas. Kriisist paranemise tingimustes on kasvanud ilma hüvitiseta registreeritud töötute osakaal kõrgemaks kui kunagi varem. Seega on neil inimestel tõenäoliselt puudu vahendeid töö otsimiseks. Pikem hüvitise potentsiaalne kestus väldiks vähemalt mõningal määral nii suure hüvitiseta töötute osakaalu teket

(2011. aastal oli kaks kolmandikku registreeritud töötutest ilma ühegi töötushüvitiseta).

Samas on Eesti ka parema majandusolukorra ajal üks töötu kohta vähimate töötushüvitise kuludega riikidest Euroopa Liidus. Seega võib töötushüvitiste mõju töötusjärgse töö kvaliteedile, aga ka töökohtade ja töötajate omavaheline sobivus olla Eesti töötushüvitiste süsteemis rohkem takistatud kui teistes Euroopa Liidu riikides. Käesolev uurimus näitab eeskätt potentsiaalse hüvitiseperioodi ja töötusjärgse töö kvaliteedi positiivset seost. Seega võib väita, et potentsiaalne hüvitiseperiood võiks olla pikem ka paremas majandusolukorras. Siiski võib ainult potentsiaalse hüvitiseperioodi pikendamine ilma teiste muudatusteta hüvitiste süsteemis (näiteks suurem monitooring ja sanktsioneerimine) kaasa tuua töötuse perioodide pikenemise ja töötuse määra kasvu.

Lisaks võib osa andmetes kajastuvas mittestimuleerivast mõjust olla põhjustatud varimajandusest, kuivõrd dissertatsioon kasutab hõive kohta ainult administratiivandmeid (ametlikult deklareeritud palkasid). Mõned inimesed võivad asuda tööle ilma ametliku töölepinguta juba hüvitiseperioodi jooksul, et jätkata hüvitise saamist, ning ametliku lepingu sõlmida alles siis, kui hüvitiseperiood on läbi saanud. See seletaks, miks on hüpe töötusest tööle liikumises hüvitiseperioodi lõpus niivõrd suur ja miks tööle liikumine peale seda järsult langeb. Kui varimajandus mängib siin olulist rolli, siis pärsivad töötushüvitised tööle liikumist vähem, kui ametlikest andmetest välja paistab.

Mõned eelnevad uuringud on näidanud, et hüvitiste mittestimuleeriv mõju võib olla väiksem, kui tööotsinguid monitooritakse (tööturuasutuse poolt) ja/või rakendatakse sanktsioone ebapiisava tööotsingu korral (näiteks Abbring *et al.* 2005, McVicar 2008, Svarer 2011). Uurimistöös vaadeldud perioodil ei olnud tööotsingute monitooring Eestis eriti põhjalik. Samas ei ole täpsemad andmed monitooringu kohta kättesaadavad ja seetõttu pole võimalik hinnata monitooringu mõju töötuse kestusele. Samuti ei rakendata sanktsioone Eesti töötushüvitiste süsteemis eriti tihti (eelkõige tehakse seda ainult konsultandi vastuvõtule mitteilmumise puhul) ning santsioonide valik on väga piiratud. Töötuskindlustushüvitise puhul on ainsaks võimalikuks sanktsiooniks hüvitise maksmise lõpetamine. Lisaks aga, kui hüvitise maksmine on lõpetatud mitteilmumise tõttu, ei ole kasutadaolevate andmete alusel võimalik kindlaks teha, kas inimene ei tulnud vastuvõtule, sest ta oli juba töökoha leidnud või oli tõesti sanktsioneerimine see, mis andis impulsi tööle liikumiseks. Seega ei ole võimalik Eesti andmeid kasutades hinnata, kuidas monitooring ja sanktsioneerimine töötushüvitiste süsteemis töötuse kestusele mõjub. Toetudes aga teiste riikide praktikale, on tõenäoline, et suurem monitooring ja sanktsioneerimine töötushüvitiste süsteemis võib lühendada töötuse kestust ka Eestis. Teisest küljest võib suurem sanktsioneerimine kaasa tuua ka languse töötusjärgse töö kvaliteedis (seda näitavad näiteks Arni *et al.* 2009 ning Van den Berg ja Vikström 2009 uuringutulemused).

Veel on varasemates empiirilistes uuringutes täheldatud, et aktiivsed tööturumeetmed võivad töötada pigem piitsa kui prääänikuna ja võib avalduda *ex ante*

mõju, mis paneb inimesed töötusest tööle liikuma, kui nad saavad teada, et peab osalema mõnel aktiivsel meetmel (näiteks Gaure *et al.* 2008, Geerdsen 2006, Black *et al.* 2003). Seda mõju ei pruugi aga avalduda, kui aktiivses meetmes osalemine ei ole kohustuslik. Eestis, kus töötuid pigem veendakse aktiivsetes meetmetes osalema, kui et sunnitakse selleks hüvitise sanktsioneerimise ähvardamisel, töötavad aktiivsed meetmed pigem prääänikuna ning avaldub vastupidine mõju. Nii kriisiaegsetel kui kriisieelsetel andmetel läbiviidud töötuse kestuse analüüs näitab, et töötusest tööle liikumine kipub just enne aktiivsel meetmel osalemist ja meetmel osalemise ajal vähenema. Seega jääb küsimuseks, kas aktiivsed tööturupoliitikad võiksid toimida ka Eestis piitsana, kui neid kasutataks laialdasemalt ja kohustuslikuna.

Võttes lühidalt kokku dissertatsioonis esitatud analüüsitulemused, võiks kaaluda Eesti töötushüvitiste süsteemi heldemaks muutmist (eelkõige võiks pikendada potentsiaalset hüvitiseperioodi, mida ka analüüsiti töös detailsemalt). Sellega seoses, tuginedes eelnevatele uuringutele, võib olla samal ajal mõistlik suurendada töötushüvitiste süsteemis ka tööotsingute monitooringu ja sanktsioneerimise taset. See tähendab, et kui praeguses süsteemis on raske hüvitisele kvalifitseeruda, kuid kerge hüvitisel püsida, võiks süsteemi muuta nii, et hüvitisele kvalifitseerumine oleks lihtsam, kuid sellel püsimine raskem.

Dissertatsioonis uuritakse töötushüvitiste mõju tööturu väljunditele. Samas peab töötushüvitiste süsteemi mõju hindamisel majandusele tervikuna silmas pidama ka mitmeid muid olulisi aspekte. Kõige olulisem aspekt sealhulgas on see, miks töötushüvitiste süsteemid on üldse loodud – et tagada mingi sotsiaalse kaitstuse tase töötuse korral. Sisuliselt peaks töötushüvitised mõningal määral siluma kõikumisi inimeste sissetulekus ja seetõttu ka kõikumisi sisenõudluses. Seetõttu on töötushüvitised eriti olulisel kohal majanduskriisi olukorras, et mõningal määral säilitada sisenõudluse taset, ennetada vaesust ja ebavõrdsuse kasvu, hoida inimesed majanduslikult ja sotsiaalselt aktiivsed jne. Samas on need küsimused väljaspool teemade ringi, millega tegeletakse selles dissertatsioonis.

CURRICULUM VITAE[90]

Name	**Anne Lauringson**
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Mobile	+372 55 62 06 63
E-mail	anne.lauringson@tootukassa.ee
Nationality	Estonian
Date of birth	08/04/1982

Work experience

Dates	January 2010 – present
Position held	Head of Analysis Department
Main activities and responsibilities	– Analysing developments on the labour market – Forecasting – Evaluation of labour market measures – Developing statistical reporting
Name of employer	Estonian Unemployment Insurance Fund
Dates	Autumn 2008 – end of 2009
Position held	Analyst
Main activities and responsibilities	– Analysing developments on the labour market – Forecasting – Evaluation of labour market measures – Developing statistical reporting
Name of employer	Estonian Unemployment Insurance Fund
Dates	Summer 2007 – summer 2008
Position held	Head of Analysis Department (temporary replacement)
Main activities and responsibilities	– Analysing developments on the labour market – Forecasting – Developing statistical reporting
Name of employer	Estonian Unemployment Insurance Fund
Dates	Autumn 2003 – spring 2007
Position held	Research Assistant
Main activities and responsibilities	Participation in the following research projects: – "Industrial relations, future trends and challenges of globalization in EU, U.S, Japan, China, India, Australia, Brazil and South-Africa" – a project of the European Foundation for the Improvement of Living and Working Conditions – "The valuation of human capital in Estonian labour market: issues of overeducation and skill-mismatch" – a project of the Estonian Science Foundation

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	– "EIRO Estonian correspondent "– a project of the European Foundation for the Improvement of Living and Working Conditions; writing short articles on Estonian industrial relations and administrating a database of news about Estonian industrial relations – Studies on the representativeness of the social partners at sectoral level in the European Union and monographs on the situation of the social partners in the candidate countries – a project of the Catholic University of Louvain and the Commission of the European Communities (DG Employment and Social Affairs) Conducting seminars in "Introduction to Business Administration" for Bachelor students
Name of employer	Faculty of Economics and Business Administration, University of Tartu
Dates	Autumn 2004 – Autumn 2006
Position held	Assistant of the Vice Dean for Research
Main activities and responsibilities	– Providing information about grants, scholarships, conferences, seminars, job vacancies etc. for faculty members – Compiling reports concerning research activities in the faculty – Taking part in organising conferences, seminars, summer schools – Participating in activities of different administrative boards and committees
Name of employer	Faculty of Economics and Business Administration, University of Tartu

Education and training

Dates	2006–present
Degree	PhD (Economics) – Thesis Title: "The impact of the generosity of unemployment benefits on the Estonian labour market outcomes in a period of crisis" – Main research areas: labour market, labour market policies, industrial relations and social dialogue, labour market flexicurity
University	University of Tartu
Level of education	ISCED 6
Dates	2004–2006
Degree	Magister Artium (Economics) – Thesis Title: "Union's Impact on Remuneration in the Estonian Public Sector"
University	University of Tartu
Level of education	ISCED 5A3

Dates	2000–2004
Degree	Baccalaureus Artium (Economics) – Thesis Title: "The Impact of Unions on Enterprise Performance (on the Example of Estonian Textile Sector)" – Econometrics as the major subject – Finance as the minor subject
University	University of Tartu
Level of education	ISCED 5A1

Personal skills and competences

Mother tongue(s): **Estonian**

Other language(s)

Self-assessment

European level (*)

	Understanding		Speaking		Writing
	Listening	Reading	Spoken interaction	Spoken production	
English	C2	C2	C2	C2	C2
French	A2	A2	A2	A2	A2
Russian	B1	B1	B1	B1	B1
German	A1	A2	A1	A1	A1

(*) Common European Framework of Reference (CEF) level

Computer skills and competences: Stata, MS Office (Word, Excel, PowerPoint, Outlook, Visio), SPSS, EViews

ELULOOKIRJELDUS[91]

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Aadress	Tammsaare 8–18
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Rahvus	Eestlane
Sünniaeg	08/04/1982

Töökogemus

Aeg	Jaanuar 2010 – praeguseni
Amet	Analüüsiosakonna juhataja
Peamised töökohustused	– Tööturu trendide analüüs – Prognoosimine – Tööturumeetmete hindamine – Statistilise aruandluse arendamine
Tööandja	Eesti Töötukassa
Aeg	Sügis 2008 – detsember 2009
Amet	Analüütik
Peamised töökohustused	– Tööturu trendide analüüs – Prognoosimine – Tööturumeetmete hindamine – Statistilise aruandluse arendamine
Tööandja	Eesti Töötukassa
Aeg	Suvi 2007 – suvi 2008
Amet	Analüüsiosakonna juhataja (asendaja õppepuhkuse ajaks)
Peamised töökohustused	– Tööturu trendide analüüs – Prognoosimine
Tööandja	Eesti Töötukassa
Aeg	Sügis 2003 – kevad 2007
Amet	Referent
Peamised töökohustused	Osalemine järgmistes teadusprojektides: – "Industrial relations, future trends and challenges of globalization in EU, U.S, Japan, China, India, Australia, Brazil and South-Africa" – Euroopa Elu- ja Töötingimuste Parandamise Fondi (European Foundation for the Improvement of Living and Working Conditions) projekt – "Inimkapitali väärtustamine Eesti tööturul: üleharitus ja hariduse mittevastavus töökoha nõuetele" – Eesti Teadusfondi projekt – "EIRO Eesti korrespondent "– Euroopa Elu- ja Töötingimuste

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	Parandamise Fondi (European Foundation for the Improvement of Living and Working Conditions) projekt; Eesti töösuhetest lühiülevaadete kirjutamine ja teemakohaste artiklite andmebaasi haldamine – Analüüside läbiviimine ja monograafiate kirjutamine sotsiaalpartnerlusest Eestis sektori tasandil – Louvain'i Katoliikliku Ülikooli (Catholic University of Louvain) ja Euroopa Komisjoni (DG Employment and Social Affairs) projekt Seminaride läbiviimine aines „Sissejuhatus ettevõttemajandusse" bakalaureuseõppe tudengitele
Tööandja	Majandusteaduskond, Tartu Ülikool
Aeg	Sügis 2004 – sügis 2006
Amet	Teadusprodekaani assistent
Peamised töökohustused	– Teaduskonna liikmetele info edastamine grantide, stipendiumite, konverentside, seminaride ja tööpakkumiste kohta – Teaduskonna teadustegevust puudutava aruandluse koostamine – Konverentside, seminaride ja suvekoolide organiseerimises osalemine – Teaduskonna nõukogu ja erinevate komiteede töös osalemine
Tööandja	Majandusteaduskond, Tartu Ülikool

Haridus

Aeg	2006–praeguseni
Kraad	PhD (Majandusteadus) – Dissertatsiooni teema: " Töötushüvitiste helduse mõju Eesti tööturu väljunditele kriisiperioodil " – Peamised uurimisvaldkonnad: tööturg, tööturu meetmed, töösuhted ja sotsiaalpartnerlus, tööturu turvaline paindlikkus
Õppeasutus	Majandusteaduskond, Tartu Ülikool
Tase	ISCED 6
Aeg	2004–2006
Kraad	Magister Artium (Majandusteadus) – Dissertatsiooni teema: " Ametiühingute mõju töötasule Eesti avalikus sektoris "
Õppeasutus	Majandusteaduskond, Tartu Ülikool
Tase	ISCED 5A3
Aeg	2000–2004
Kraad	Baccalaureus Artium (Majandusteadus) – Lõputöö teema: " Ametiühingute mõju ettevõtete tootlikkusele Eesti tekstiilisektori näitel " – Ökonomeetria peaerialaks – Rahandus kõrvalerialaks
Õppeasutus	Majandusteaduskond, Tartu Ülikool
Tase	ISCED 5A1

Oskused ja kompetentsid

Emakeel **Eesti keel**

Võõrkeeled

Enese-hindamis-skaalal (*)	Arusaamine		Rääkimine		Kirjutamine
	Kuulamine	Lugemine	Suuline suhtlus	Suuline esitus	
Inglise keel	C2	C2	C2	C2	C2
Prantsuse keel	A2	A2	A2	A2	A2
Vene keel	B1	B1	B1	B1	B1
Saksa keel	A1	A2	A1	A1	A1

(*) Common European Framework of Reference (CEF) level

Arvutioskus Stata, MS Office (Word, Excel, PowerPoint, Outlook, Visio), SPSS, EViews

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