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Effect of unemployment benefit on the duration of unemployment in Estonia: A quantile regression approach

Masters Thesis

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Tartu 2024

I have written this Master's Thesis independently. Any ideas or data taken from other authors or other sources have been fully referenced.

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Abstract

This thesis examines the impact of unemployment insurance benefits (UIB) on the duration of unemployment in Estonia, using data from the Estonian Unemployment Insurance Fund for the period 2017–2022. Based on job search theory, the study uses quantile regression to analyze how UIB affects different segments of the unemployed. This approach allows for a detailed study of how the impact of UIB varies across the distribution of unemployment duration. The results show significant heterogeneity in the effect of UIB, with older individuals and those with higher education experiencing longer periods of unemployment in higher quantiles. Based on these findings, the thesis recommends tailoring the duration of UIB to individual characteristics, strengthening targeted job search assistance and training programs, integrating UIB with active labor market policies, periodically reviewing and adjusting benefit levels and durations, and implementing a robust monitoring and evaluation framework.

Keywords: Unemployment Insurance Benefits, Unemployment Duration, Quantile Regression, Job Search Theory.

CERCS: S180 Economics, econometrics, economic theory, economic systems, economic policy

Introduction

Unemployment insurance benefit (UIB) is a crucial component of contemporary social welfare programs, aimed at providing financial assistance to individuals who involuntarily lose their jobs. Rooted in principles of economic stability, social protection, and labour market flexibility, UI has evolved over time to address the various challenges of unemployment.

Originating in the early 20th century amidst economic disruption and industrialization, UIB programs emerged as a response to the growing volatility in labour markets. These programs aimed to ease economic insecurity caused by cyclical unemployment and structural changes in industries. Economically, UIB serves as a countercyclical policy, injecting essential funds into the economy during downturns to mitigate the adverse effects of reduced consumer spending and demand shocks. By providing a safety net for displaced workers, UIB helps maintain economic activity and lessen the severity of recessions.

Socially, UIB acts as a vital safety measure, offering stability and security to individuals and families experiencing job loss. It promotes principles of social justice and solidarity by providing income replacement to mitigate financial difficulties and social isolation. Moreover, UI enhances labour market flexibility by enabling unemployed individuals to seek suitable job opportunities without immediate financial pressure. This flexibility benefits both workers, who can pursue jobs aligned with their skills, and employers, who gain access to a more adaptable workforce.

Estonia's UIB program, managed by Eesti Töötukassa, exemplifies the implementation of UIB principles. Established in 2001, Eesti Töötukassa operates independently to administer UI benefits and labour market initiatives. However, its operations still rely heavily on government support and approval, potentially limiting its autonomy. Despite its benefits, not all unemployed individuals are eligible for UIB benefits, and some exhaust their benefits before finding new employment, highlighting the limitations of UIB programs.

The objective of this study is to estimate the effects of unemployment benefits on the duration of unemployment using the quantile regression approach. Based on the context provided, the main research hypothesis is thus presented as:

- The duration of UI benefits increases the duration of unemployment
- The effect of the duration of the UI benefits is heterogeneous (it varies in subgroups of the unemployed) and it depends on age, gender, disability, etc.

The predominant result from studies in this area is that unemployment benefits have negative effects on employment duration. It is therefore expected that an increase in UI benefits duration will also increase duration of unemployment because people may be less likely to want to go back into the workforce or take more time to look for better suited jobs. However, what is the size of these effects at different quantiles of the distribution? Where are the effects most pronounced? Answering these questions with this thesis will help labour policies to understand effects in different quintiles and use the results to inform labour policies.

This study follows the job search theory which explains how job seekers engage in a dynamic decision-making process, balancing factors such as search intensity, wage expectations, and job duration. Quantile regression is majorly used for the analysis, although I compare results from the cox proportional hazard model to show how quantile regression better explains the relationship between unemployment benefits and unemployment duration as well as other socio-economic variables in different quantiles of the data. The analysis is based on cross-sectional registry data from the Estonian unemployment insurance fund between 2017 and 2022.

The rest of the paper is structured as follows. The next section presents a review of existing literature including the job search theory which is the predominant theory on the topic, the different methodologies used in related studies including regression kink design, discontinuity design, duration models and quantile regression. The third section discusses methods used in this analysis including Cox proportional hazard model and quantile regression. Next, data is introduced and explained. The fifth section presents the results of the analysis. The final section concludes and provides some policy recommendations.

1. Literature Review

1.1.International studies

The most prominent theory generally used is the job search theory where individuals seek work possibilities that match their abilities, interests, and limits, with credentials, job market circumstances, and personal preferences all playing a role. It focuses on reservation wages, the minimal salary that individuals accept for a job, as well as the effect of information asymmetry in the labour market, which can generate friction in job matching and lengthier search times. A foundational paper on the idea of reservation wage is Mortensen (1977) which argued that UI benefits can influence the reservation wage, as they provide a financial safety net that allows individuals to be more selective in their job search, potentially leading to longer unemployment durations. The paper also analysed the effects of UI on job search results, including the possibility that it will lengthen unemployment. This is because UI benefits can encourage people to hold off accepting a job offer if it does not exceed their reservation salary.

Generally, the job search theory predicts that, depending on when the benefit lapses, the amount of the benefit affects the propensity to exit unemployment and the hazard of doing so. Lalive et al (2004) agrees with this prediction when the paper addressed the Austrian unemployment benefit policy in 1989 and its effects on how people reacted to finding work. The policy divided the unemployed into four groups and yielded different implications for each of the group. The study concluded that, although there are various responses, the job search theory predictions still hold and workers will on average be reluctant to find work as their incentive increases.

Although this study does not include macro level control, it is an important part of the story. Bover (2002) worked on this when the study examined a rotating panel sample of jobless men in Spain between 1987 and 1994. The study considered both individual level traits and economic business cycles using the job search theory. The study concluded that in this particular case, the risk of unemployment is procyclical and that getting unemployment benefits lowers the risk of quitting. The likelihood of landing a job is also more affected by unemployment benefits than by shifts in the business cycle. Another paper that studies the cyclical nature of UI is Kiley (2002). The paper investigated how unemployment benefits

should respond to the business cycle, exploring the delicate balance between consumption smoothing and incentivizing job search within UI programs. The paper concludes that unemployment benefits should respond to the business cycle, exploring the delicate balance between consumption smoothing and incentivizing job search within unemployment insurance UI programs. Mitman & Rabinovic (2015) go further on this topic. They find that the optimal cyclical behaviour of unemployment insurance is characterized in an equilibrium search model with risk-averse workers. Contrary to the US policy, the path of optimal unemployment benefits is pro-cyclical – positively correlated with productivity and employment. Moreover, the best unemployment benefits respond to a productivity shock in a non-monotonic way: when productivity declines, they first increase, but during the recovery, they subsequently decline much below their pre-recession level.

Various empirical methods have been employed in the earlier papers to address the effects of unemployment insurance schemes. Lalive (2006) used the Regression Discontinuity Design to investigate how extended benefits affect unemployment duration. More recent studies conduct nuanced research, for example investigating how different groups of people respond differently to unemployment benefits, or how changes in the way of working, especially since remote work became an option, affect how people search for jobs when on unemployment benefits. Dooley (1988) and Hagedorn (2013) both highlight the importance of individual-level surveys and equilibrium labour market theory, respectively. They both find that unemployment benefit extensions have a substantial effect on total unemployment, with the stimulative effect of increased spending by the unemployed being offset by the negative impact on employment. Delgado (2019) proposed a distribution regression model that allows for varying coefficients, finding that unemployment benefits can affect the duration of unemployment. Bover (2002) used discrete hazard models to show that unemployment benefits reduce the likelihood of leaving unemployment, while favourable business conditions increase this likelihood. Rotar (2020) found a negative relationship between unemployment benefits and unemployment duration, particularly in countries with more generous social policies. Machado (2002) used quantile regression to explore the determinants of short and long-term unemployment, highlighting the role of "advanced notice of firing" in impacting short durations.

1.2.Estonian studies

The complexities of unemployment and the welfare policies that accompany it are a focus of scholarly research in the context of Estonia – the, country that is distinguished by its shift from a centrally planned to a market-oriented economy. In particular, one of the most important areas of study in labour market research is the analysis of how unemployment benefits affect the length of unemployment. There have been several Estonian studies in this area, with research questions ranging from understanding labour supply incentives to examining labour reforms and reservation wages.

One of the most notable studies is Lauringson (2012) which utilized the hazard rate model among other techniques to investigate the effect of unemployment benefits on the duration of unemployment. The research highlighted the disparities between unemployment insurance benefits and unemployment assistance recipients, ultimately concluding that higher unemployment insurance benefits could potentially lead to lower survival estimates after the benefit period has ended, thereby impeding exits from unemployment other than those related to lower benefits. The evidence above points to potential inefficiency in the unemployment incentive system in Estonia. Huang (2022) while examining the impact of unemployment benefits and duration on unemployment spells before and during COVID-19, found that the disincentive effect of unemployment benefits weakened during COVID-19, particularly for high-income groups, professionals, and high-skilled workers. Pointing to the possible case of heterogeneity in effects, the study also found that age and education were significant factors influencing the probability of exiting unemployment. Greyson (2024) using the kind design method found that there was no significant change in unemployment duration at the location of kinks in the schedule of unemployment benefits, indicating minimal moral hazard effects from benefits.

Le-Barbanchon & Rathelot & Roulet (2016) found the minimum wage rate to be an important factor which drives the employment re-entry decisions. This could in turn increase or reduce the duration of unemployment. If the benefits of unemployment have no significant difference from the reservation wage of employment, then it Is logical that an individual might not want to enter the workforce. Rõõm (2003) analyzed factors influencing reservation wages

and unemployment duration in Estonia, highlighting the impact of eligibility for benefits, personal characteristics, and qualifications on these outcomes. Among the findings of the study, three things stood out. First, the study found eligibility for unemployment benefits seemed to prolong the unemployment period. Secondly, high reservation wages decreased the likelihood of finding a job. If the amount that would make a person re-join the market is high, usually stemming from several economic factors, then it is unlikely that there is a willingness to join the workforce. Lastly and quite importantly, in Estonia, Unemployment benefits and social assistance do not significantly affect reservation wages.

Away from reservation wages, Brixiova and Egert (in 2012) discussed the impact of labor market reforms in Estonia, focusing on increasing labor market flexibility through reducing the tax wedge on labor and deregulating employment protection, with a specific emphasis on the Employment Protection Legislation adopted in 2009. The study also outlined the main features of the Estonian labor market, presented a search matching model and policy simulations, compared results with OECD countries, and concluded by suggesting measures to improve labor market outcomes in Estonia. The paper used a search model, applying the frameworks of Mortensen and Pissarides (1999) and Van Ours (2007), and conducting a simulation exercise based on the labor market matching model with active labor market policies. The study found that linking unemployment benefits to participation in active labor market programs can reduce unemployment when combined with effective job creation incentives.

Finally, concerning the macro effects of UIB, Marksoo (2011) analyzed the determinants and changes in long-term unemployment in Estonia for two decades, focusing on the impact of economic fluctuations on socio-demographic characteristics. The study also examines the development and determinants of long-term unemployment in Estonia over two decades, showing that differences in characteristics of long-term unemployed individuals decreased during the economic bust compared to the boom, with older people, those with lower education levels, and ethnic minorities at higher risk of long-term unemployment.

2. Data Description

This study uses cross-sectional registry data from the Eesti Töötukaasa, and contains information regarding recipients of unemployment insurance. The initial dataset contains all people who became unemployed 1.1.2017 - 31.12.2022 and were assigned unemployment Insurance benefits. To be eligible to receive UI, an individual must have contributed to unemployment insurance for a minimum of five years and received payments for at least 12 months within the preceding 36 months.

The duration of unemployment benefits an individual receives is determined by the period of time during which they contribute to the unemployment insurance scheme. During the specified timeframe, contributions lead to allocations of either 180, 270, or 360 benefit days. If there are interruptions in the unemployment benefit payments, the data may also include days shorter than these days.

Table 1. Variables in the analysis

Demographic data	Person id, region of residence, gender, age, Estonian language knowledge, education level, whether living in rural area, whether disabled
Labour market history	Previous employment sector, pervious 4-12 months earning, last employment duration, previous unemployment spells, last employment termination reason
Unemployment benefit and duration	Spell id, Unemployment benefit days granted (180, 270 or 360 days), unemployment benefit waiting days, unemployment benefit amount, unemployment allowance days granted, start date of spell, end date of spell, censored end date of spell, censored end date of spell indicator

Out of a total of 148,312 individuals, 54,300 or 37% receive unemployment insurance (UI) payments over days, while 32,784 or 22% are granted 270 UI days. Additionally, 39,473 or 27% are assigned 360 UI days. A significant portion, 121,272 or 82%, of the unemployed population exits unemployment during this period.

Table 2. Description of Unemployment benefit recipients from 2017 to 2022

	UIB 180 days	UIB 270 days	UIB 360 days
Number of Samples	54300	32784	39473
Tertiary Education	31%	36%	47%
Secondary Education	51%	50%	44%
Primary Education	18%	14%	9%
Gender Male	45%	44%	44%
Age Group			
[15,30)	33%	18%	0.4%
[30,50)	42%	57%	53%
[50,65]	25%	25%	46.6%
Estonian Speaker	60%	63%	64%
Last Employment Duration			
To 3 months	29%	24%	18%
3 to 12 months	29%	19%	12%
1 to 3 years	32%	21%	13%
3 to 10 years	10%	35%	24%
More than 10 years	0%	1%	33%
Last employment field:			
Agriculture	2%	1%	1%
Business service	22%	27%	30%
Construction	11%	10%	6%
Industry	16%	18%	21%

Personal service	19%	18%	14%
Retail	13%	11%	9%
Transport	4%	5%	6%
EducHealthSocPub	8%	7%	10%
Other	5%	3%	3%
Region:			
North	45%	52%	50%
North-East	15%	10%	12%
West	11%	10%	10%
Central	7%	7%	8%
South	22%	21%	20%

Table 2 presents a detailed summary of all recipients of unemployment benefits from 2017 to 2022, arranged according to the length of time they received benefits (180 days, 270 days, and 360 days). In terms of educational attainment, there is a noticeable trend of increasing proportions of tertiary education holders among UIB recipients as the duration of benefit receipt extends, with percentages rising from 31% to 47%. In contrast, as the length of benefit receipt increases, the percentages of UIB recipients with secondary and primary education decline. Over the course of the three periods, the gender distribution of UIB recipients is largely unchanged, with males constituting approximately 44–45% of the recipients.

An examination of age groups shows notable changes in distribution throughout the three duration groups. For example, the [15,30] age group makes up a significant fraction of UIB recipients for 180 days, but for longer durations, its share of recipients drops dramatically and is replaced by a significant increase in the [30,50] and [50,65] age groups, indicating longer periods of unemployment for older people. Language proficiency appears to have a minor influence on UIB receipt, with Estonian speakers consistently forming the majority across all durations.

From the data, we can already see demographic and socio-economic patterns among UIB recipients, emphasising the importance of targeted interventions and support measures tailored to different segments of the unemployed population.

3. Econometric Methodology

3.1.Cox proportional hazard model

The Cox Proportional Hazards model is a standard statistical tool used to investigate the relationship between the hazard rate and various covariates. Its primary objective is to assess how multiple factors simultaneously impact survival. This model enables the examination of how specific factors, such as sociodemographic characteristics, historical employment, and benefits, influence the likelihood of exiting unemployment. The mathematical model for this study is given as;

$$h(t \mid X) = h0(t) \times exp(\beta X)$$

Where:

- $h(t|X)$ is the hazard function at time tt for a subject with covariate values XX.
- $h0(t)$ is the baseline hazard function.
- βx is the coefficient associated with the respective covariates.

This model allows you to examine how each covariate affects the hazard of experiencing unemployment duration, while controlling for the effects of other covariates.

3.2.Quantile regression

This paper uses quantile regression to investigate the relationship between unemployment benefit and the duration of unemployment. Prominent papers in this field like Lauringson (2012) have used the standard duration model in estimating this relationship. The problem with this method is that it focuses on the average effects. Quantile regression allows us to further explore the wealth of information contained in the distribution curve and through different quantiles. The concept of quantile regression was formally introduced by Koenker (1978) and was initially used to study income distributions and wage differentials, where the interest lies not only in estimating average effects but also in understanding how different parts of the distribution are affected by explanatory variables.

Quantile regression focuses on the estimation of the conditional quantiles of the dependent variable given the values of the independent variables. For this study, the regression equation for the τ-th quantile of the dependent variable 'unemployment duration' (where τ is a value between 0 and 1) can be written as:

$$Q\tau(y \mid x) = \beta\tau 0 + \beta\tau 1x1 + \beta\tau 2x2 + \ldots + \beta\tau jxj + \epsilon i$$

Where:

- Qτ(y|x) is the τ-th quantile of the dependent variable y given the values of the independent variables x.
- βτ is the vector of coefficients and
- ϵi is the error term.

This study also accounts for socio-economic variables like education level, age, and disability to identify the precise influence of unemployment benefits on the length of time individuals remain unemployed.

4. Estimation Results

This section will begin with an overview of the Cox proportional hazards model, a widely used technique in survival analysis. However, it will also highlight the challenges encountered when applying this model to our dataset. Subsequently, the focus will shift to the quantile regression model, offering an alternative approach to analysing our data and providing unique insights into the relationships between variables at different points in the distribution.

4.1.Cox model estimation result

Table 3 presents estimations for various benefit periods. Each period is divided into smaller time intervals. Within each interval, a separate constant exponential hazard model is constructed. This model predicts the likelihood of an event (such as benefit receipt) based on certain factors. A hazard rate lower than 1 indicates that the specific factor has a lower likelihood of occurrence compared to the benchmark.

Table 3: Hazard estimates of the Cox Regression model

	exp(coef)	z	p
UIB duration 270 days	0.8676	-19.489	< 2e-16
UIB duration 360 days	0.8060	-26.657	< 2e-16
UIB waiting period (days)	0.9914	-41.350	< 2e-16
Age group [30,50)	0.7628	-33.173	< 2e-16
Age group [50,65]	0.6991	-37.505	< 2e-16
Gender male	1.0389	6.288	3.22e-10
Education Secondary level	0.9453	-6.404	1.52e-10
Education Tertiary level	0.9170	-8.985	2.46e-16
Region North	0.9052	-8.703	< 2e-16
Region North-East	1.0037	0.265	0.7912
Region South	1.0298	2.442	0.0146
Region West	1.0333	2.425	0.0153
Estonian language	1.0191	2.711	0.0067
Risk disabled	0.8153	-23.693	< 2e-16
Real UIB (log)	1.0258	4.233	2.30e-05

No of obs. = 126371

No od events = 122972

Concordance= 0.595 (se = 0.001)

Likelihood ratio test= 10176 on 15 df, p=<2e-16

Wald test = 9862 on 15 df, p=<2e-16

Score (logrank) test = 10138 on 15 df, p=<2e-16

Note: UIB duration 180 days, gender male, age group [15,30], Education primary level, region central are reference categories. Real UIB is the unemployment benefit adjusted for the wage rate to reflect the actual effects

From table 3 above, unemployment benefit durations, age groups, education level, and whether a person is disabled or not are key variables affecting the hazard rate. Before further interpretation is done, however, it is important to test the validity and goodness of fit of the model to ensure proper interpretation. Table 4 in the appendix shows that from the test of proportional hazard, all of the covariates and the global test are statistically significant. This gives the assumption that there is no proportional hazard in the model. This is a major violation of the Cox proportional hazard model assumption and prompts a deeper dive into the data. One way to try to fix this issue is by modelling for categorical variables. Specifically, to run the model separately for three categories of UIB days (180, 270, 360). Table 5 in the appendix shows that, even with this type of modelling, there are still some violation to the model assumptions.

The observed violations of the proportional hazards assumption within certain covariates underscore the necessity for methodological adjustments or transformations to appropriately address these issues. One potential avenue for mitigating such violations is to enhance the flexibility of the Cox model itself, perhaps by including time-varying effects. However, the severity and persistence of these violations may warrant the adoption of more sophisticated modelling approaches. In light of this, the utilization of separate quantiles for modelling offers an advantageous strategy, facilitating the accommodation of varying effects of covariates across different segments of the distribution. This methodological choice underscores the importance of the application of Quantile regression techniques, which provide a better examination of the varying impacts of covariates throughout the distribution, thereby improving the accuracy of the analysis and interpretation of results.

4.2.Quantile regression results

Table 4: Main effects of quantile regression of UIB duration on the duration of unemployment

Variables	θ = 0.25	θ = 0.5	θ = 0.75
UIB duration 270 days	5.55475***	28.07412***	47.44339***
UIB duration 360 days	1.16401	36.21921***	93.71356***
UIB waiting period (days)	1.98860***	2.92908***	1.68683***
Age group [30,50)	15.30638***	27.08989***	43.70589***
Age group [50,65]	28.26350***	45.35095***	54.52131***
Gender male	-4.09494***	-11.3289***	-9.15685***
Education Secondary level	2.17721	6.65170**	12.18221***
Education Tertiary level	3.11701*	12.03878***	15.62261***
Region North	2.73243	12.8111***	19.92289***
Region North-East	7.13787***	10.2065***	1.64616
Region South	0.44524	-0.3341	-4.48509
Region West	5.17588**	2.9028	-5.00847
Estonian language	2.03169*	-3.8577*	-5.88726***
Risk disabled	40.18448***	53.0688***	27.49486***
Real UIB (log)	10.91374***	13.8934***	-4.72588***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Note: UIB duration 180 days, gender male, age group [15,30], Education primary level, region central are reference categories. Real UIB is the unemployment benefit adjusted for the wage rate to reflect the actual effects

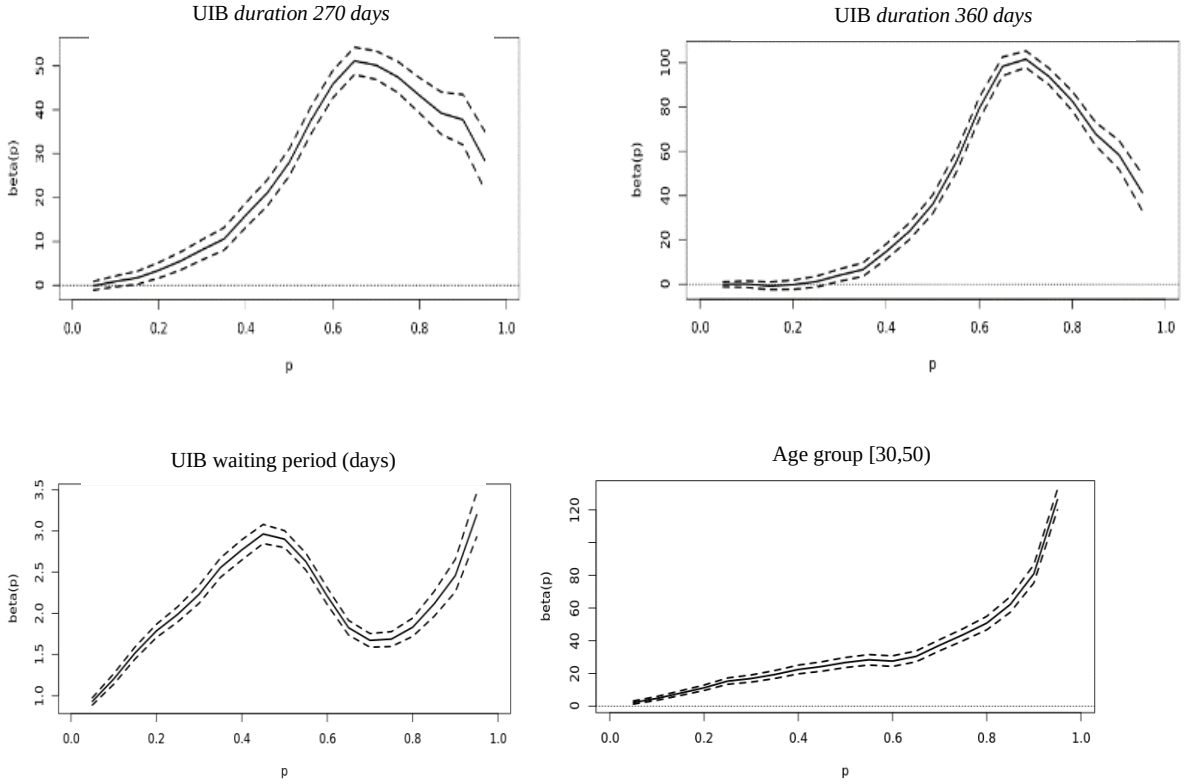
No. of obs. = 126371

No. of events = 122972

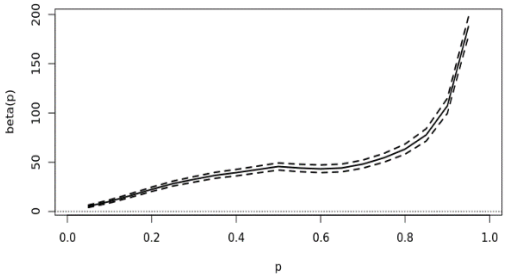
Table 4 shows the relationships between the variables in different quantiles of the distribution. Real UIB (log) is the unemployment benefit adjusted for the wage rate to reflect the actual effects. It is the variable used to reflect the actual size of the benefit in the data. From the table, we see that people who receive UIB for 270 days stay unemployed longer than those who receive UIB for 180 days. This is true and significant for all the quantiles included in this analysis. For those that receive UIB for 360 days, the results are not significant in the 25^{th} quantile but in the median and 75^{th} quantile, they stay 36 days and 94 days longer unemployed than those that receive UIB for 180 days. Longer waiting periods for UIB are associated with significantly longer unemployment durations across all quantiles. Individuals in the North and North-East regions generally have longer unemployment durations compared to those in the central region, with varying significance across quantiles. The South and West regions show mixed results, with some effects not being significant.

For the demographic effects, across the board, older people stay longer unemployed than younger people, with those around (30,50) staying 15 days, 27 days and 43 days more and people aged (50,65) staying 20 days, 45 days and 54 days more than young people in the 25th, 50th and 75th quantile. Men generally have shorter unemployment durations than women with an average of 4 days, 11 days and 9 days shorter durations. The effects of education are not significant in the 25th quantile of the distribution. It starts to get significant along the median but the most effects are felt at the end of the distribution. Compared to people who do not, people who speak Estonian have shorter unemployment spells but this effect is only significant in the 75th quantile. Disabled people stay unemployed longer than those who are not with varying effects across the distribution. The real UIB amount (adjusted for wage rate) significantly affects unemployment duration positively at the 25th and 50th quantiles but shows a negative effect at the 75th quantile. The varying effects in the different quantiles point to non-linear movement throughout the distribution. The movement of the effects is displayed in fig 1 below:

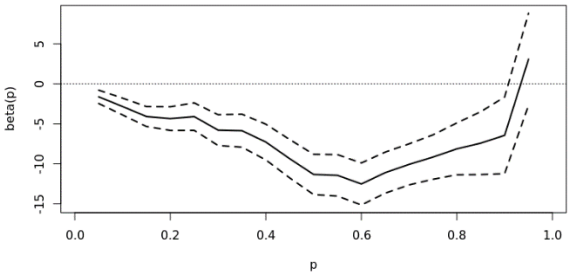
Fig 1: Effects of UIB duration on the duration of unemployment



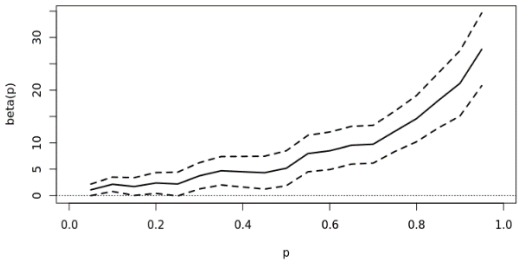
Age group [50, 65)



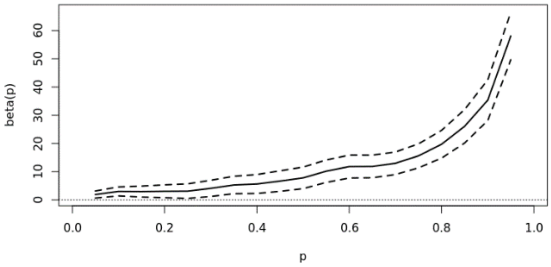
Gender male



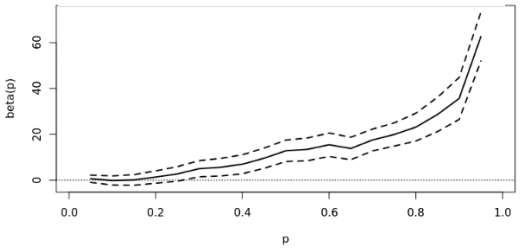
Education secondary level



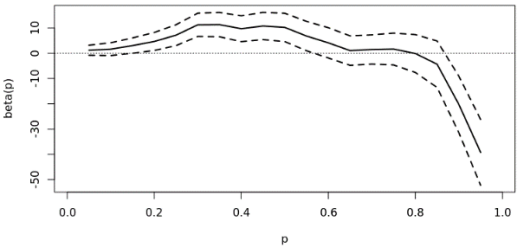
Education tertiary level



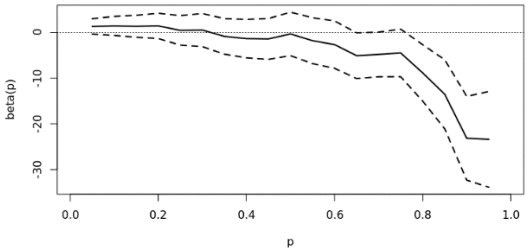
Region North



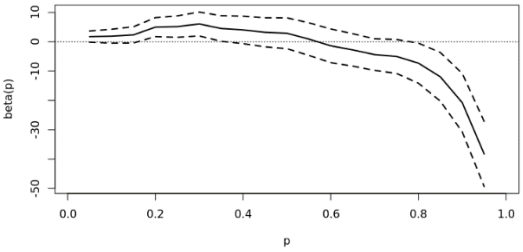
Region North-East



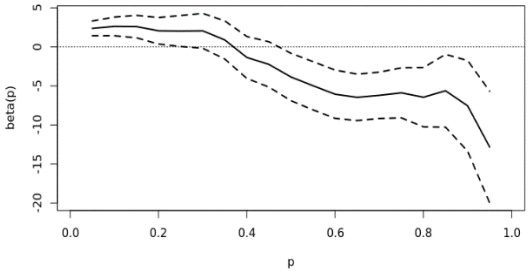
Region South



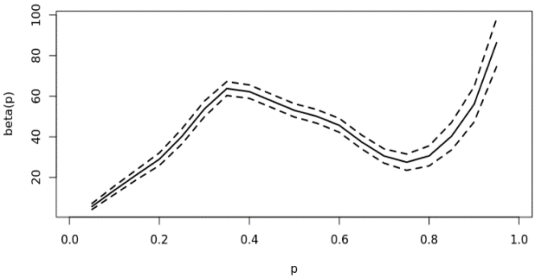
Region West



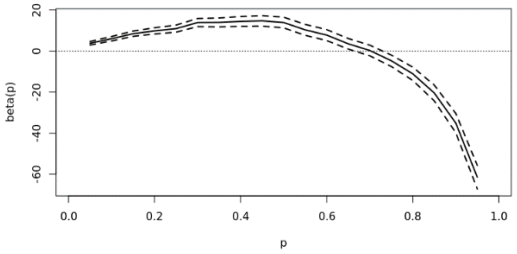
Estonian language



Risk disabled



Real UIB (log)



4.3.Heterogeneous effects of UI benefit duration on socio-economic variables

The appendix includes detailed tables that present the estimations for the interaction effects of age group, disability, and education. These variables were selected because they can be effectively targeted by policies to bring about significant changes in the duration of unemployment. By analysing these specific factors, policymakers can better understand how age, disability status, and educational attainment interact with unemployment benefits, enabling them to design more effective interventions.

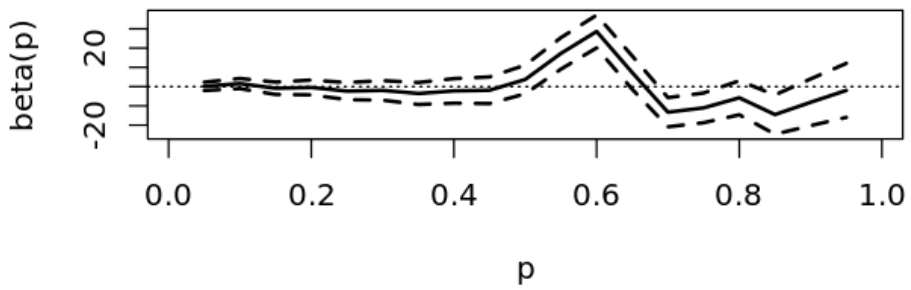
4.3.1. Age Group

The table in Appendix C contains the interaction effects of UIB duration on age groups.

UIB Duration 270 Days, Age Group [30,50]:

At the 25th quantile, the effect is not significant, indicating no significant change in the length of unemployment for this age group compared to the reference category. At the median, the effect is positive but also not significant, showing a modest increase in unemployment length. At the 75th quantile, the effect is considerably negative and more significant than the others, indicating that individuals in this age group experience significantly shorter unemployment periods while receiving UIB for 270 days than those receiving UIB for 180 days.

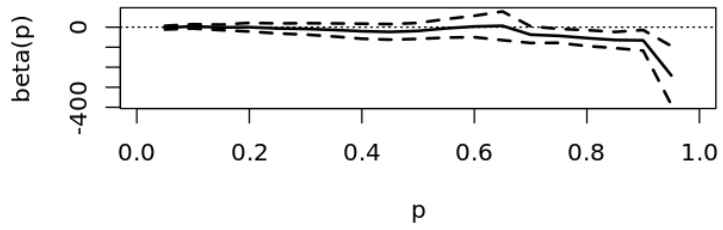
UIB Duration 270 Days, Age Group [30,50]:



UIB Duration 360 Days, Age Group [30,50]:

At the 25th quantile, the effect is negative but not significant, suggesting a non-significant decrease in unemployment length. At the median, the effect is negative and not significant, indicating a larger but non-significant decrease in jobless duration. At the 75th quantile, the effect is considerably negative, indicating a strong and significant decrease in unemployment length for this age group while receiving UIB for 360 days rather than 180 days.

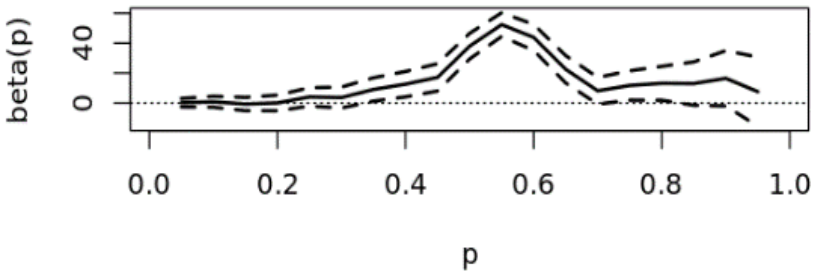
UIB Duration 360 Days, Age Group [30,50]:



UIB Duration 270 Days and Age Group [50-65]:

At the 25th quantile, the effect is positive but non-significant, indicating a slight increase in unemployment duration. At the median, the effect is considerably positive, indicating a large increase in jobless duration for this age range. At the 75th quantile, there is a positive and significant impact, showing an increase in unemployment length for this age group, though smaller than the median.

UIB Duration 270 Days and Age Group [50-65]:

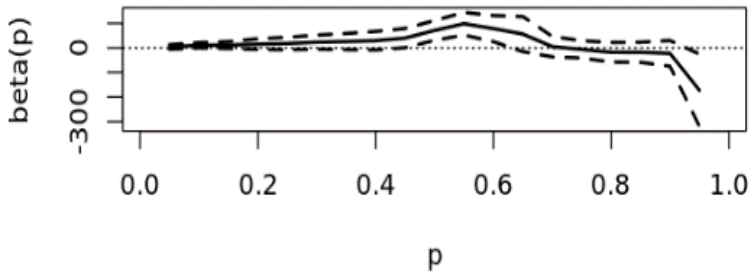


UIB Duration 360 Days, Age Group [50,65]:

At the 25th quantile, the effect is positive but not significant, indicating no substantial increase in jobless duration. At the median, the effect is significantly positive, indicating an

increase in jobless duration for this age group. At the 75th quantile, the effect is negative but non-significant, indicating a modest decrease in unemployment length.

UIB Duration 360 Days, Age Group [50,65]:



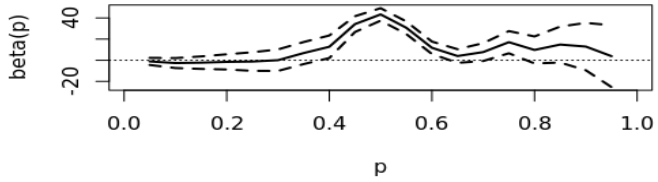
4.3.2. Disability Status

Appendix D contains the table with the interaction effects of UIB duration on disability.

UIB duration 270 days: Risk disabled

Increasing UIB for disabled people from 180 to 270 days shows generally an increase in unemployment duration. Most of the effect is significant around the median with UIB duration increasing unemployment duration for disabled people by 43 days. The 75th quantile of the distribution is less significant but still shows a 17 day increase in unemployment duration by increasing UIB duration to 270 days.

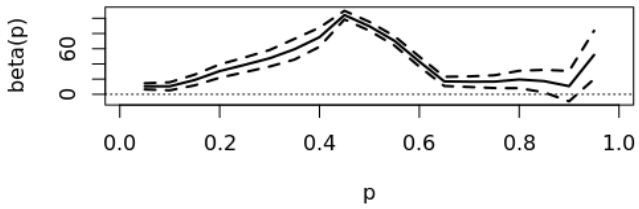
UIB duration 270 days: Risk disabled



UIB duration 360 days: Risk disabled

There is a clear increase in unemployment duration for disabled people who receive UIB for 360 days. In the 25th quantile, disabled people stay unemployed for 38 more days while the median group had 89 days of unemployment. The increase in unemployment duration tapers off as it moves towards the 75th quantile with people having 16 more unemployment days.

UIB duration 360 days: Risk disabled



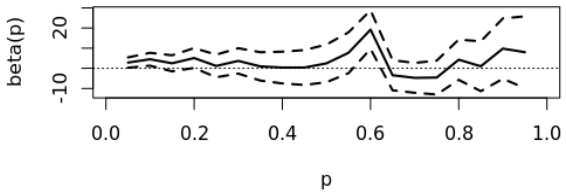
4.3.3. Education

Appendix E presents the interaction effects of UIB duration on education levels, specifically focusing on secondary and tertiary education. The impact of UIB duration on educational outcomes varies across different quantiles.

UIB Duration 270 Days: Education Secondary Level

Increasing UIB from 180 to 270 days shows mixed effects on individuals with a secondary level education. At the 25th quantile, there is a small, non-significant increase in unemployment duration by approximately 1.18 days. This effect becomes more pronounced at the median (50th quantile) with an increase of 2.46 days. However, at the 75th quantile, there is a notable decrease in unemployment duration by 4.59 days, although this effect is not statistically significant.

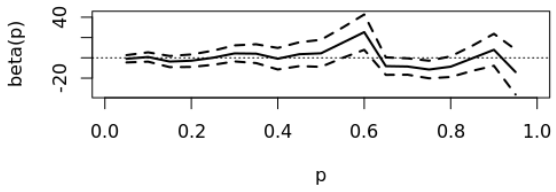
UIB Duration 270 Days: Education Secondary Level



UIB Duration 360 Days: Education Secondary Level

For those with secondary education, extending UIB to 360 days generally leads to higher unemployment durations. At the 25th quantile, the increase is minimal at 0.08 days. The median shows a more substantial increase of 4.47 days, but this is not statistically significant. At the 75th quantile, there is a significant reduction in unemployment duration by 11.51 days, indicating a nuanced impact of extended UIB duration at higher quantiles.

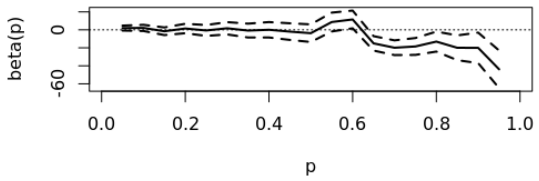
UIB Duration 360 Days: Education Secondary Level



UIB Duration 270 Days: Education Tertiary Level

Increasing UIB duration to 270 days for individuals with tertiary education shows a consistent negative impact across all quantiles. At the 25th quantile, there is a decrease of approximately 0.70 days. The median sees a more considerable reduction of 3.72 days, while the 75th quantile experiences a significant decrease of 18.49 days, suggesting that extended UIB duration significantly reduces unemployment duration for individuals with higher education at the upper end of the distribution.

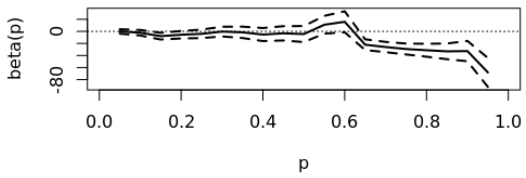
UIB Duration 270 Days: Education Tertiary Level



UIB Duration 360 Days: Education Tertiary Level

Extending UIB to 360 days continues to show a negative impact for tertiary-educated individuals. At the 25th quantile, there is a decrease of about 4.10 days. This negative effect is consistent at the median with a reduction of 4.47 days. The most substantial impact is observed at the 75th quantile, where there is a significant decrease of 29.27 days, highlighting a strong negative correlation between extended UIB duration and unemployment duration for highly educated individuals.

UIB Duration 360 Days: Education Tertiary Level



In summary, the effect of UIB duration on education varies significantly across different education levels and quantiles. For secondary education, the impact is mixed, with some reduction in unemployment duration at higher quantiles. For tertiary education, longer UIB durations generally reduce unemployment duration, particularly at higher quantiles, indicating that more extended UIB benefits may incentivize faster reemployment among highly educated individuals.

5. Conclusion

5.1. Summary of results

This thesis investigates the effects of unemployment insurance benefits (UIB) on the duration of unemployment in Estonia. Utilizing cross-sectional registry data from the Estonian Unemployment Insurance Fund (Eesti Töötukassa) covering the period from 2017 to 2022, the study examines how the duration of UIB impacts unemployment duration across different demographic and socio-economic groups. The theoretical foundation of this research is rooted in job search theory; that individuals' job search behaviours and unemployment durations are influenced by the level and duration of unemployment benefits. The study used both cox model and quantile regression and compares the result to provide a more nuanced understanding of the relationship between UIB and unemployment duration.

For our interaction variables: in the Cox model, disabled people receiving UIB for 270 days have lower hazard of exiting unemployment compared to non-disabled individuals. The quantile regression model while agreeing with this however shows that this result is not significant in the 25^{th} quantile of people. Most of the effect is felt by people in the median of the population, with disabled people staying unemployed for 43 more days than non-disabled

people in this quantile Although higher quantiles show some increase in unemployment duration as well, they are less significant.

When it comes to age groups, the cox model found that older people have less hazard of exiting unemployment and will stay longer unemployed. From the results of the quantile regression however, although less significant, people aged (30,50) and collecting UIB for 270 days in the 75^{th} quantile spend 11 less days unemployed compared to their counterparts collecting UIB for 180 days. This is a complete shift form the result of the cox model. One reason could be that people that are eligible to collect UIB for 270 days in this age range are generally well-to-do and do not stay unemployed longer than is necessary. The biggest variance however can be seen in the effects of UIB duration on the different education levels. The cox model shows a lower hazard ratio for people with both secondary and tertiary education. The quantile regression however found that, in the higher quantiles, these people spend less time unemployed with the exact time varying. This is intuitive because Estonia prides itself as being the tech hub of Europe and the jobs available also reflect that. A lot of these jobs require secondary and tertiary education which might make it easier for holders of these certificates to find jobs and leave unemployment quicker than those without.

5.2. Policy Recommendations

Based on the findings from the Quantile Regression analysis, several policy recommendations can be made for the Estonian Unemployment Insurance Fund (Eesti Töötukassa) to enhance the effectiveness of UIB and better support the unemployed:

Tailor UIB Duration Based on Individual Characteristics: Given that older individuals tend to experience longer unemployment durations, it is recommended to adjust the duration of UIB based on these characteristics. For example, providing specialized job search assistance and retraining programs that align with their skills and experience, facilitating their return to employment.

Periodic Review and Adjustment of Benefit Levels and Durations: Regularly reviewing and adjusting the levels and durations of unemployment benefits to reflect changes in the labor market and cost of living can ensure that UIB remains adequate and effective. Tailoring these adjustments based on quantile-specific insights can better address the needs of diverse unemployed groups.

By adopting these recommendations, Eesti Töötukassa can optimize the design and implementation of unemployment insurance benefits, ensuring they provide necessary support to the unemployed while promoting efficient labor market re-entry and economic stability.

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APPENDIX

Appendix A: Test for proportional hazard in the Cox regression model

	chisq	**p**
Uib days appointed	1638.701	< 2e-16
UIB waiting period (days)	3398.807	< 2e-16
Age group	129.472	< 2e-16
Gender male	0.345	0.5568
education	13.091	0.0014
region	134.618	< 2e-16
Estonian language	32.126	1.4e-08
Risk disabled	195.695	< 2e-16
GLOBAL	4208.175	< 2e-16

Appendix B: Test for proportional hazard in the time varied Cox regression model

	180 days		270 days		360 days	
	chisq	**p**	**chisq**	**p**	**chisq**	**p**
uib_waiting_period_days	42.76	1.9e-15	310.94	< 2e-16	903.195	< 2e-16
age_group	129.472	5.2e-10	13.16	0.0014	126.277	< 2e-16
gendermale	5.73	0.017	8.77	0.0031	0.544	0.46
education	6.54	0.038	3.61	0.1641	0.424	0.81
region	103.44	< 2e-16	24.23	2e-05	157.858	< 2e-16
estonianlanguage	27.73	1.4e-07	6.78	0.0092	16.372	5.2e-05
risk_disabled	148.90	< 2e-16	56.47	5.7e-14	251.566	< 2e-16
GLOBAL	360.45	< 2e-16	412.31	< 2e-16	1320.327	< 2e-16

Appendix C: Effect of UIB on age groups

Variables	θ = 0.25	θ = 0.5	θ = 0.75
UIB duration 270 days: Age group [30,50)	-2.3294	3.724	-11.037**
UIB duration 360 days: Age group [30,50)	-6.3026	-18.644	-43.222*
UIB duration 270 days: Age group [50,65)	4.0493	37.939***	11.688*
UIB duration 360 days: Age group [50,65)	17.9709	71.069***	-6.039

UIB duration 180 days and age group (15,30) are the reference groups

Appendix D: Effect of UIB on disabled

Variables	θ = 0.25	θ = 0.5	θ = 0.75
UIB duration 270 days: Risk disabled	-1.2371	43.3953***	17.096**
UIB duration 360 days: Risk disabled	38.7668***	89.4866***	16.648***

UIB duration 180 days is the reference group

Appendix E: Effects of UIB on education

Variables	θ = 0.25	θ = 0.5	θ = 0.75
UIB duration 270 days: Education secondary level	1.17810	2.460	-4.591
UIB duration 360 days: Education secondary level	0.08136	4.467	-11.513**
UIB duration 270 days: Education tertiary level	-0.69508	-3.721	-18.486***
UIB duration 360 days: Education tertiary level	-4.10233	-4.466	-29.271***

UIB duration 180 days is the reference groups

Resümee

TÖÖTUSHÜVITISE MÕJU TÖÖTUSE KESTUSELE EESTIS: KVANTIILNE REGRESSIOONIMEETOD

See lõputöö uurib töötuskindlustushüvitiste (UIB) mõju töötuse kestusele Eestis, kasutades andmeid Eesti Töötukassalt ajavahemikus 2017–2022. Tuginedes tööotsinguteooriale, kasutab uuring kvantiilregressiooni, et analüüsida, kuidas UIB mõjutab erinevaid töötute segmente. See lähenemine võimaldab üksikasjalikult uurida, kuidas UIB mõju varieerub töötuse kestuse jaotuses. Tulemused näitavad UIB mõju olulist heterogeensust, kus vanemad isikud ja kõrgharidusega inimesed kogevad pikemaid töötusperioode kõrgemates kvantiilides. Nende leidude põhjal soovitab lõputöö kohandada UIB kestust vastavalt individuaalsetele omadustele, tugevdada sihitud tööotsinguabi ja koolitusprogramme, integreerida UIB aktiivsete tööturupoliitikatega, perioodiliselt üle vaadata ja kohandada hüvitiste tasemeid ja kestusi ning rakendada tugevat seire- ja hindamisraamistikku.

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