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https://orcid.org/0000-0001-8521-9893

VILNIUS UNIVERSITY

Kristina
ZITIKYTĖ

Labor Market Participation of Older Workers in Lithuania: Factors Affecting Employment in Old Age

DOCTORAL DISSERTATION

Social sciences,
Economics S 004

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This dissertation was written between 2017 and 2021 at Vilnius University.

Academic supervisor:
Prof. Dr. Teodoras Medaiskis (Vilnius University, Social Sciences, Economics, S 004)
Academic consultant:
Assoc. Prof. Dr. Algirdas Bartkus (Vilnius University, Social Sciences, Economics, S 004)

This doctoral dissertation will be defended in a public meeting of the Dissertation Defence Panel:
Chairman – **Prof. Dr. Boguslavas Gruževskis** (Lithuanian Social Research Centre, Social Sciences, Economics, S 004).
Members:
Dr. Audrius Bitinas (Vilnius University, Social Sciences, Law, S 001).
Prof. Dr. Gindrutė Kasnauskienė (Vilnius University, Social Sciences, Economics, S 004).
Dr. Virginija Poškutė (ISM University of Management and Economics, Social Sciences, Economics, S 004).
Assoc. Prof. Dr. Andriy Stavytskyy (Taras Shevchenko National University of Kyiv (Ukraine), Social Sciences, Economics, S 004).

The dissertation shall be defended at a public meeting of the Dissertation Defence Panel at 14:00 PM on October 22, 2021 in Room 402 of the Vilnius University Faculty of Economics and Business Administration.
Address: 9 Saulėtekio Ave., LT-10222, Vilnius, Lithuania
Phone No.: +370 5 236 6128; email: evaf@evaf.vu.lt

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VILNIAUS UNIVERSITETAS

Kristina
ZITIKYTĖ

Vyresnio amžiaus darbuotojų dalyvavimas Lietuvos darbo rinkoje: veiksniai, lemiantys užimtumą vyresniame amžiuje

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Mokslinis vadovas
prof. dr. Teodoras Medaiskis (Vilniaus universitetas, socialiniai mokslai, ekonomika, S 004).
Mokslinis konsultantas
prof. dr. Algirdas Bartkus (Vilniaus universitetas, socialiniai mokslai, ekonomika, S 004).

Gynimo taryba:
Pirmininkas – prof. dr. Boguslavas Gruževskis (Lietuvos socialinių tyrimų centras, socialiniai mokslai, ekonomika, S 004).
Nariai:
dr. Audrius Bitinas (Vilniaus universitetas, socialiniai mokslai, teisė, S 001),
prof. dr. Gindrutė Kasnauskienė (Vilniaus universitetas, socialiniai mokslai, ekonomika, S 004),
dr. Virginija Poškutė (ISM Vadybos ir ekonomikos universitetas, socialiniai mokslai, ekonomika, S 004),
prof. dr. Andriy Stavytskyy (Kijevo Taraso Ševčenkos nacionalinis universitetas (Ukraina), socialiniai mokslai, ekonomika, S 004).

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INTRODUCTION

Relevance of the topic. Low fertility rates and increasing life expectancy accelerate demographic change in the whole world, and Lithuania too. As a result, the proportion of working-age people is shrinking, while the relative number of retired people is expanding. These demographic trends negatively affect the pension system, health system, and labor market. The pension system is meeting big challenges with less people contributing and more people receiving benefits (challenge to ensure pension sustainability), which may result in lower benefits and replacement rates (challenge to ensure pension adequacy). As people age, they need more nursing and treatment services, which leads to a greater need for health system functions. Because of the aging population, employers must deal with a workforce shortage, resulting in firms having to meet the demands of older workers. Finally, individuals themselves are confronted with low pension income and the risk of living in old-age poverty.

Many measures have been proposed to deal with the effects of aging (raising social insurance contributions, increasing productivity, lowering benefits, increasing the retirement age, etc.), but none of them can eliminate all the negative effects of this process. Increasing the retirement age is most often mentioned as the first measure to tackle this problem; nearly all European countries have already increased the level of early and statutory retirement ages. Next, to secure the financial sustainability of pension systems and higher pensions in European countries, structural reforms were proposed, such as shifting from the defined benefit to defined contribution pension schemes and moving from single to multi-tiered pension systems to lower the share of pay-as-you-go pensions and increase people's activity to accumulate for retirement in private pension funds. Moreover, countries tend to discourage early retirement arrangements, as an easy early labor market exit would create growing imbalances between the individual's active years and years in retirement. However, the economic crisis in 2009 highlighted weaknesses in some pension systems and denied the myth that pension reform measures alone can cope with all the negative effects of aging, and that increasing the pension age is also insufficient to reduce negative aging impact on pension systems.

One solution to resource the needs of an aging population is the encouragement of individuals to remain longer in the labor market, avoiding labor shortages for employers, providing employees with a greater income in old age, and helping to ensure the financial stability of pension and health systems. Participation in a paid job in various forms, including part-time,

temporary, full-time or self-employment after reaching the pension age is often defined as "bridge employment," signifying the "bridge" from employment at retirement age to full retirement. Employment in old age is assessed differently: employers are more cautious about older people's capacity to work as productively as before, while even though older people themselves value employment as an opportunity to foster social relationships and as a source of extra income, they are more likely to do part-time rather than full-time jobs. The debate on "transition work" and active aging is becoming increasingly important, arguing that in the future, work, lifelong learning, and other activities will contribute to the longevity of people's lives, enabling them to feel needed in society, further their social ties, and increase their income in old age. This determines the relevance of this dissertation, which examines in detail the factors of transition work and active aging.

The Covid-19 pandemic that began in 2020 also presented a new challenge for the labor market participants. This dissertation discusses the Covid-19 pandemic, highlighting the key challenges that older people can face trying to stay in the labor market for longer in the future, especially if such pandemics continue.

The problem and research object. Pre-retirement and post-retirement employment in Lithuania and factors determining different employment outcomes in old age are the prime concern of this thesis. The problem this thesis solves is that there are pushing and pulling factors of working longer, so in the context of an aging population and a pandemic, it is necessary to identify which factors limit and which encourage people to stay in the labor market longer, so as to take measures to remove the limiting factors and maintain the motivating factors of employment in Lithuania.

Goal and objectives. The purpose of this thesis is to identify push-and-pull-factors determining pre-retirement and post-retirement employment in Lithuania and propose solutions to increasing people's employment in old age. To achieve the goal, the following objectives are formulated:

1. Critically evaluate demographic trends and policy measures taken in European Union countries to reduce the consequences of an aging population.
2. Provide a comprehensive review of previous research on this topic and determine the main push-and-pull-factors of employment in old age singled out by other authors.
3. Build a survival model to evaluate the employment duration of 55-years-of-age and older individuals in Lithuania.

4. Construct the binary response models to measure the impact of individual, financial and other factors on bridge employment in Lithuania.
5. Evaluate the possible impact of the Covid-19 pandemic on older workers by constructing binary response models.
6. Summarize research results and provide recommendations on how to implicate the employment of older people in Lithuania.

Methods used. To analyze the factors that limit and encourage employment in old age at the individual level, survival model and binary response models are applied in the empirical part of thesis. Using survival analysis allows modelling the length of time spent in a given state (employment) before moving into another state (full retirement). In this thesis a hazard-based duration model is used to estimate the duration of employment after 55 years in Lithuania and to identify the factors that influence the probability of staying in the labor market for longer. Binary response models are used to identify the push-and-pull-factors determining bridge employment in Lithuania. These models are also used to determine the impact of the Covid-19 pandemic on the employment of people aged 55-64 during the pandemic. Both methods have been chosen for the thesis because they allow the identification of factors influencing employment at the individual level using administrative microdata of Lithuania.

Defended statements:

1. Health is a key factor in enabling people to work longer, and higher qualifications is a key factor in allowing them to stay in the labor market longer.
2. In Lithuania, the gap is widening between two groups of older people: ones who earn a higher wage, secure higher career opportunities, work longer, and increase their already higher income in old age, and the other group, who are low-skilled, earn a lower wage, work shorter, and are less likely to increase their low income in old age.
3. Women and disabled people could stay in the labor market for longer, but today they are more likely to leave the labor market faster than other labor market participants.
4. An active aging policy is not sufficiently promoted in Lithuania.
5. The employment of older people has not been disproportionately impacted by the Covid-19 pandemic, and if such pandemics occur in the future, they may present both limitations and opportunities from the point of view of older people.

Theoretical significance and scientific novelty of the research. The latter is characterized by three things: *(1) unique data, (2) studied the majority of the population, not a sample,* and *(3) the first models on the impact of pandemic on older workers' employment in Lithuania*. *(1)* This thesis is the first study on key influencing factors of pre-retirement and post-retirement employment in Lithuania using administrative data. Most social science studies on older workers and retirement transitions use survey data, such as the Survey of Health, Aging and Retirement in Europe *(Dingemans et al., 2016; Dingemans & Henkens, 2019; Komp et al., 2010; Kalwij & Vermeulen, 2008; Boersch-Supan et al., 2013; Dingemans & Mohring, 2018)*, European Union Labor force survey *(Aliaj et al., 2016)* or questionnaires surveys *(Maxin & Deller, 2010; Deller et al., 2009; Gobeski & Beehr, 2009; Kim & Feldman, 2000; Damman & Henkens, 2015, 2018; Shacklock et al., 2009; Hult, 2008; Damman et al., 2015; Van Solinge, 2014; Mulders et al., 2014)*. In Lithuania, most research has been conducted on the analysis of statistical data *(Okunevičiūtė-Neverauskienė & Moskvina 2008, 2013; Okunevičiūtė-Neverauskienė & Pocius, 2017)* and survey data *(Vilkoitytė & Skučienė, 2020; Lengvinienė & Rutkienė, 2016; Moskvina & Skučienė, 2014; Brazienė & Mikutavičienė, 2015)*. This dissertation uses administrative State social insurance fund (hereaftert the SSIF) budget data of Lithuania. *(2)* This study uses unique micro-data to treat the whole population, not a sample, as is the case in most other studies. The number of 26.0 thousand retirees were analyzed to gain new evidence on their health, qualification, and financial situation in respect to post-retirement employment behavior. Another 18.5 thousand people were analyzed with the help of the survival analysis to determine how the probability of survival in the labor market changes with each passing year after 55 years, when the individual enters pre-retirement age. *(3)* Another 132 thousand people aged 55-64 working in the non-budgetary sector were analyzed with the help of the binary response models to determine how the employment of people aged 55-64 changed during the pandemic. As the Covid-19 pandemic continues in 2021, researchers perform most of their statistical analysis, comparing employment rates with those of the 2009 economic crisis, to determine the potential impact of the pandemic on employment *(Coibion et al., 2020; Bui et al., 2020; Munnell & Chen, 2021)* or by only theoretically discussing the potential impact of the pandemic on the elderly *(Truxillo et al., 2020; Morrow-Howell, 2020; Kanfer et al., 2020; Li & Mutchler, 2020)*. This dissertation models the impact of the pandemic on the employment of older people in Lithuania using unique administrative micro-data of SSIF. This allows to draw deeper conclusions about how the pandemic affects workers aged 55-64 in Lithuania. Thus, this dissertation

demonstrates the possibilities in Lithuania to perform labor market assessments with the help of a micro-data analysis and then to formulate policy improvements related to employment.

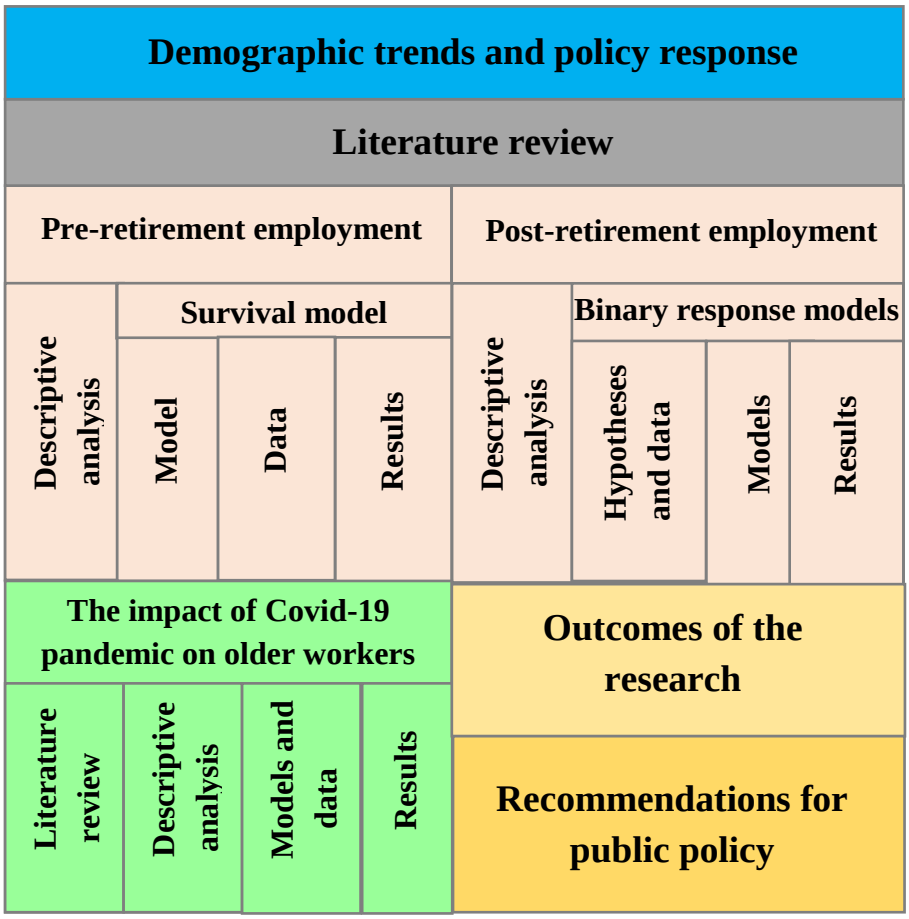
Practical significance of the research. The latter is characterized by two things: *(1) recommendations for individuals,* and *(2) guidelines for policy-makers*. *(1)* Studying individual behavior on the micro-level is the key to find ways to deal with the impact of population aging and design customized reforms in practice to uniquely support individuals in old age and beyond their retirement. The dissertation focuses on the factors that determine the employment in old age and the formation of practical recommendations. The researched Lithuanian data show that individuals should pay great attention to greater health promotion and choice of occupation and prepare for lifelong learning and continuous professional development. *(2)* After briefly and clearly defining the employment trends taking place among older people in Lithuania, a guideline is drawn out where policy-makers should focus on solving the problems of aging. Among all the recommendations, it is recommended to strengthen support for active aging, to develop pilot employment programs for older people in the budget sector, and to debate the introduction of a flexible retirement age, considering previous recommendations.

Difficulties and limitations experienced in this dissertation stem from the restriction of administrative data. Although the use of administrative data in this dissertation is unique and distinguishes the research from others conducted in Lithuania, the lack of certain data does not allow to draw conclusions about some areas. For example, the dissertation does not examine family factors, such as the number of children and a spouse's employment status, which possibly also contribute to individuals' decisions to stay in the labor market for longer. Also, it is important that some factors, such as morbidity and exposure to unemployment, are analyzed using data from social security recipients. Both sickness and unemployment benefits are received only by those who meet the length of experience requirements, so those who may be ill but do not receive sickness benefits or become unemployed but do not have the required length of service to receive unemployment benefits are not included in these surveys.

Structure. The rest of the dissertation is structured as follows. The first section reviews demographic trends and policy responses to aging, including an analysis of demographic situations in both Europe and Lithuania as well as the economic impact of aging and policies implemented to cope with aging consequences. In the second section a review of literature on pre-retirement and post-retirement employment is presented, distinguishing the difficulties

faced by older workers, the different attitudes of employers towards older labor market participants, and the factors that determine whether an older person will participate in or leave the labor market. In the third section, a full analysis of pre-retirement employment in Lithuania is performed by using a descriptive analysis of the data and by applying survival analysis to evaluate the duration of employment after 55 years. In the fourth section, a full analysis of post-retirement employment in Lithuania is performed by using descriptive analysis of the data and applying binary response models to evaluate which factors have a greater impact on the decision to work at retirement age. By identifying employment trends of older people and the individual factors impacting on them, it is impossible to skip the Covid-19 pandemic, which, unlike previous crises, threatened to have new long-term consequences for the labor market. The Covid-19 pandemic, which started in the beginning of 2020, brought growing uncertainty not only to the health sector, but also to the labor market. In the fifth section, the impact of the Covid-19 pandemic on the labor market is analyzed with highlighting some limitations and opportunities for older people. This section separately presents the analysis of the literature on this topic, followed by a descriptive analysis of Lithuanian employment indicators, and then the generation of binary response models; finally, the results of the models are discussed. The outcomes of the research and the recommendations for public policy are discussed in detail in the conclusions.

The structure of this thesis in short:



1. DEMOGRAPHIC TRENDS AND POLICY RESPONSE

The purpose of this section is to provide an overview of population aging trends, their impact on economics, and the policy measures taken as response to these trends. Firstly, demographic trends, changes in the structure of the population, and their life expectancy are presented for European Union countries and Lithuania separately. Next, the impact of aging on economics is provided by dividing them in three sets: the impact on *(1) public finances*, *(2) labor market*, and *(3) poverty and inequality*. Finally, this section explains how European Union countries reformed their pension systems to reduce the negative impact of aging on pension expenditures.

1.1 Population aging trends in Europe and Lithuania

Population aging is a topic that has gained a lot of interest recently in whole world, both from politics and academia, as it has become apparent that it will play an increasing role in political, economic, and social life. It will be presented below how demographic aging is defined, how older people will be divided by age groups in this thesis, and what demographic trends are prevalent in Europe and Lithuania.

Concept of aging. Demographic aging signifies a process when the proportion of working-age people shrinks while the number of older people expands (Corporate authors, 2019). According to the Ageing Europe technical report, older people are defined as those aged 65 years or older (Corporate authors, 2019). Those aged 85 years or older are described as very old people (Corporate authors, 2019). To analyze the transition from work into retirement, special attention in this thesis is paid to pre-retirement age covering years from 55 to 64 and to retired people aged 65.

Population aging has resulted primarily from a fall in fertility rates and increased life expectancy. The Ageing Europe technical report also named these factors as influencing the aging process: reductions in child mortality, advances in public health and medical technologies, increased awareness of the benefits linked to a healthy lifestyle, improved living conditions (Corporate authors, 2019).

As people live longer, one can only rejoice that never have generations lived so long before. For many people longer life expectancy, especially if those extra years are spent in relatively good health, provides many benefits to the individual, such as a longer connection to their families, friends, and communities.

Firstly, life expectancy may be used to study the aging processes of society. Life expectancy at age 65 is the average number of years that a person at that age can be expected to live, if age-specific mortality levels remain constant. Table 1 shows life expectancy at age 65 in European Union countries (EU-28 below) and separately in Lithuania by gender.

In 2005, upon reaching the age of 65, men in the EU-28 could expect to live an additional 16.4 years on average, while women could expect to live an additional 19.9 years (Table 1). Between 2005 and 2019, the increase in the EU-28 life expectancy for both men and women at the age of 65 was 2 years with a continuing trend of women expected to live longer than men.

Table 1. Life expectancy at age 65 in EU-28 and Lithuania (years), 2005-2019

Years	EU-28			Lithuania		
	Total	Males	Females	Total	Males	Females
2005	18.3	16.4	19.9	16.0	13.2	17.9
2006	18.7	16.8	20.4	16.0	13.3	17.9
2007	18.9	16.9	20.5	16.1	13.1	18.2
2008	19.0	17.1	20.6	16.5	13.6	18.4
2009	19.2	17.3	20.8	16.7	13.6	18.8
2010	19.4	17.5	21.0	16.7	13.8	18.8
2011	19.6	17.7	21.3	17.0	14.0	19.2
2012	19.5	17.7	21.1	17.1	14.1	19.2
2013	19.7	17.9	21.3	17.1	14.1	19.2
2014	20.0	18.2	21.6	17.4	14.3	19.5
2015	19.7	17.9	21.2	17.1	14.1	19.2
2016	20.0	18.2	21.6	17.3	14.2	19.4
2017	19.9	18.2	21.5	17.4	14.4	19.4
2018	20.0	18.2	21.5	17.6	14.5	19.7
2019	20.2	18.4	21.8	17.9	14.8	20.0

Source: Eurostat

Lithuania records one of the lowest life expectancies in European Union. In 2005, upon reaching the age of 65, men in Lithuania could expect to live an additional 13.2 years on average, while women could expect to live an additional 17.9 years (Table 1). Between 2005 and 2019, the increase in Lithuanian life expectancy for men and women at the age of 65 was 1.6 and 2.1 years, respectively. Thus, life expectancy for men after 65 years has increased but has been slower than the EU-28 average. Estonia has the largest gender gap in life expectancy at the age of 65 (5.3 years). Estonia is followed

by Lithuania (5.2 years), Latvia (5.0 years), and Poland (4.3 years) (Appendix 1).

Life expectancy at 65 in total is lower than in Lithuania only in Slovakia (17.9 years), Latvia (17.4 years), Hungary (16.9 years), Romania (16.9) and Bulgaria (16.3 years) (Appendix 2). The highest life expectancy at age 65 in EU-28 is recorded in Spain (22.0 years), France (22.0 years), and Italy (21.4 years).

In the process of assessing demographic change, not only life expectancy is important, but exactly how many of those years a person can live without limitations in functioning or disability. Table 2 provides information on healthy life years – in other words, the number of years that a person can expect to live in a healthy condition without severe or moderate health problems.

Table 2. Healthy life years at age 65 by gender in EU-28 and Lithuania, 2005-2019

Years	EU-28			Lithuania		
	Total	Males	Females	Total	Males	Females
2005	8.6	8.4	8.7	4.8	5.3	4.4
2006	8.8	8.7	9.0	5.6	5.9	5.4
2007	8.9	8.7	8.9	5.5	5.4	5.6
2008	8.4	8.3	8.5	6.1	5.7	6.5
2009	8.3	8.3	8.3	6.5	6.1	6.8
2010	8.8	8.7	8.8	6.5	6.4	6.7
2011	8.6	8.5	8.6	6.5	6.2	6.7
2012	8.5	8.4	8.5	5.9	5.6	6.1
2013	8.6	8.5	8.5	6.1	5.9	6.3
2014	8.6	8.6	8.6	6.1	6.1	6.1
2015	9.4	9.3	9.4	5.3	5.0	5.5
2016	10.0	9.8	10.1	5.6	5.6	5.6
2017	10.0	9.8	10.1	5.6	5.7	5.6
2018	10.0	9.9	10.0	6.0	5.6	6.3
2019	10.3	10.2	10.4	6.2	6.0	6.4

Source: Eurostat

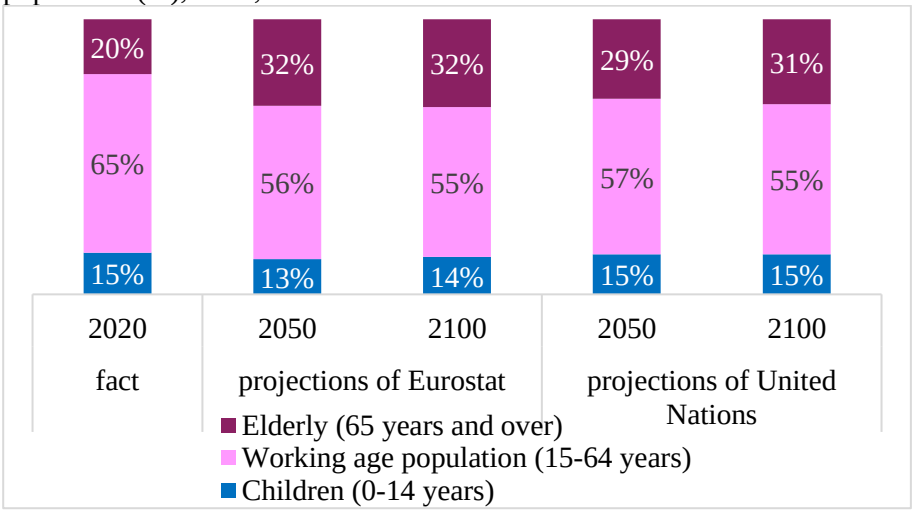
Across the EU-28 in 2019, both women and men aged 65 years could expect to live, on average, for 10 years of their remaining lives in a healthy condition, but for women it accounts for 48% of their remaining, lifespan while for men it consists 55% of their remaining lifespan (Tables 1, 2). In Lithuania as well as in other European Union countries at the age of 65,

women can expect to live a smaller share of their remaining lives in a healthy condition due to the generally existing longer life expectancy. Women aged 65 years could expect to live, on average, for 6.4 years of their remaining lives in a healthy condition (32% of their remaining lifespan), while the comparable figure for older men was lower – 6.0 years (or 41% of their remaining lifespan) (Tables 1, 2).

Lithuania has one of the lowest healthy life expectancies in European Union countries (Appendix 3). Only Croatia (4.8 years), Latvia (4.7 years) and Slovakia (4.7 years) have a shorter duration of healthy life expectancy than Lithuania. The highest healthy life expectancy at age 65 in EU-28 is recorded in Sweden (16.2 years), Malta (14.8 years), and Ireland (13.6 years). Duration of healthy life years have only increased over the last fifteen years and, in general, it is estimated that about half of life expectancy after the age of 65 is in healthy life years.

Living longer determines the rising share of elderly persons in the EU's population. The resulting demographic projection is characterized by a rapid aging of the population of working age, as well as an increasing share of the population of ages 65 and over. Older people aged 65 years and over at the start of 2019 equated to one fifth (20%) of the total population in Lithuania. According to projections of Eurostat and United Nations, this share of the total population will gradually increase and is projected to reach 31-32% in 2100 (Figure 1).

Figure 1. Population of Lithuania by broad age group as share of total population (%), 2020, 2050 and 2100

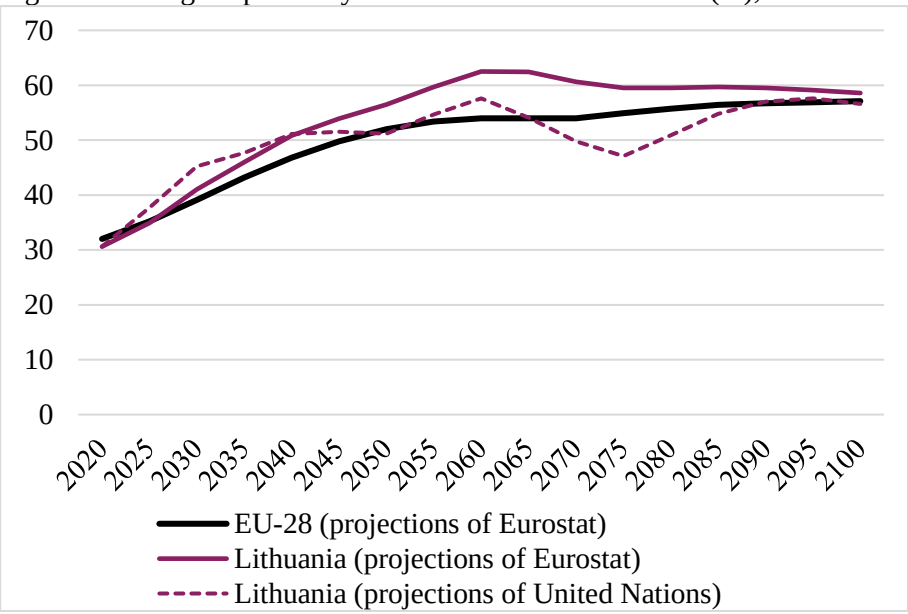


Note: 2020 fact, 2050 and 2100 baseline projections. Source: Eurostat, United Nations

An identical situation is projected in the case of EU-28 as well: the share of elderly of the total population will increase from 20% in 2019 to 31% in 2100 (projections of Eurostat).

The Ageing Europe technical report mentions that the old age dependency ratio may be used to study the level of support given to older people by the working-age population (Corporate authors, 2019). This ratio expresses the relative size of older population (65 and over) compared with the working age population (aged 15-64) (the number of older persons per 100 persons of working age). The demographic old-age dependency ratio is projected to increase significantly in the EU-28 countries in the coming decades (Figure 2).

Figure 2. Old-age dependency ratio in EU-28 and Lithuania (%), 2020-2100



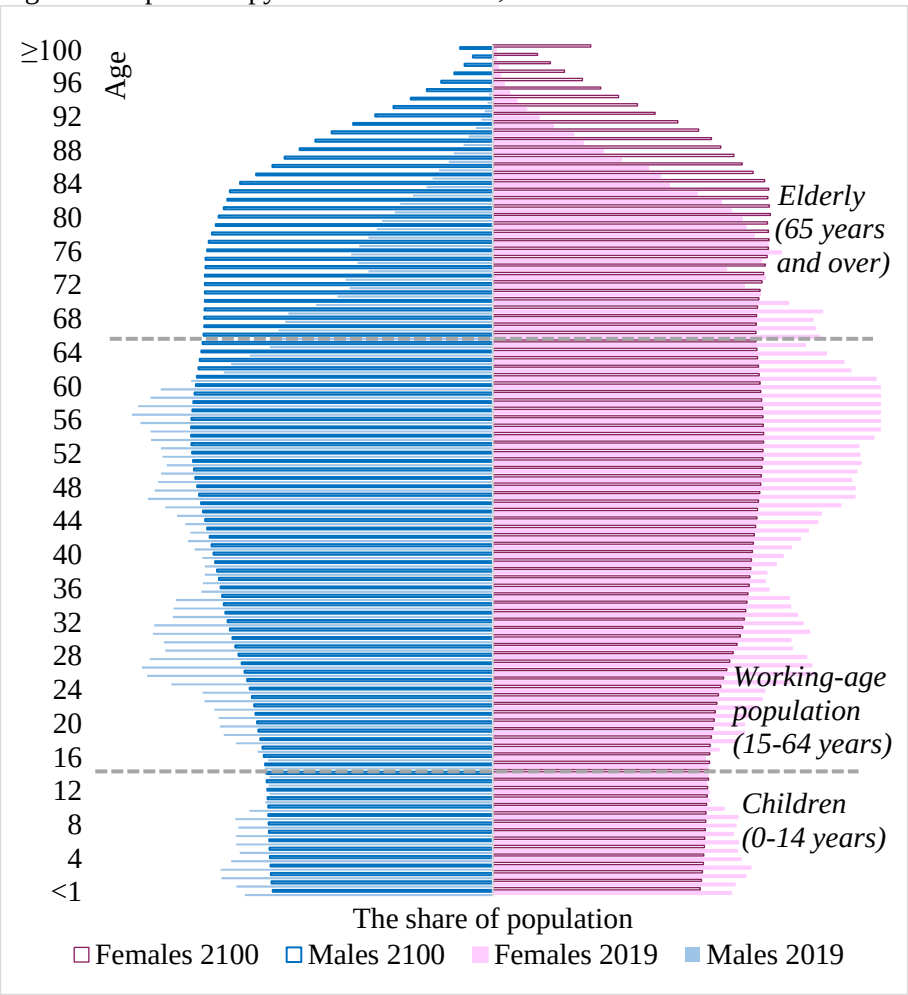
Note: 2020 fact, 2025-2100 projections. Source: Eurostat, United Nations

According to Eurostat, the old-age dependency ratio in Lithuania will increase significantly in 2020-2060 and will reach 62% due to the declining rate of mortality and increased net migration (it is projected that the number of emigrants will exceed the number of immigrants by 2060, but after 2060 the situation will reverse and the number of immigrants will exceed the number of emigrants), while in the EU-28 countries it will reach 57% on average. Then, the old-age dependency ratio in Lithuania will approach the EU-28 average again and reach about 59% in 2070-2100. Projections of

United Nations are remarkably similar to those of Eurostat projecting that in 2100 old age dependency ratio in Lithuania will be 57%.

Low fertility rates, high emigration rates, and an increasing life expectancy accelerate demographic change in European countries. Figure 3 presents two pyramids for Lithuania that are overlaid: one showing the situation at the start of 2019 (the solid bars) and the other a projection for 2100 (the bars with borders). They highlight the demographic transition that is projected to take place across Lithuania during the next eight decades.

Figure 3. Population pyramid of Lithuania, 2019 and 2100



Source: Eurostat

The population pyramid of Lithuania in the beginning of 2019 is narrow at the bottom, with a bulge in the middle of the pyramid indicating that the

baby-boom generation are rapidly approaching retirement (Figure 3). The pyramid shows the highest share of total population moving from those aged 40-60 years old in 2019 to those aged 55-70 years old in 2100. Finally, in 2100 the population pyramid of Lithuania takes on an almost pillar-like shape, with each age group having a similar share of the total population.

Thus, in Lithuania, as in the entire European Union, the life expectancy of the population is increasing, including the number of healthy life years. Projections of Eurostat and United Nations suggest that the share of older people in society will continue to grow in the next decades. In Lithuania, the old age dependency ratio is expected to be even higher than the European Union average. It would be difficult to answer whether such projections will come true and whether the structure of the population will change so drastically, knowing that the projections, especially in the case of Lithuania, are based on assessments of the extent of possible emigration and immigration flows. Either way, filling in both the larger or smaller projections of an aging trends, the shrinking size of the working-age population, and the growing number of older people pose major challenges to the economy, which are discussed in the next subsection.

1.2 The economic impact of aging

Population aging is one of the most important process influencing policy directions in social, labor market and economic transformations. The literature highlights broad areas affected by population aging (Table 3).

Table 3. Systems affected by population aging

Economy	Education	Social protection and health systems
• Aging labor force • Productivity changes • Economic growth	• Lifelong learning	• Pension systems • Long-term care and nursing • Active aging

Source: compiled by the author using Bussolo et al. (2015), Chłoń-Domińczak et al. (2014), Corporate authors (2019)

In the opinion of some observers, "population aging will likely exert downward pressure on economic growth, reduce labor supply, lead to higher (age-related) social costs and impact on the sustainability of government

finances," other observers argue that "population aging need not impede economic growth and that it may instead provide a stimulus for developing new goods and services, for example, housing or transport adapted to the needs of an aging population, or a range of new social care services" (Corporate authors, 2019, p. 8). Chłoń-Domińczak et al. (2014) finds that demographic change affects family policy including education, lifelong learning, and labor market; and social protection system including pensions and health and long-term care systems.

According to Bussolo et al. (2015) the economic impact of population aging arises from several observations which can be divided into three sets*:* the impact on *(1) the public finances*, *(2) labor market*, and *(3) poverty and inequality*. All three of these observations are introduced below.

Firstly, fiscal expenditures on health care, long-term care, and pensions are expected to rise (Corporate authors, 2019; Bussolo et al., 2015; Rouzet et al., 2019; Martin, 2018). With an increasing share of dependent older people in society, there may not be sufficient resources to maintain the living standards of this older group, especially if increasing fiscal expenditures on health care, long-term care, and pensions must be financed through the contributions and taxes paid by increasingly smaller younger age groups (Bussolo et al., 2015; Rouzet et al., 2019; Corporate authors, 2019; Martin, 2018). It is projected that the number of pension beneficiaries will increase as the number of pension contributors declines (Corporate authors, 2019). Projected rises in public expenditures will have to be financed by either an increase in social security contributions and other taxes or by a cut in generosity of benefits, or even by some combinations of both (Bussolo et al., 2015; Rouzet et al., 2019).

Secondly, population aging can affect labor markets because the average age of workers rises, and older workers may be less productive than younger ones (Bussolo et al., 2015; Eurobarometer, 2012; Aiyar & Ebeke, 2016). The quality of older workers' human capital might be lower; their acquired experience often may not be useful in new expanding sectors; they tend to be less mobile, less entrepreneurial, and generally less flexible (Bussolo et al., 2015). The elderly are less likely to be open to new ideas or maintain a working understanding of new technology (Eurobarometer, 2012). Labor productivity may fall due to a decline in older workers' physical and cognitive abilities, but this prospect could also induce firms to invest in new, productivity-enhancing technologies (Aiyar & Ebeke, 2016). According to Aiyar & Ebeke (2016), aging could reduce total factor productivity growth by an average of 0.2 percentage points per annum over the next twenty years. But their analysis suggested that the variety of policies, such as broadening access

to health services, improving workforce training, increasing labor market flexibility by lowering the tax wedge, and promoting innovations can help to ameliorate the negative productivity impact of an aging workforce.

On the macro level, the new, smaller age groups entering the labor market are endowed with more and better human capital, which, to some extent, compensates – or even overcompensates – for the loss of the larger, less well-educated older groups exiting the labor market (Bussolo et al, 2015). Some authors note that on the micro level, the skills of older workers are not so much declining as shifting (Bussolo et al., 2015; Eurobarometer, 2012). Eurobarometer (2012, p. 4) shows that "a growing number of older people are in good health, have valuable skills and experience." The human brain has an extraordinary ability to compensate for declines in certain cognitive functions with improvements in others, taking advantage of the stock of accumulated experience among older people. In addition, older people have clear advantages in certain areas of personality and noncognitive skills (Bussolo et al., 2015). So, opinions are diverse, and it should be concluded that older people have a variety of potential skills.

Thirdly, older societies may become more unequal, with inequalities between more and less skilled workers and inequalities between women and men. The difference between the wages of skilled and unskilled workers increases with age; an ever-bigger cohort of older people may become polarized into one group that is skilled and active and is earning large incomes and another group that is unskilled, drops out the labor market at earlier ages, and receives low salaries (Bussolo et al., 2015). This trend may affect pension benefits, as these become more linked to contributions and earlier wages or to private saving schemes and this can only increase exclusion in old age. Families with breadwinners that are well-educated and enjoy significant increases in wages as they gain experience will be able to accumulate abundant wealth and pass it on through inheritance, thereby perpetuating inequality (Bussolo et al., 2015).

Other inequalities are formed in families between the genders because older women are more often at bigger risk of poverty than men. Women stay at home to take care of children, they are more likely to take career breaks, which results in lower earnings for them and later lower old-age pensions. In 2017, almost one fifth (19.2%) of women aged 75 years or more in the EU-28 were at risk of poverty; this was 6.2 percentage points higher than the corresponding rate for men of the same age (Corporate authors, 2019).

This dissertation will further analyze the impact of aging on the labor market. Therefore, policy responses to aging will continue to focus on the impact on two especially important systems – the labor market and the pension

system. As the aging population affects many areas of the economy, policy decisions have been taken to tackle the consequences of aging. Policy measures in response to the effects of an aging population are discussed in the next subsection.

1.3 Policy response to the aging process

This subsection summarizes the main measures taken by EU-28 countries to manage the negative effects of an aging society.

Towards full employment. The European Union sees full employment as an important way of coping with the challenge of aging populations from The European Employment Strategy set in 1997 to The Europe Strategy 2020 set in 2010 (Presidency Conclusions, 1997; European commission, 2010). For example, to cope with demographic aging, the European Council in 2001 agreed on a three-pronged strategy of reducing public debt rapidly, raising employment rates and productivity, and reforming pension, healthcare, and long-term care systems (Presidency Conclusions, 2001). It was emphasized that a greater involvement of women and older workers as well as the better integration of migrants should help bolster the work force. The European Council in 2003 defined an ambitious target: a rise in the employment rate of older workers (55-64) to 50% by 2010 (in 2003 the employment rate of people aged 55-64 years was 39.8% in EU-28, and in 2010 it reached 46.2%) (Presidency Conclusions, 2003; Eurostat). Later, the Europe Strategy 2020 of the European Commission set a target for the employment rate of the population aged 20-64 years to increase from the current 69% to at least 75% (European commission, 2010). Since the adoption of the Europe Strategy 2020 in 2010, the employment rate has grown by 5.6 percentage points: the EU-27 employment rate (20-64) stood at 73.4% in 2020. It is emphasized that the rises in employment rates for women and older workers have been clear successes over the period of the strategy (European Commission, 2019). With an employment rate in the EU of 73.1% in 2019, the Europe 2020 employment rate target of 75% was almost reached (in 2020 the growth of employment rate was slowed by the Covid-19 pandemic). The European Union therefore continues to pursue the goal of increasing employment, with a goal to achieve an employment rate of 78% for people aged 20-64 by 2030 (European commission, 2017).

As life expectancy improves, longer working lives “will be vital to enable men and women to acquire adequate pensions” (European Commission, 2018, p. 17). In the “European pillar of social rights action plan” (2017), among other areas of social security and working conditions, such

directions are mentioned as active support to employment (the right to receive support for job search, training and requalification) and healthy, safe and well-adapted work environments (workers have the right to a working environment adapted to their professional needs and which enables them to prolong their participation in the labor market) (European commission, 2017). Thus, the issue of increasing employment and improving the conditions for employment remains one of the priority areas for the EU-28 countries.

***A continuation of the move toward full employment is increasing the labor market participation of women and older workers*.** Women tend to earn less than men and tend to take career breaks for caring responsibilities more often than men (European Commission, 2009). Consequently, their old-age pensions tend to be lower, and the risk of poverty tends to be higher among older women, also because they live longer (European Commission, 2009). Childcare breaks, part-time work, care for dependent adults is likely to have a continued impact on women's pensions. Therefore, higher female employment would make up for those losses. The European Commission (2012) presented three main pension challenges related to population aging: financial sustainability of pensions systems, the adequacy of pension benefits and the increase of labor market participation of women and older workers. The European Commission (2012), among other recommendations, proposed to support longer working lives by providing better access to life-long learning, adapting workplaces to a more diverse workforce, developing employment opportunities for older workers, supporting active and healthy aging, and equalizing the pensionable age of men and women. In the "European pillar of social rights action plan," among other areas of social security and working conditions, such directions are mentioned as gender equality (ensured and fostered in all areas, including regarding participation in the labor market, terms and conditions of employment, and career progression) and the work-life balance question (women and men shall have equal access to special leaves of absence in order to fulfil their caring responsibilities and be encouraged to use them in a balanced way) (European Commission, 2017).

***Increasing retirement ages*.** The most common measure adopted to tackle the challenge of pension sustainability was increasing pension ages. Nearly all European countries have increased the level of early and statutory retirement ages (Appendix 4). According to the Aging report (2015), only Luxembourg and Sweden have not legislated further rises of pension ages (European Commission, 2015). In 2060, the highest statutory retirement age will be 72.5 for both men and women in Denmark, while the lowest one will be 63 for women in Bulgaria. Nearly all European countries have equalized

the pension age of men and women (with the exceptions being Bulgaria, Austria and Romania).

Reduced incentives for early retirement. The Barcelona European Council supported the idea of full employment as the essential goal of economic and social policies underlying those reforms of employment and labor market policies being needed (Presidency Conclusions, 2002). In 2003, the Brussels European Council underlined the importance of discouraging early retirement incentives (Presidency Conclusions, 2003). Many pathways to early retirement were introduced in the 1970s in response to rising unemployment. But in within the context of an aging population, EU policy-makers need longer working lives, mainly through discouraging early retirement and increasing pension ages (Eurofound, 2012). Thus, there is a general policy of reducing incentives to retire early.

Transforming pension systems with transitions shifting from the defined benefit to defined contribution schemes, moving from single to multi-tiered pension systems, and with addressing longevity risk through automatic mechanisms. In the context of an aging population, European countries have a major challenge to ensure the adequacy and sustainability of retirement income for European Union citizens. The World Bank in 1994 assured that these pension systems are not financially sustainable under population aging and they proposed for countries to apply funded pension schemes to avert the old age crisis (Bargo, 1994). Five "old" European union member states – Sweden, Italy, Greece, Germany, and Austria – have adopted additionally systemic reforms in the period from 2000 to 2016 (Carone et al., 2016). Sweden and Italy shifted at the end of the 1990s to a notional defined contributions public pension system (Carone et al., 2016). Greece in 2010 introduced a basic pension and reformed the defined benefit first pillar. In 2012, it transformed its second pillar also into a notional defined contributions system (Carone et al., 2016). Most of the "new" EU countries introduced mandatory private individual schemes, including Bulgaria, Estonia, Croatia, Latvia, Lithuania, Hungary, Poland, Romania, and Slovakia, while a smaller group of countries, such as Cyprus and Slovenia, adopted mandatory private occupational schemes (Carone et al., 2016). Latvia and Poland converted their old defined benefit public pillars into notional defined contributions systems.

There was a time when it was thought that funded pension schemes were better than pay-as-you-go pension systems, but the financial and economic crisis let us to see that "sluggish economic growth, budget deficits and debt burdens, financial instability and low employment have made it harder for all pension systems to deliver on pension promises" (European Commission, 2012). Barr & Diamond (2008) noted that "there is no single

best pension system" because all of them just share risks differently. As a result, another trend to reform pension systems subsequently prevailed. According to Carone et al. (2016), one of the most important features of pension reforms over the last two decades was the adoption of either automatic balancing mechanisms, sustainability factors (direct link between pension benefits and life expectancy), and / or automatic links between retirement age and life expectancy.

According to the European Commission, "automatic balancing mechanisms ensure that the pension system will be able to remain financially sustainable by adjusting benefits' indexation and / or by social contributions when needed." For example, indexation is reduced in Sweden and Spain in case the pension system shows a deficit. Some countries (Germany, Finland, Spain, Italy, Latvia, Poland, Portugal, Sweden, and Norway) adopted a sustainability factor that changes the size of the pension benefit depending on the expected demographic changes, such as life expectancy at the time of retirement or the ratio between contributions and pensions (Carone et al., 2016, p. 17). Finally, some countries (Italy, Portugal, Greece, Slovakia, Cyprus, Denmark, Netherlands, Malta and Finland) introduced an automatic link between retirement ages and life expectancy.

According to Carone et al. (2016), in the context of the 2008-2009 financial and economic crisis, in many cases temporary measures were adopted to reduce the financial burden of public pension expenditures (freeze of indexation, cuts in pensions in payment) or increase the resources (increase in contribution rates, taxes). Thus, the main levers of the reforms were the introduction of increasing retirement ages, tightening eligibility conditions, and reductions in early-retirement opportunities (European commission, 2018).

In Lithuania, it was decided to increase the length of service requirements for receiving an old-age pension (the required length of service will be increased until it reaches 35 years in 2027), index pensions according to wage growth rates, and reform the second pillar of pensions (the inclusion of people in the second pillar of pensions with the possibility to refuse was last introduced in 2019).

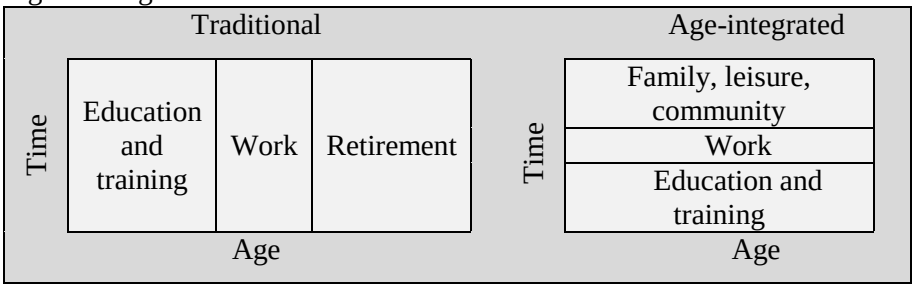
Promoting active aging. The European innovation partnership on active and healthy aging was created in 2011 and aims to foster innovation that will promote active aging and raise healthy life expectancy. The World Health Organization (2015) defines active aging as the process of optimizing opportunities for health, participation, and security to enhance quality of life as people age. According to the Eurobarometer (2012), active aging is defined not just as the participation of older workers in the labor market, but also as

their active contribution to society through voluntary work, notably through family careers or the possibility to live independently thanks to adapted housing and infrastructure. The European commission, in a specially designed AGE platform, refers active aging to the situation where people continue to participate in the formal labor market as well as engage in other unpaid productive activities (such as care provision to family members and volunteering), and live healthy, independent, and secure lives as they age.

The Active Ageing Index (AAI below), designed by the European Commission (DG Employment), Social Affairs and Equal Opportunities and the European Centre, is a tool for measuring the untapped potential of older people for active and healthy aging at national and subnational levels (Index, 2018). It measures the level to which older people live independent lives, participate in paid employment and social activities as well as their capacity to actively age. AAI for Lithuania in 2018 was 33.4. When dividing the scores into quartiles, Lithuania falls into the third group together with the Czech Republic (36.5), Austria (35.8), Cyprus (35.7), Malta (35.4), Latvia (35.3), Luxembourg (35.2), Italy (33.8), Spain (33.7), and Portugal (33.5) with a score lower than 37 points. The first group with the highest scores includes Sweden (47.2), Denmark (43.0) and the Netherlands (42.7) with more than 42 points. The last group covers Slovakia (32.3), Bulgaria (31.8), Slovenia (31.1), Poland (31.0), Hungary (30.5), Romania (30.2), Croatia (29.3) and Greece (27.0) with scores lower than 33 points (Index, 2018).

The work life cycle, which was traditionally divided into three periods – training, work, and retirement – has changed significantly in the recent years and gives way to a more horizontal distribution of activities with a life being more diversified, more flexible, and more dynamic (Reday-Mulvey, 2005; Figure 4).

Figure 4. Age-based distribution of activities



Source: Reday-Mulvey, 2005

It is getting harder now and it will be even harder in the future to realize that people can only work after concluding their tertiary education degrees and

may simply retire at the end of their working careers. Increasingly, society is seeing the importance of learning and working throughout life while reconciling family responsibilities and leisure, and only a combination of these three will help leading more productive and successful lives in the future.

In the World report on aging and health (2015), four priority areas are identified: *(1)* aligning health systems with the needs of the older populations they now serve; *(2)* developing systems for providing long-term care; *(3)* creating age-friendly environments; *(4)* improving measurement, monitoring, and understanding (World Health Organization, 2015). As people age, they need more chronic and complex healthcare. As it was mentioned in subsection 1.1 across the EU-28 in 2019, women aged 65 years could expect to live, on average, for 10.4 years of their remaining lives in good health (48% of their remaining lifespan), while the comparable figure for older men was lower at 10.2 years (or 55% of their remaining lifespan) (Corporate authors, 2019). Just less than half (49.7%) of older people (aged 65-74 years) in the EU-28 perceived their health to be good or very good, a share that fell close to one third (34.1 %) among those aged 75-84 years and to one quarter (25.0%) for very old people (aged 85 years or more) (Corporate authors, 2019). It is noticeable that if increasing longevity goes in line with an increasing number of healthy life years, then aging may not necessarily translate into rising health care costs (European Commission, 2015).

OECD mentions that promoting the development of life-long skills to enhance the career opportunities and productivity of senior workers is a priority, in particular through training in the use of digital technologies (Rouzet et al., 2019). Policy-makers should strive to enhance the employability of senior workers, enable multi-stage careers, and improve the well-being of seniors at work (Rouzet et al., 2019). The World Bank notes that adjustments in labor and pension laws and improved incentives to keep investing in human capital throughout an individual's working life would facilitate the increased participation and productivity of the elderly in the labor market (Bussolo et al., 2015).

To sum up, major international organizations, including the World Bank, OECD, World Health Organization, and European Union agree on increasing the employment of older people, promoting lifelong learning and active aging (Martin, 2018; Rouzet et al., 2019; World Health Organization, 2015; Conclusions, 1993; Presidency Conclusions, 2001; Presidency Conclusions, 2003; Presidency Conclusions, 2005; European Commission, 2009; European Commission, 2012; European Commission, 2018). From the Stockholm Council (Presidency Conclusions, 2001) to the Europe strategy

2020 (European commission, 2010) the most striking discourse in the EU battle against poverty and social exclusion is increasing employment. Employment is considered a key factor for social inclusion, not only because it generates income but also because it can promote social participation and personal development (Ervik et al., 2009). The next section reviews the literature which analyzes what factors researchers see as determining the employment of older people and what problems do older workers face in the labor market.

2. LITERATURE REVIEW ON EMPLOYMENT OF OLDER WORKERS

As mentioned in the previous section, structural reforms were implemented, such as shifting from defined benefit to defined contribution schemes or establishing mandatory funded pillars, to secure the financial sustainability of pension systems in European countries. However, the economic crisis of 2009 highlighted the weaknesses in some pension systems and denied the myth that a specific type of pension system can cope with demographic changes by itself. Moreover, many countries started to increase their retirement age and discourage early retirement arrangements, as an easy early labor market exit would create growing imbalances between active years and years spent in retirement. Finally, the European Commission found that increasing the employment rate of older people will be crucial in enhancing economic growth and laying a solid foundation for sustainable and adequate pensions (European Commission, 2012).

Henkens et al. (2018, p. 806), who invited researchers to join the scholarly conversation about the future research on retirement, wrote that "future working lives are likely to be extended, and individuals will have to deal with uncertainty and risks on a much broader scale, assume new responsibilities and perhaps take on new roles." To understand the employment opportunities and constraints for older people, this section analyzes the problems faced by older workers aged 55 and over, the attitudes of the elderly, policy-makers, and employers on bridge employment, and the factors leading older workers to stay in the labor market for longer.

2.1 Employment of pre-retirement age

In this subsection, literature on older workers aged 55-64 is analyzed. As a population ages, increasing the employment of older people is often envisaged as a means of combating the negative effects of aging, but it is important to examine how older people cope with these changing conditions, and what challenges they face.

A negative employers' attitude to older workers does exist. Older workers may face a number of difficulties keeping their jobs because, as it was mentioned above, employers may doubt the productivity of older workers as compared to younger ones, a part of which is the belief that they have been trained through a different educational system; they may be less mobile, less entrepreneurial and generally less flexible; the quality of their human capital might be lower; and, even if they have acquired experience, it is often not

useful in new, expanding sectors (Bussolo et al., 2015). On the other hand, there are employers who especially value the work ethic of older workers, appreciate their low rates of absenteeism, and welcome older workers serving as mentors to younger workers (Cummins & McGrew, 2018). So, it has to be mentioned once again that older people are different, which explains the differing attitudes towards them.

Changing technologies may become a challenge for older workers. Technologies can be both opportunities (Rouzet et al., 2019; Henkens et al., 2018; Thompson & Mayhorn, 2012) and limitations for older workers (Thompson & Mayhorn, 2012; Charness & Boot, 2009; Villosio et al., 2008; Zientara, 2009). Technological innovations may provide individuals with more opportunities to work in a location- and time-independent way, thereby allowing them to attain longer working careers (Henkens et al., 2018). Thompson & Mayhorn (2012) mentioned that tools and technologies have been developed to help older adults capitalize on their strengths and overcome age-related limitations with respect to working memory, physical strength, visual acuity, and mobility. In addition, technology can function to reduce age discrimination and enhance training, social support, and networking opportunities.

However, despite its potential, technology can also cause new problems, thus contributing to the challenges faced by older workers. Such problems may stem from a lack of usability and attitudinal barriers to technology acceptance (Thompson & Mayhorn, 2012). Charness & Boot (2009) discussed reasons to expect that the lag in technology adoption between younger and older adult technology will continue to advance rapidly. Also, perceptual, cognitive, and psychomotor declines will continue to occur with aging, in concert with lifespan-sensitive changes in motivational factors. Hence, future cohorts of older adults are likely to continue to lag in technology adoption. Villosio et al. (2008) found that the introduction of new technology is biased against low-skilled workers, and while it appears to have improved job opportunities in some fields, it has resulted in job losses for older workers. Zientara (2009) interviewed entrepreneurs and employees from Polish enterprises and found out that despite recognizing the value of older employees and the need to accommodate them, most of entrepreneurs perceive older workers as inflexible, information technology-incompetent, and experiencing difficulty learning new things.

Older people face age discrimination. Choi et al. (2018) found that age discrimination is a compelling factor in diminishing work enjoyment later in life: older workers who perceived a higher level of retirement pressure from colleagues and promotion preference for younger workers reported a lower

level of work enjoyment. Desmette & Gaillard (2008) argued that self-categorization as an "older worker" is related to negative attitudes towards work (stronger desire to retire early, stronger inclination towards intergenerational competition), while the perception that the organization does not use age as a criterion for distinguishing between workers supports positive attitudes towards work.

The main perceived advantage of employees aged 55 and over is that they are thought to be more experienced than younger employees (87% "more likely") (Eurobarometer, 2012). Secondly, they are perceived as being more reliable than younger employees (67% "more likely"). Just over six out of ten (64%) feel that older people are better able to make decisions on their own than young people, and a similar proportion (60%) feel that they are better at finding solutions to problems than younger employees. Half of the respondents are of the view that people aged 55 and over are more likely to be better at handling stress and working with other people. By contrast, relatively few believe that older people are more open to new ideas (25%) and more up to date with new technology (22%) (Eurobarometer, 2012).

Despite the difficulties in finding and maintaining a job, work makes older people's lives healthier and happier. Choi et al. (2018) analyzed employees in U.S. found out that the level of work enjoyment among older workers on average was high, suggesting that older employees generally view working positively. Calvo (2006) found out that longer working lives will help most people maintain their overall well-being and working longer seems beneficial for most people.

Health plays a major role in selecting who remains at work in older age (Doan et al., 2019). On the one hand, an individual's health status determines activity in the labor market (McNair et al, 2004; Lecours et al., 2019). McNair et al. (2004) observed that people with formal qualifications are much more likely than the unqualified to stay longer in labor market, and this is closely related to health. The unqualified workers are twice as likely to be suffer from long-term illness or be disabled than those with any qualification and by this reason they are more likely to leave labor market earlier. On the other hand, staying in the labor market for longer provides the feeling of being needed in the society, which has a positive impact on well-being and health, too. It can therefore be said that the link between employment and health status work in both directions.

Older workers favor flexible working arrangements and highlight the importance of fair treatment. Institutional factors are very important in determining the transition from work to retirement (Eichhorst, 2011; AARP, 2014; Choi et al., 2018). AARP (2014) and Choi et al. (2018) found that older

workers view the ideal job as one with flexible work arrangements, such as a flexible schedule, the opportunity to work part-time, and the ability to work from home. Bell & Rutherford (2013) and Visser et al. (2018) also showed that many older workers would prefer to reduce their working hours.

McNair et al. (2004) also emphasized that part-time employment and other labor arrangements can play an important role in filling the gap between full-time employment and retirement and providing flexibility, which allows older people to better combine their personal and health needs with their working lives. Plomp et al. (2019) suggest that a higher variation in work activities and fewer repetitive movements at work might also lead to fewer older workers with health limitations exiting early from the workforce. However, in many countries, older workers are still more likely to be made redundant (Meadows, 2003), which can cause "involuntary" early retirement.

If it happens that a person cannot work a few years before retirement, he or she can choose the alternative – early retirement. Early retirement was implemented in many European countries in the 1970s and 1980s as a policy to contain unemployment in a situation of weak economic growth. Martin (2018) identified such reasons for the trend toward early retirement: *(1) strong growth in real incomes* which increased the demand for leisure and facilitated saving for longer retirement; *(2) the maturation of pension systems* in many countries which provided generous retirement benefits relative to wages; and *(3) deliberate public policies* to encourage early retirement by older workers in response to the steep hike in unemployment post the two oil shocks of the 1970s in order to make way for increased hiring of youth. But since the late 1990s, this major policy was reversed in European union member countries, as it was found that member states should reduce incentives for early withdrawal from the labor force and raise the employment rate of older workers.

Researchers found a strong interaction between early retirement policies and the discouragement of older worker participation (Eichhorst, 2011; Bassanini & Duval, 2006; Staubli & Zweimuller, 2013). Echhorst (2011) argued that institutional settings that can provide pathways out of the labor market do not only concern specific early retirement schemes but also options to receive old-age pensions at an early stage, such as disability pensions, extended unemployment benefits for older workers, long-term sickness benefits, and a number of other pathways to retirement, such as old-age part-time work. Bassanini & Duval (2006) showed that the removal of early retirement incentives, a later statutory retirement age as well as less generous unemployment benefits, and lower income taxes lead to higher employment rates of older workers. Bell & Rutherford (2013) and Albanese

et al. (2019, 2020) showed that those who wish to work fewer hours are more likely to retire early, while those who want more hours delay their retirement compared with otherwise similar workers. Sewdas et al. (2018) in their study confirmed that a higher risk of voluntary early retirement was observed among those with a higher physical workload, lower job satisfaction and a lack of job control.

Increasing the early retirement age can extend the employment rate of older people. Calvo (2006) says an increase in the early retirement age reduces the ability of people to voluntarily decide their labor force participation. Less control in the work and retirement decision could have an adverse impact on the well-being of older individuals. For example, Eichhorst (2011) pointed out that Germany has successfully increased the employment of older workers in the last decade by using institutional factors, such as removing incentives to early retirement, activation strategies and enhanced training for older workers.

Staubli & Zweimuller (2013) showed that increasing the early retirement age increased employment by 9.75 percentage points among affected men and by 11 percentage points among affected women. Analyzing the increasement of early retirement age in Austria showed large spillover effects on the unemployment insurance program and disability insurance claims. Staubli & Zeimuller (2013) finished with the results finding that unemployment increased by 12.5 percentage points among men and by 11.8 percentage points among women. The employment response was the largest among high-wage and healthy workers, while low-wage and less healthy workers either continued to retire early via disability benefits or bridged the gap to the early retirement age via unemployment benefits.

There is some qualitative evidence that both poor and good health can play a role in the transition to early retirement. For example, people may want to enjoy life and may choose to retire earlier if their health allows them to enjoy retirement (Reeuwijk et al., 2017). But of course, as Papke (2019) found, being eligible for early retirement, or receiving an early-out offer, significantly increases the probability of retiring.

Older people who can no longer work at full capacity or cannot work at all may choose another alternative – receiving disability pensions. Disability in older age is a common problem and, in most cases, a chronic condition (Tas et al., 2011). Older workers in Europe with poor self-rated health are at risk of exit from paid employment, most notably through disability benefits followed by unemployment (Reeuwijk et al., 2017). The older people are, the greater is their probability to face more severe health problems and to lose part of their capacity for work. But does it deprive them of access to the labor market?

People with disabilities are willing to work, but they desperately need special conditions. Older people with disabilities aged 50-64 years are more likely to have a part-time job compared with their non-disabled counterparts, and they use part-time employment as a means of achieving a much better balance between their personal and health needs and working life (especially those with depression and other mental problems) (Pagan & Malo, 2009). This suggests that policy makers must encourage part-time employment as a means of increasing employment opportunities for older workers with disabilities and support gradual retirement opportunities with flexible and reduced working hours (Pagan & Malo, 2009). Part-time employment provides flexibility to older disabled people, thus enabling them to remain in the labor market despite their health limitations.

Stricter conditions for receiving disability benefits can affect labor participation. Kantarci et al. (2019) analyzed the new benefit regime which substantially decreased disability benefit receipt in 2006 in the Netherlands, and its impact had been persistent during the ten years of the study period as a stricter benefit regime of the reform limited the access to disability insurance substantially, and increased labor participation and unemployment benefit receipt to a limited extent.

Therefore, the literature review thus suggests that a lower employment rate among older people may be influenced by health problems and difficulties older people face in labor market. However, researchers also note that alternatives such as early retirement or disability pension can distract older people from the labor market, although sometimes they could be still active enough. The next subsection analyzes the labor market participation of people beyond the retirement age, the different attitudes on bridge employment of employers, employees and policy-makers, and the factors determining the choice to stay in the labor market for longer.

2.2 Employment beyond the retirement age

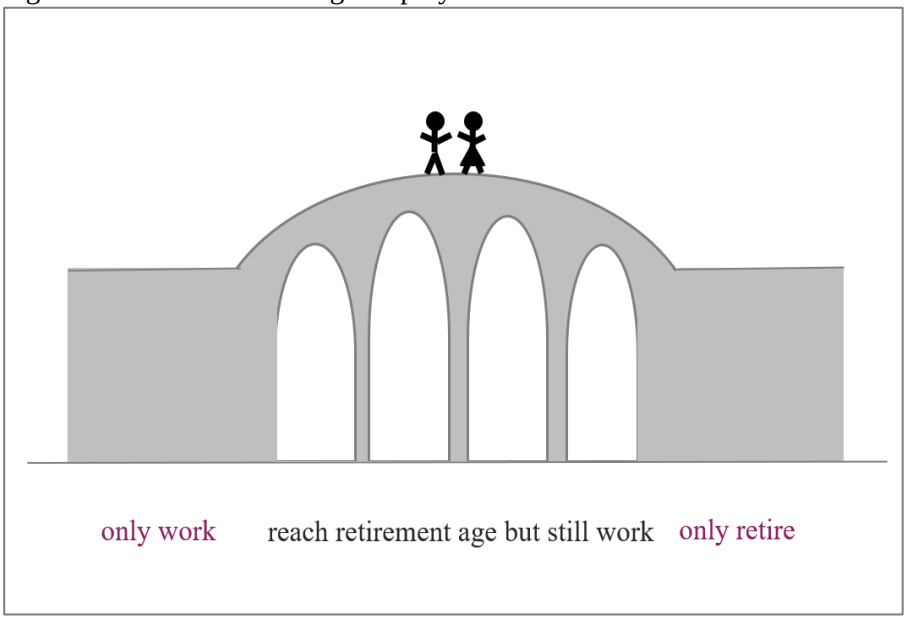
The purpose of this subsection is to provide an overview of different attitudes of policy-makers, employers, and employees on work beyond retirement. A literature review shows that employers and employees can find both positive and negative sides of working at old age, while policy-makers are geared towards promoting the conditions for a longer stay in the labor market. Furthermore, this subsection reviews factors which other authors find having impact on employment beyond retirement. Studying the participation of retirees in the labor force introduces various possible determinants of post-retirement employment, which are grouped by the author of this thesis into

individual, financial, family, and other factors in order to formulate hypotheses (see subsection 2.2.3, Table 4).

2.2.1 Concept of bridge employment

Retirement can be defined in multiple ways, but in this thesis, retirement will be defined as the age at which someone is entitled to a statutory or occupational pension. The interest of this thesis lies in those people who work beyond the retirement age (Figure 5). Some authors may call it "work in retirement" to interpret retirement as a stage rather than event, others may call it "work beyond pensionable age" to refer retirement as the status of not working. In some literature work after the retirement age is also called as "silver work" (Deller et al., 2009; Maxin & Deller, 2010) or the "fourth pillar" of income (Giarini, 2009).

Figure 5. Illustration of bridge employment



Source: compiled by the author

Other related concepts include "bridge employment" or "bridge job." The term "bridge employment" used in European countries is slightly different from that in the United States, where "bridge employment" is often defined as participation in a paid job (part-time, temporary, full-time or self-employment) after exit from a full-time career job, in other words it signifies

the “bridge” from pre-retirement employment to full retirement (Gobeski & Beehr, 2009; Feldman, 1994; Dingemans et al., 2016).

In European countries, where part-time employment is relatively common in all stages of the work, especially among female employees this definition would be controversial (Eurofound, 2012). Like Dingemans et al. (2016), here bridge employment will be defined as the participation in paid work by those who receive old-age benefits and both “bridge jobs”; “bridge employment” and “old-age employment” will be used as synonyms.

2.2.2 Different attitudes of policy-makers, employers, and employees

In the context of an aging society, international organizations stress the need for longer working lives, mainly through discouraging early retirement and increasing pension ages (European Commission, 2012; Sarfati, 2008). They emphasize that negative consequences of aging cannot be offset only by policies that encourage greater immigration, higher fertility, or faster productivity growth, arguing that those developments must go together with attempts to mobilize all available labor reserves, including older people (Sarfati, 200).

Sarfati (2008) highlights that encouraging older workers to remain in work longer could result in a triple dividend: *(1) it would boost labor force growth and help offset the negative impact of population aging on economic growth*; *(2) it would improve public finances through reduced public expenditures associated with early retirement while increasing tax revenues*; *(3) and it would also help employers by smoothing the pace at which they will have to replace retiring workers with new entrants*. The following presents how longer employment is perceived by policy-makers, employers, and employees themselves.

The policy-makers are embracing longer employment as a positive thing, reducing the pressure on pension and health systems and the labor market. To analyze the attitudes of different groups of society to bridge employment, the easiest way to begin is with policy-makers. Increased expenditures of health, pension, and care for elderly people, and the labor shortage are some of the negative implications of population aging that pose serious threats to macroeconomic performance. For this reason, the Lisbon European Council (European commission, 2000), Stockholm European Council (European commission, 2001) and Barcelona European Council (European commission, 2003) agreed a new strategic goal for European countries aiming to strengthen employment, including the participation of

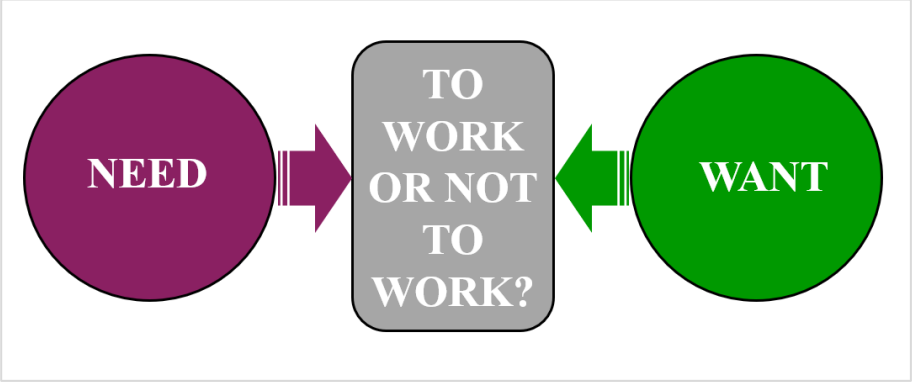
older women and men aged 55-64 in the labor market. The new employment strategy, as part of the Europe 2020 strategy, explicitly includes promoting active aging in the sense of increasing labor force participation, working for more years and remaining at work for longer (European commission, 2010). Increasing life expectancy can ensure that individuals could continue to work longer to support fiscal sustainability and growth.

According to Aliaj et al. (2016) increased employment in the 50+ age group can be associated with a triple benefit: *(1)* improving pension system finances by keeping older workers paying social security contributions; *(2)* improving health outcomes through active aging, and *(3)* preventing female old-age poverty by extending their careers. As more individuals remain productive and have higher incomes late in life, fewer are dependent on public programs and the nation has more goods and services to distribute among an aging population (Cahill et al., 2006).

Government policies typically focus on enhancing the prospects of older workers by a combination of subsidies and regulations (e.g., subsidies enticing firms to hire older workers; laws restricting age discrimination) (Henkens et al., 2018). However, little is known about how employers react to these external forces.

Retirees may have a variety of incentives to work longer, both from the desire not to lose social connections (motive "want") and from the need to increase income (motive "need"). Most often two different motives of individuals for bridge employment are distinguished in the literature (Figure 6).

Figure 6. Two main motives for bridge employment



Source: compiled by the author using Eurofound (2012)

On the one hand, retirees in a better financial situation may choose to work beyond retirement to get life satisfaction, maintain social relationships

(Dingemans & Henkens, 2019; Sandor 2011), and to earn income, augmenting their social security pension income (Cahill et al., 2006). The argument supporting this statement is that retiring people face the feeling that they are no more useful to their society, although in many cases they would be motivated to continue working and maintaining social relationships. Sudden transition from work to retirement is often associated with a high level of stress (Atchley, 1989).

On the other hand, bridge jobs may reflect the financial necessity to avoid poverty risk, especially for those at the lower end of the socioeconomic scale (Cahill et al., 2006; Maestas & Zissimopoulos, 2010; Aliaj et al., 2016; Komp et al., 2010; Sarfati, 2008). Older persons face an increasing risk of poverty, and they may counter this by working longer. According to Corporate authors (2019), in 2012, more than one third (37.5%) of people aged 50-69 years in the EU-28 who received pensions but continued working did so in order to have sufficient income; a further 14.6% did so to have sufficient income and to establish/increase their future pension entitlements, and 6.8% did so uniquely to establish or increase their future pension entitlements. However, three tenths (29.2%) of people in the EU-28 who received a pension and continued to work cited non-financial reasons for continuing to work (for example, job satisfaction) (Corporate authors, 2019).

Martin (2018) distinguished five forces driving the working longer trend across OECD countries:

(1) there has been a generalized drive in public pension policies to encourage working longer (raising the statutory retirement age in public pension systems, linking the statutory retirement age to life expectancy, organizing tax benefits, introducing positive bonuses for future pensions for those who opt to work beyond the statutory retirement age);

(2) there is a long-term effect favoring working longer via the rising average educational attainments of older age cohorts. Those with higher education tend to work longer and have better career prospects than those with low education (Dingemans et al., 2016; Komp et al., 2010);

(3) the rising employment of women has facilitated the longer careers of their spouses;

(4) improvements in average health status have facilitated many older workers to remain in the labor force;

(5) there has been a wealth effect favoring working longer. The trend slowdown in labor productivity growth, combined with widening wage inequality, has encouraged many older workers to continue working to build up sufficient savings for retirement.

Consequently, individuals may not want to work longer, but they may need to work to support their consumption and avoid poverty. However, older workers may face a few difficulties in keeping their jobs. As it was mentioned above, they may be less productive than younger workers, as they have been trained through a different educational system; the quality of their human capital might be lower; and, even if they have acquired experience, it is often not useful in new, expanding sectors (Bussolo et al., 2015). Moreover, the hiring policies of firms may be biased against older, possibly less productive but more expensive workers. Health and difficult working conditions may also play a significant role. Sarfati (2008) highlighted that it is proved in some studies that blue-collar workers and less-qualified workers are more likely to retire earlier than white-collar workers and more highly qualified workers. Consequently, even those who will want to work at old age may face many problems, beginning with their health opportunities and ending with potentially negative employers' attitudes to older workers.

Employers' attitudes, if still negative, should already begin to change. Many authors agree that paying more attention to the potential of older workers is needed because of labor shortages (Schalk et al., 2010; Maestas & Zissimopoulos, 2010; Cahill et al., 2006). There is need for more provision of training to older employees that matches their needs, since older workers receive less training than younger workers, and women have fewer opportunities in this respect compared with men (Villosio et al., 2008).

Maestas & Zissimopoulos (2010) noted that older workers are becoming closer skill substitutes for younger workers, which in turn should raise the demand for older workers, particularly in jobs where the productivity return to experience is high. They also added that the biggest constraint on demand for older workers in the future will be health care costs. Schalk et al. (2010) argued that the lower maximum capacities with age are becoming less and less important because of automation in physical work and the computerization of cognitive work, especially of memory and computation-related tasks.

As it was mentioned above, Villosio et al. (2008) found that the introduction of new technology has been found to be biased against low-skilled workers, and while it appears to have improved job opportunities in some fields, it has resulted in job losses for older workers.

Increasing attention is needed for the potential of older workers. Companies should consider this potential, but do they really do this? Sarfati (2008) courageously stated that employers are part of the problem in terms of restricting job opportunities for older workers because of negative attitudes.

Conen et al. (2012) stressed that both recruitment and retention levels of older workers are rather low, while employers' actions to extend working lives have a stronger focus on retention than on recruitment of older workers. There also seems to be a normative barrier in employers' behavior: recruitment and retention beyond the statutory age of retirement is not applied by many employers.

For example, after a comparative survey of four European countries – Greece, Spain, The Netherlands, and the United Kingdom – Mulders et al. (2014) found that despite the aging workforce, employers take no substantial measures to retain and recruit older workers or improve their productivity and that only the United Kingdom seems to recognize older workers as a valuable source of labor supply.

One of the main findings explaining why employers do not rehire older employees is the downward wage flexibility. Employers are considerably more likely to rehire employees who are prepared to accept a significantly lower wage after mandatory retirement because they probably want the post-retirement wage to be more related to workers' productivity (Mulders et al., 2014). So, there are contradictions – older workers become less productive over time, but their experience allows them to expect a reasonably higher wage.

Furthermore, individual productivity declines in some dimensions with age, but Sarfati (2008) argued that this decline can be partly compensated for by experience and personal aids, such as eyeglasses and suitable workplace adjustment. Employers also have less incentive to train older workers in comparison to younger employees, because there is less time to gain a return on the investment (Squire, 2020). But Bussolo et al. (2015) suggested that employers should be encouraged to invest in their current employees, modify workplaces and create mixed age working teams. Older workers often want to work reduced hours, and their choice largely depends on whether companies provide such flexible options. It is obvious that flexible working-time arrangements may encourage older workers continue to work longer (Sarfati, 2008).

It is clear enough that as the labor force shrinks, more and more employers will face the problem of labor force shortage, but the question is if they find it advantageous to hire older workers and devise new mechanisms for retaining older workers. Here, public policy should develop information campaigns, guidelines, and age-discrimination legislation, although it must be said that public measures have a limited role in changing employer practices, since they cannot directly force employers to hire or retain older workers and can only rely on indirect measures to encourage employers to do so.

2.2.3 Factors of employment beyond retirement

Nowadays the topic of employment beyond retirement is getting more and more attention among researchers (Dingemans et al., 2016; Bussolo et al., 2015; Mulders et al., 2014; Gobeski & Beehr, 2009; Maestas & Zissimopoulos, 2010; etc.). Some authors try to distinguish different variables that mostly influence the decision to work at old age. Their studies focus on assuming that bridge employment participation is the result of a complex set of socioeconomic factors, health, contextual factors (including family influence), macroeconomic and psychological factors. Other researchers (Gobeski & Beehr, 2009; Feldman, 1994) analyze what factors can affect retirees' choices whether to fully retire or to take one of two types of bridge jobs after retirement including career-consistent bridge jobs and bridge jobs in fields different from their original careers. Finally, there are some researchers who analyze why retirees can be unsuccessful in finding a bridge job (Dingemans et al., 2016).

Bridge employment is investigated from a variety of disciplines and therefore different factors can be analyzed. Economists mostly study demographic, socioeconomic factors and macro-economic conditions while sociologists and psychologists are more interested in impact of social influences (such as marital status or family relationships) and psychological factors (such as retirement planning and work commitment), respectively.

Studying the participation of retirees in the labor force introduces various possible determinants of post-retirement employment, which are grouped into individual, financial, family and other factors by the author of this thesis (Table 4).

A group of individual factors (Table 4, Column 1) includes age, gender, health, education, occupation, work history, sector, and region. Many authors agree that the most significant factor for choosing whether to work or not is health (Kalwij & Vermeulen, 2008; Van Solinge, 2014; Dingemans et al., 2016; Kim & Feldman, 2000; Wang et al., 2008). In the second group (Table 4, Column 2) all possible financial factors are analyzed, including wage, old-age benefit, and wealth in common. This subsection will present in detail two main factors influencing choice whether to work beyond the retirement are financial situation and good health status (Wang et al., 2008). Family factors (Table 4, Column 3) consider that marital status and spouse's employment can affect a person's choice to stay in the labor market for longer. A new aspect is discussed in the literature saying that with increasing life expectancy, older people will feel the pull of family care-giving responsibilities from many directions – their elderly parents, their spouses, and even grandchildren

(Maestas & Zissimopoulos, 2010). For this reason, the family context factor was taken into the list of family factors. Some authors compare different countries making different impacts on bridge employment. Analyzing data by this aspect, other factors (Table 4, Column 4) such as retirement age in the country, early retirement schemes, generosity of state and private pensions, macroeconomic factors, and flexibility of combining income of work and retirement are discussed.

Table 4. Grouped factors of employment beyond retirement

Individual factors (1)	Financial factors (2)	Family factors (3)	Other factors (4)
Age	Old-age benefit	Marital status	Retirement age
Gender	Wage	Spouse's employment	Early retirement schemes
Health	Wealth	Family context	Private pension schemes
Education			Macroeconomic factors
Occupation			Pension deferment
Work history			Unemployment benefits
Sector			
Region			

Source: compiled by the author

2.2.3.1 Individual factors

Age, gender, education, occupation, work history, health, sector, and region are the most frequently mentioned individual factors in literature. Next, individual factors are introduced that the author assumes influence bridge employment and formulate statements based on which hypotheses for Lithuania will be formed later in section 4.

Age. Age is the first individual factor which can affect a retiree's choice to work. Persons at relatively young ages are most likely to work beyond retirement (Gobeski & Beehr, 2009; Dingemans et al., 2016; Kim & Feldman, 2000). Age factor is causally related to the health factor because the older the retiree, the bigger probability is that they will have health problems, which makes continued participation in the workforce more difficult. However, Schalk et al. (2010) highlighted that the lower maximum capacities with age are becoming less and less important because of automation in physical work and computerization of cognitive work, especially in memory and

computation-related taxes. To sum up, age is inversely related to participation in bridge employment.

***Gender*.** Another well-known and important predictor of bridge employment is gender, with men being more likely to work in old age (Komp et al., 2010; Maestas & Zissimopoulos, 2010; Kim & Feldman, 2000; Damman & Henkens, 2018; Damman & Henkens, 2015; Pleau, 2010; Shacklock et al., 2009). Most authors agree that the women's labor force participation rate is lower than men's because of social norms and women's responsibility for familial care-giving (Hult, 2008; Komp et al., 2010; Pleau, 2010). Many women perceive a conflict in the choice between paid work and child rearing (Hult, 2008). Unlike male retirees, female retirees face not only the discrimination of age but also the discrimination of gender (Shacklock et al., 2009). However, women increasingly meet direct incentives for continued work at later ages because additional work may raise their social security benefits (Maestas & Zissimopoulos, 2010).

The gender factor is also important, because different factors can influence bridge employment of men and women. Marital status, earnings and household wealth are significant in bridge employment analysis only when the gender factor is incorporated (Pleau, 2010). Komp et al. (2010) found that among both men and women, occupational prestige has a significant effect although it is stronger among men than women. Also, they showed that men's choice to work in a bridge job is also affected by wealth and educational levels, while women's choice was related only to occupation. Pleau (2010) found that for women, being married and having high household wealth were negatively related factors, while higher earnings were positively related to labor force reentry; for men, wealth and earnings had the opposite effect. The probability of bridge employment is greater for separated and divorced women than for married women (Pleau, 2010). Beutell & Schneer (2020) found a significant interaction between gender and marital status with married men and non-married women more likely to be engaged in bridge employment. Shacklock et al. (2009) found that different work-related factors can affect men and women's choice to stay at work beyond the retirement. While "importance of work" and "interests outside of work" were important factors for men, "interpersonal relationships," "autonomy," "flexibility," and "interests outside of work" were important for women.

This means that social roles such as being married, having children or grandchildren may lower the employment odds of retired women. For both men and women, higher probabilities of postretirement employment were associated with good health, high level of education and having two or more children (Pleau, 2010). Kim & DeVaney (2005) showed that men who spent

their adult life working have a strong desire to retire as soon as their retirement incomes are satisfactory, while women's employment depends on familial responsibilities.

Flexibility in work schedule and work location have been suggested as being those work features that may promote prolonged employment among older workers; Damman & Henkens (2018) showed that women on average perceive to have less workplace flexibility than men, both in work schedule and in work location.

Given that additional motivation to work can be the maintaining of social relationships, women may have to adjust to the loss of the social dimensions of work more than men (Damman & Henkens, 2015). On the other hand, women will be less likely to have enough savings and generous pension benefits because of their career breaks, and these factors may promote to work. Longer life expectancy, better health, and a worse financial situation (greater probability to become widowed, lower pensions) should lead to greater involvement in bridge employment. It could be the case, but many family factors discussed below often adjust women's opportunities to work. To sum up the results of all researchers, it is more often stated that women are less likely to do bridge jobs than men, but, on the other hand, women may be less likely to be in good financial circumstances to make bridge employment financially unnecessary.

Health. Health is found to be the most significant factor influencing the choice to stay in the labor market beyond retirement age in the literature (Kalwij & Vermeulen, 2008; Van Solinge, 2014; Dingemans et al., 2016; Kim & Feldman, 2000; Wang et al., 2008; Damman & Henkens, 2015; Komp et al., 2010; Kalwij & Vermeulen, 2008; Reeuwijk et al., 2017; Zucchelli et al., 2007). Those people in good health are particularly likely to work in bridge jobs compared to those who suffer from health problems, are less productive or less competent.

With increasing age, a person's health tends to deteriorate, especially in terms of sensory functions, such as eyesight and hearing, and physical functional capacity. Less clear-cut are the changes affecting people's mental functional capacity, since some mental characteristics may also improve. At the same time, lifestyle and working conditions may accelerate the natural deterioration of people's health (Ilmarinen, 2005). The health situation of older workers has also improved over time and is likely to improve further over the next half century, which will help to underpin longer working lives (Sarfati, 2008).

Many studies showed that two most important motivators for retirees to work are financial pressure and good health, with financial pressure making

retirees feel that they should engage in bridge employment and good health making it possible to do (Wang et al., 2008).

Older workers may be particularly at risk from exposure to difficult working conditions – such as heavy physical work or restrictive postures – as these can amplify the natural deterioration of the body related to the aging of sensorial and physical capacities (Ilmarinen, 2005). Villosio et al. (2008) found that older workers in sectors such as manufacturing, construction and agriculture are most exposed to physical risks. Workers in the hotels and restaurants sector should also be added to this list, especially due to the heavy loads and difficult work positions entailed in such work. Lower levels of exposure to risks are experienced by people working in real estate, financial intermediation, and public administration and defense.

Zucchelli et al. (2007) showed that an individual's own health is an important determinant of labor supply among older working individuals, and that this is especially true for men. Reeuwijk et al. (2017) also found that workers with poor health are more likely to leave the labor market than workers with good health.

But new studies show that working beyond retirement can also positively affect health by increasing retirement and life satisfaction, and assuring active aging. Atchley (1989) suggests that a sudden transition from work to retirement is often associated with high levels of stress. So, one of the way for both policy-makers and employers to encourage bridge employment is to educate current and prospective retirees with the beneficial effects of bridge employment on maintaining mental health. Therefore, good health will be positively related to participation in bridge employment.

Education. A person's high educational level makes them a valuable employee and increases their participation in the labor market (Grigoli et al., 2021; Dingemans et al., 2016; Komp et al., 2010; Leenaars, 2010). For this reason, the education factor will be relevant when finding and maintaing employment in old age. Dingemans et al. (2016) found that bridge employment is particularly likely among highly educated and healthy retirees. Komp et al. (2010) found that highly educated older men are particularly likely to work for pay. On the one hand, people with higher educational levels can have better paid work and be more attractive as employees, and this increases their chances to be employed at old age; on the other hand, persons with a high educational level need to work in their later life due to their long educational phase. Moreover, more educated people are more aware of how the government uses their taxes and contributions, and for this reason they may tend to be more critical about government responsibility for pension provisions (Leenaars, 2010).

However, there was also evidence that for individuals with the lowest education, who are most likely to be found in low-skilled jobs, have prolonged low earnings and little savings, the financial need to work is likely to be also high (Eurofound, 2012). To sum up, older persons with a higher educational level are particularly more likely to work than persons with a low educational level.

Occupation. Occupation prestige is closely related to paid work. Komp et al. (2010) found that occupations with high job autonomy and a low stress-level motivate persons to work longer and that the effect of occupational prestige is strong among both men and women.

The higher the occupational prestige, the more likely an older person is to engage in paid work because persons in prestigious occupations usually have more autonomy in their work tasks and this makes paid work more agreeable for them. Komp et al. (2010) also added that persons in prestigious occupations often have specialized skills which make these employees more valuable for their employers, motivating them to prevent early retirement. So, older persons with higher occupational prestige are more likely to bridge employment than persons with lower occupational prestige.

Work history. Some authors found that older workers who have lost a job face the greatest challenge in finding a new one (Bussolo et al., 2015; Dingemans et al., 2016). Dingemans et al. (2016) found that unsuccessful searches for bridge employment were closely related to involuntary retirement. Particularly those who had experienced an involuntary career exit were found to have a higher probability of being unsuccessful at finding bridge employment. Regarding work histories, the findings showed that retirees who had a steep upward career path in their midlife are less likely to miss money/income, are equally likely to miss social contacts, and more likely to miss their status compared with those that did not experience any upward mobility (Damman et al., 2015).

Kim & Feldman (2000) analyzed if long-time employees can be more likely to desire bridge employment to sustain continued participation in a valued activity and to sustain valued contacts with colleagues. They found that organizational tenure was significantly related to engaging in all types of bridge employment, at least in their analyzed university system. To sum up, the more years a person spent in the labor market, the greater the likelihood of working after retirement.

However, the choice of bridge employment also depends on the type of employment. Dingemans & Mohring (2018) found that for both genders part-time work and self-employment were positively correlated to the probability of working after retirement.

Sector. Fontaine et al. (2020) found that the public sector hires mostly women, college graduates and older workers. In the countries they studied, the public sector represents a larger fraction of employment of older workers, accounting for 25% of their employment in France and the UK and 22% in Spain and the US. Fontaine et al. (2020) calculated that the probability of a worker losing his job is 2-3 times higher in the non-budgetary sector. The public sector is not relevant for workers with only a primary education. Consequently, those working in the budget sector are more likely to work in retirement than those working in the non-budgetary sector.

Region. Living in urban areas also increases participation in the labor market (Grigoli et al., 2021). An urbanized area means more jobs and thus greater opportunities to stay in the labor market for longer. So, those working in cities are more likely to work longer than those living in more remote towns or villages.

2.2.3.2 Financial factors

Broadly speaking, retirees work either because they need to or because they want to. The financial situation may play a crucial role in choosing to continue work or retire. A better financial position is associated with an increased likelihood to retire fully rather than to continue working. On the other hand, higher income may also mean that a person does not feel the need to work and will have the opportunity to choose whether to work after retirement. When making this decision, an individual may compare their old-age benefits with possible work income and consider their whole wealth. In this dissertation three financial factors – old-age benefit, wage and person's wealth – are discussed as strong factors determining the choice to work beyond retirement.

Generosity of old-age benefits. The generosity of pensions is important in two ways. Firstly, the higher old-age pensions are, the more attractive retirement is – the so-called "income effect." Secondly, the choice to stay in the labor market will depend on how much or how little an extra year's work affects the flow of income both from earnings and from old-age pensions and other benefits – the so-called "substitution effect" (Sarfati, 2008).

The primary purpose of public old-age pensions is to ensure an adequate income in retirement. However, to ensure sustainable and adequate pensions, a balance needs to be reached between guaranteeing adequate income and maintaining appropriate work incentives. Like Sarfati (2008) highlighted, on the one hand, more generous benefits imply higher taxes and weaker work

incentives; on the other hand, lower replacement rates imply lower taxes and stronger work incentives, but at the risk of greater poverty among pensioners.

Bussolo et al. (2015) argued that assuming that leisure is a normal good (the amount of leisure desired increases with income), reforms that reduce expected benefits may encourage later retirement, while increases in pension generosity may encourage earlier retirement. However, there is no reason to believe that increases or decreases in pension generosity will have any direct effect on the labor supply, because some authors who have examined this relation did not find it significant. For instance, Kim & Feldman (2000) found in their study that pension benefits were not significantly related to bridge employment. Overall, the generosity of the pension context is negatively associated with bridge employment behavior.

Wealth. Wealth summarizes the income and assets a person accumulates through their whole life. On the one hand, accumulated assets reduce the need for paid work in retirement. But on the other hand, persons valuing paid work are more likely to work, thereby generating wealth. Komp et al. (2010) analyzed these two possible opposed effects of wealth and concluded by defining the necessity to decide what people value more: their material circumstances or personal preferences. They assumed that material circumstances have a stronger effect on an individual's behavior than their preferences, but finally, they found that the wealthier older men become, the more likely they are to engage in paid work. Thus, wealthier older persons are more likely to work beyond retirement.

Wage. The wage factor is not widely discussed in literature and by default is considered to have an inverse relationship with bridge employment. Kim & Feldman (2000) found in their study that the higher a retiree's wage, the less likely they were to engage in any type of bridge employment.

Also, a U-shaped relationship is found for working after retirement against income status (Cahill et al., 2006). This means that retirees with low as well as high income status are likely to work after retirement, although probably for different reasons. Higher wages reflect higher positions at work, which makes it more likely that such a person will tend to stay in the labor market for longer. Lower wages reflect the necessity to work to avoid poverty risk. To sum up, wages at the time of retirement are positively related to participation in bridge employment.

2.2.3.3 Family factors

As it was mentioned above, family factors are more important when women's choice to work at old age is analyzed. A social roles perspective predicts that being married, having children and grandchildren, and performing non-household caregiving would lower the odds of retired women's labor force reentry (Pleau, 2010). A remarkably interesting distinguished potential constraint on labor supply was found in the literature: with increasing life expectancy, older people will feel the pull of family caregiving responsibilities from many directions – their elderly parents, their spouses, and even grandchildren (Maestas & Zissimopoulos, 2010). Caregiving responsibilities are described as the "family context" factors in this thesis. All family factors are presented next.

***Marital status*.** The marital status factor is strongly related with women's bridge employment. Married women were significantly less likely to transition into postretirement employment than unmarried women or men of any marital status (Pleau, 2010). For unmarried retirees, bridge employment is not only a necessity for earning income but also a way to maintain social relationships with others (Kim & Feldman, 2000).

Another specific risk group found in the current study was divorced women. In line with previous research conducted in the United States (Pleau, 2010), the results suggested that divorced women may be an economically vulnerable group in retirement (Dingemans et al., 2016). Compared with continuously married retirees, divorced retirees without a partner are more likely to miss the social dimensions of work and those who repartnered are more likely to miss financial resources (Damman et al., 2015). However, divorced or unmarried people are more likely to work due to other factors such as socialization. To sum up, unmarried or divorced retirees are more likely to engage in bridge employment than married retirees.

***Spouse's employment*.** It is strongly evident that men and women are more likely to be working if their spouses are working (Bussolo et al., 2015; Kim & Feldman 2000). Hersche & Moor (2018) found that the labor force participation rates of women drop when their spouse reaches full retirement age, but the labor force participation of men does not respond so strongly to the full retirement of their spouses.

Komp et al. (2010) found that compared to older men with a working wife, older men with a retired wife (17%), older divorcees or separated men (7%), and older widowers (9%) are less likely to engage in paid work. Compared to older women with a working husband, older women with a retired husband (11%), and older widows (4%) are less likely to engage in

paid work. To sum up, the retirees' whose spouses are employed are more likely to engage in bridge employment than those whose spouses are retired.

Family context. Bussolo et al. (2015) found that in Central Europe and the Baltics, the presence of older family members (in the 60-80 and the 80+ age groups) is associated with a reduced likelihood of working, suggesting that care responsibilities reduce labor force participation. Kim & Feldman (2000) found that having children to support was positively and significantly related to bridge employment. Retirees who are financially supporting their children, parents or grandchildren will be more likely to engage in bridge employment than retirees who no longer have any dependent relatives.

2.2.3.4 Other factors

Governments can play a crucial role in keeping older workers in the labor market, by facilitating training and avoiding measures that may discourage older people to work. Some of them will be discussed below in this subsection.

Retirement age. The age at which retirement benefits become available can exert a powerful influence on retirement behavior. One of barriers faced by retirees who want to continue working is the fact that in several European Union countries, contracts are automatically discontinued when people reach the statutory retirement age (Eurofound, 2012). A higher retirement age is associated with delayed exit from the labor market (Grigoli et al., 2021). The earliest age at which pension benefits can be first accessed remains potentially an important determinant of retirement decisions both in traditional pension systems with a fixed retirement age as well as those with a variable retirement age, with corresponding actuarial reductions and increases in benefits for earlier and late retirement, respectively.

Early retirement schemes. As it was mentioned above, increasing the early retirement age can extend the employment rate of older people. Calvo (2006) found that an increase in the early retirement age reduces the ability of people to voluntarily decide their labor force participation. Grigoli et al. (2021) found that greater pension generosity seems to encourage early retirement. To sum up, generous early retirement schemes decrease incentives to work.

Private pension schemes. Komp et al. (2010) found that the higher the share of private pensions in a country, the less likely older persons with high occupational prestige are to engage in paid work. Wealthy persons have the means to invest in private pension schemes and, consequently, the possibility to retire early.

Dingemans et al. (2016) showed that retirees with occupational pensions are less likely to continue working after retirement than those with only public pensions. This seems to suggest that a dependency solely on public benefits pushes retirees back into employment to supplement their retirement income. This closely aligns with current ideas in policy discussions on ways to stimulate different forms of supplementary pensions, such as occupational pensions and savings, as a means to make retirees more self-reliant rather than maintain their full reliance on (various forms of) public benefits. However, there is a risk associated with this approach, namely that full retirement may become a reality only for well-off retirees, while those in lower socioeconomic strata may be forced to rely on the fourth pillar of pension income, namely paid work (Bowman, 2013; Larsen & Pedersen, 2013). Those who receive private pensions are more likely to retire fully instead of participating in bridge jobs compared to those who only receive public pensions.

***Generosity of unemployment benefits*.** More generous unemployment benefits seem to mainly depress the participation of those aged 55-64, consistent with a discouragement effect or the use of unemployment benefits system as a path to early retirement (Grigoli et al., 2021). Generous unemployment benefits decrease incentives to work.

Pension deferment. The possible deferral of pensions can make work beyond retirement more attractive. Subsequently, additional accruals are earned over these years, so a higher pension will be received when the retiree decides to start drawing from it. In most European Union countries public pensions can be deferred beyond the standard statutory retirement age. The bigger additional accrual can be earned when postponing pension, the higher likelihood that a person will continue to work.

***Macroeconomic factors*.** Pleau & Shauman (2013), having analyzed US trends and correlates of postretirement employment in the 1977-2009 period, found that macroeconomic forces, such as policy changes, economic recessions, fluctuations in unemployment, and the changing occupational structure, are significant determinants of the employment transitions retirees make. Strong macroeconomic conditions and well-functioning labor markets are especially important for underpinning higher participation rates among older people (Sarfati, 2008). Employment rates among retirees have increased even during the economic and financial crisis. When comparing the third quarter of 2007 with the same period in 2011, employment rates of people aged 65 to 69 increased from 9.9% to 10.5%, including self-employment (Eurofound, 2012). The greater an individual's uncertainty about macroeconomic trends, the less likely he or she is to retire early and the more likely he or she is to accept bridge employment.

2.2.3.5 Factors analyzed for Lithuania

The employment of older people in Lithuania was studied by Gruževskis (2006), Okunevičiūtė-Neverauskienė & Moskvina (2008; 2013), Moskvina & Skučienė (2014), Brazienė & Mikutavičienė (2015), Skučienė et al. (2015), Lengvinienė & Rutkienė (2016), Okunevičiūtė-Neverauskienė & Pocius (2017), Vilkoitytė & Skučienė (2020), Lazutka & Skučiene (2005), etc.

Researchers studying the Lithuanian case found that the gender factor is important in staying in the labor market in old age. The scientists revealed that older people's attitudes to work are also influenced by the gender dimension (Okunevičiūtė-Neverauskienė & Moskvina, 2013; Vilkoitytė & Skučienė, 2020). Older women have poorer employment opportunities, and it is more difficult for them to return to the labor market after career breaks (Okunevičiūtė-Neverauskienė & Moskvina, 2013). Vilkoitytė & Skučienė (2020) found out that women are more likely to work longer than men in agriculture, hotels and education, and in the construction sector, on the contrary, men are more likely to work longer. Thus, women are less likely to do bridge jobs than men.

Studies in Lithuania mention the following factors that determine staying at the labor market in old age: financial situation (pension replacement rate, income per household) (Okunevičiūtė-Neverauskienė & Moskvina, 2008; Moskvina & Skučienė, 2014; Okunevičiūtė-Neverauskienė & Pocius, 2017; Vilkoitytė & Skučienė, 2020), health status (Okunevičiūtė-Neverauskienė & Pocius, 2017; Moskvina & Skučienė, 2014; Vilkoitytė & Skučienė, 2020), opportunity to continue working the same job (Moskvina & Skučienė, 2014), education (Vilkoitytė & Skučienė, 2020), decent working conditions and work-life balance (Vilkoitytė & Skučienė, 2020).

Brazienė & Mikutavičienė (2015) analyzed employers' attitudes on older employees and identified that older workers face barriers to career and prospects at work, in a way that they are becoming more limited in their opportunities for further training, learning, promotion, roles and responsibilities. Older workers are also more likely to face discriminatory employment relationships that lack social justice and respect; they are more likely to be under pressure to retire or are simply unjustifiably dismissed. Lengvinienė & Rutkienė (2016) added that although stereotypical attitudes towards older people are often prevalent (deteriorating health, slower reaction, lower receptivity to innovation), employers often see the benefits of older people in the labor market as well, such as loyalty, reliability, flexibility over time, accumulated experience, a combination of personal qualities and professional competencies. Okunevičiūtė-Neverauskienė & Moskvina (2013)

argued that Lithuania is missing a comprehensive national strategy to ensure quality employment for older people. To solve the accumulated problems of older workers, some authors mentioned that it would be expedient to consider the possibilities of differentiating the retirement age (for example, a lower retirement age should be set for people who work harder in manual work, and a longer retirement age for professionals with higher education) (Okunevičiūtė-Neverauskienė and Pocius, 2017; Vilkoitytė & Skučienė, 2020).

The aim of this thesis is to identify the factors that most influence the decision to stay in the labor market after retirement in Lithuania. The study will differ from the works of other Lithuanian authors in its large amount of data (26.0 thousand retirees and another 18.5 thousand people who were of pre-retirement age during the research) and its data sources – unique administrative microdata and a wide range of variables are used (social insurance benefit factors are included; a survival model is applied to the pre-retirement age employment survey). According to the literature analyzed in this section and considering the available administrative data, factors for Lithuania are analyzed and hypotheses are formulated in section 4. But before analyzing the factors determining the stay in the labor market after reaching retirement age, the thesis will firstly analyze the employment of people of pre-retirement age in Lithuania (section 3). This will allow a more consistent analysis of the factors that affect the employment of older people, as the analysis of the Lithuanian case will show that older work is decisively affected by work history and especially the years before retirement, when the risk of falling out of labor market increases and the opportunity to return to the labor market decreases.

2.3 Models and data used by other authors

In this subsection models and data used by other authors are analyzed to determine which models are suitable for the analysis of the Lithuanian case.

Research on the labor market and pension reforms in the context of an aging population can be separated into two groups: micro-research and macro-research.

The aim of macro-research is to identify the most appropriate measures to reduce the negative effects of aging on the economy (Boersch-Supan & Ludwig, 2011; Braz et al., 2013; Kilponen et al., 2006; Nerlich & Schroth, 2018; Bonenkamp et al., 2017; Baksa & Mukasci, 2016). In macroeconomic research, the most general equilibrium model (Boersch-Supan & Ludwig, 2011; Braz et al., 2013) or overlapping generation model

(Kilponen et al., 2006; Bonenkamp et al., 2017; Baksa & Mukasci, 2016) are used. While the aim of this thesis is to identify factors of bridge employment by individual level, macro-approaches are not analyzed in more detail.

Micro-research helps to answer a question what factors affect a retiree's choice to work in old age, what does work in old age look like, and what the employers' role is in this process. To evaluate incentives to stay in labor force beyond retirement, researchers mostly use different methods of micro econometrics.

Authors use statistical analysis (Maxin & Deller, 2010; Deller et al., 2009), ordinary least squares regressions (Damman et al., 2015; Damman & Henkens, 2018; Damman & Henkens, 2015; Shacklock et al., 2009; Hult, 2008), binary response models (Komp et al., 2010; Leenaars, 2010; Dingemans & Mohring, 2018; Pleau & Shauman, 2013; Aliaj et al., 2016; Pang et al., 2010; Kalwij & Vermeulen, 2008); multinomial logit models (Cahill et al., 2006), tobit models (Radl, 2012) or survival (duration) analysis (Aranki & Macchirielli, 2013; Pleau, 2010; Zucchelli et al., 2007) (Table 5).

Table 5. Methods used by other authors

Method	Authors
Statistical analysis	Maxin & Deller (2010); Deller et al. (2009).
Ordinary least squares regressions	Damman et al. (2015); Damman & Henkens (2018); Damman & Henkens (2015); Shacklock et al. (2009); Hult (2008).
Binary response models	*Logit model*: Komp et al. (2010); Leenaars (2010); Dingemans & Mohring (2018); Pleau & Shauman (2013); Beutell & Schneer (2020). *Probit model*: Aliaj et al. (2016); Pang et al. (2010); Kalwij & Vermeulen (2008).
Multinomial logistic regression	Gobeski & Beehr (2009); Cahill et al. (2006); Kim & DeVaney (2005); Wang et al. (2008); Van Solinge (2014); Dingemans et al. (2016); Bonsdorff et al. (2017).
Tobit models	Radl (2012).
Survival analysis	Aranki & Macchirielli (2013); Pleau (2010); Zucchelli et al. (2007); Reeuwijk et al. (2017); Tatsiramos (2007); Burkert & Hochfellner (2017); Papke (2019); Ciuca & Matei (2010).

Source: compiled by the author

Ordinary least squares regressions are used when responses are ranked in surveys. For example, in Damman & Henkens (2018), fully retired respondents were asked about their level of postretirement work role residuals by using six Likert items with five response options (1 = completely agree to 5 = completely disagree). Binary response models are used when there is an indication in the study whether the person is working or not. Multinomial response models are applied when it is known whether a person works or not after retirement, whether a person works the same as before retirement or goes to work partly, and whether they are engaged in another type of job or self-employment. The tobit model is rarely found. Survival analysis is used when the authors need to analyze the probability of retiring at a given age.

Aranki & Macchirielli (2013) modeled the length of time spent at work before moving into retirement in euro area and EU non-euro area countries. Aranki & Macchirielli (2013) mentioned the main advantage of using duration analysis as being its ability to model the length of time spent in each state (i.e., employment) before moving into another state (i. e. retirement). They used the Cox proportion hazard model, which makes no assumption about the shape of the hazard function or about how covariates may affect this shape.

Pleau (2010) used hazard models that estimated the instantaneous rate, or "risk," of transition into the categorical state of postretirement employment. In Pleau (2010) a hazard ratio is an estimate of the ratio of the hazard rate when the covariate of interest is 1 over the hazard rate when the covariate is 0; it indicates the relative likelihood of postretirement employment at any given point in time for a person with that characteristic, given that the event has not yet occurred. Similar to odds ratios, a hazard ratio greater than 1.00 indicates that the covariate increases the risk, or "hazard," of postretirement employment, and conversely, a hazard ratio less than 1.00 indicates that the covariate decreases the risk of labor force reentry.

Ciuca & Matei (2010) used survival analysis for estimating unemployment duration. They found out that the individuals within the low level of education group have the highest probability of employment; there are no strong differences between women and men's unemployment duration, while the unemployed persons of the 36-45 age group have a higher probability of remaining unemployed.

The majority of authors' studies on older workers and retirement transitions make use of survey data, such as the Survey of Health, Aging and Retirement in Europe (SHARE) (Dingemans et al., 2016; Dingemans & Henkens, 2019; Komp et al., 2010; Kalwij & Vermeulen, 2008; Boersch-Supan et al., 2013; Dingemans & Mohring, 2018), EU Labour Force Survey (Aliaj et al., 2016), Eurostat Survey on Income and Living Conditions (EU-

SILC) (Aranki & Macchirielli, 2013), Health and Retirement Study (Cahill et al., 2006; Pang et al., 2010; Pleau, 2010; Kim & DeVaney, 2005; Wang et al., 2008), or their own surveys (Maxin & Deller, 2010; Deller et al., 2009; Gobeski & Beehr, 2009; Kim & Feldman, 2000; Damman & Henkens, 2018; Damman & Henkens, 2015; Shacklock et al., 2009; Hult, 2008; Damman et al., 2015; Van Solinge, 2014; Mulders et al., 2014; Leenaars, 2010; Beutell & Schneer, 2020) (Table 6).

Table 6. Sources of data by other authors

Sources of data	Authors
The Survey of Health, Aging and Retirement in Europe (SHARE)	Dingemans et al. (2016); Dingemans & Henkens (2019); Komp et al. (2010); Kalwij & Vermeulen (2008); Boersch-Supan et al. (2013); Dingemans & Mohring (2018); Reeuwijk et al. (2017).
EU Labor Force Survey	Aliaj et al. (2016)
Health and Retirement Study	Cahill et al. (2006); Pang et al. (2010); Pleau (2010); Kim & DeVaney (2005); Wang et al. (2008); Papke (2019); Bonsdorff et al. (2017).
Eurostat Survey on Income and Living Conditions (EU-SILC)	Aranki & Macchirielli (2013)
European social survey	Radl (2012)
Authors‘ own questionnaires, interviews	Maxin & Deller (2010); Deller et al. (2009); Gobeski & Beehr (2009); Kim & Feldman (2000); Damman & Henkens (2018); Damman & Henkens (2015); Shacklock et al. (2009); Hult (2008); Damman et al. (2015); Van Solinge (2014); Mulders et al. (2014); Leenaars (2010); Beutell & Schneer (2020).
Household, Income and Labor Dynamics in Australia (HILDA) Survey	Zucchelli et al. (2007)
European Community Household Panel (ECHP, 1994-2001)	Tatsiramos (2007)
administrative data	Burkert & Hochfellner (2017); Ciuca & Matei (2010).

Source: compiled by the author

Research by Lithuanian authors targeting the employment of older people in Lithuania is mainly based on the analysis of statistical data (Okunevičiūtė-Neverauskienė & Moskvina, 2008, 2013; Okunevičiūtė-Neverauskienė & Pocius, 2017) and the analysis of survey results (Vilkoitytė & Skučienė, 2020; Lengvinienė & Rutkienė, 2016; Moskvina & Skučienė, 2014; Brazienė & Mikutavičienė, 2015).

Using survey data has some limitations. Firstly, survey data are limited in sample size. Next, in most of surveys, people report their retirement status or health status themselves and thus may do so incorrectly and subjectively. One of the advantages of using administrative data is no additional need to work with panel attrition and nonresponse, as the data are collected historically through social security notifications.

Administrative data will be used in this thesis. In addition to the benefits of a larger sample size, administrative data contain precise information on characteristics like wages, employment or unemployment periods, periods of sickness and social security transfers. The limitation of the use of administrative data is that data on some factors cannot be collected because they are not the object of SSIF. For example, when analyzing Lithuanian data, family factors will not be considered, as SSIF is not the owner of such data. The data used in the further compilation of each model for Lithuania will be presented separately.

3. PRE-RETIREMENT EMPLOYMENT IN LITHUANIA

The worker's situation prior to retirement influences the transition to retirement and the life after. An analysis of the employment of people of pre-retirement age will allow for a proper assessment of the factors determining the stay in the labor market after retirement. This section consists of two parts. In the first part of this section, the employment trends of people of pre-retirement age in Lithuania are investigated using descriptive analysis. In the second part of this section the survival duration model is further developed to evaluate the duration of participation in the labor market of older people in Lithuania and the factors that influence the stay of pre-retirement age people in the labor market. This second subsection provides a model, describes the data used, and discusses the results of the research.

3.1 Descriptive analysis of people of pre-retirement age

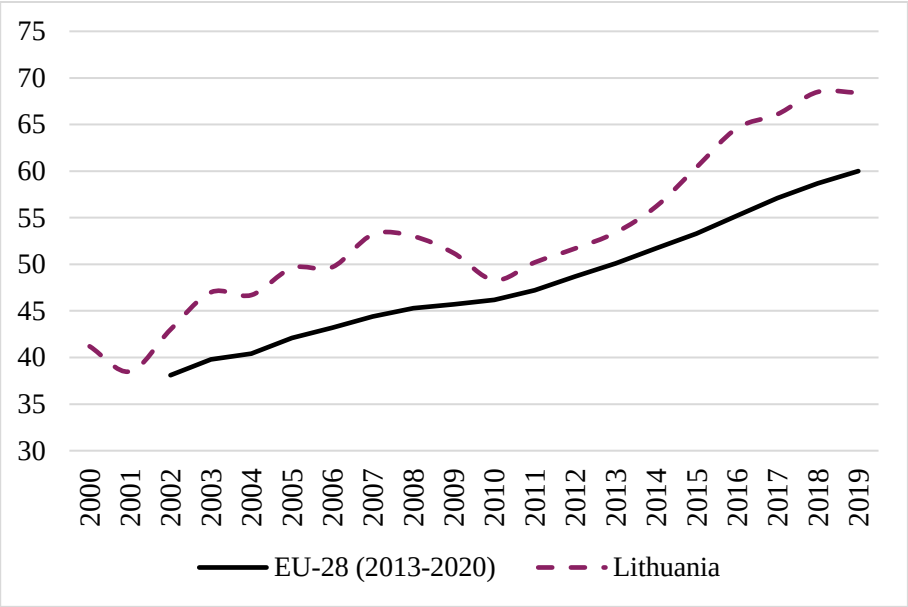
This subsection provides a descriptive analysis with the aim to find out the employment rate of older people aged from 55 to 64 years in Lithuania. This baseline analysis allows for the first time in Lithuania to assess the disability pensions and early retirement benefits as alternatives of work for older people in context of an aging population.

3.1.1 Employment trends in EU-28 and Lithuania

The employment of people of pre-retirement age is increasing. In the European Union, the participation of people aged 55-64 in the labor market is growing since 2002 and has reached 60% in 2019 (Figure 7). In Lithuania, the employment rate of people aged 55-64 in 2019 was 68.4% and was higher than the EU-28 average. During the economic crisis in 2009, the employment rate of this age group decreased in Lithuania, but since 2010 it continues to grow. This is also determined by the increase of the retirement age in Lithuania.

Employment rate of people aged 55-64 years also increased in all EU-28 countries, declining only in Romania (from 52% in 2000 to 47.8% in 2019) (Appendix 5). Employment of people of pre-retirement age is higher than in Lithuania only in Sweden (77.7%), Germany (72.7%), Estonia (72.5%), Denmark (71.3%) and Netherlands (69.7%). The lowest employment of people of pre-retirement age in EU-28 is recorded in Croatia (43.9%), Greece (43.2%), and Luxembourg (43.1%). Thus, in general, the employment of people of pre-retirement age in Lithuania is quite high compared to other EU-28 countries.

Figure 7. Employment rate of people aged 55-64 years (%) in EU-28 and Lithuania, 2000-2019



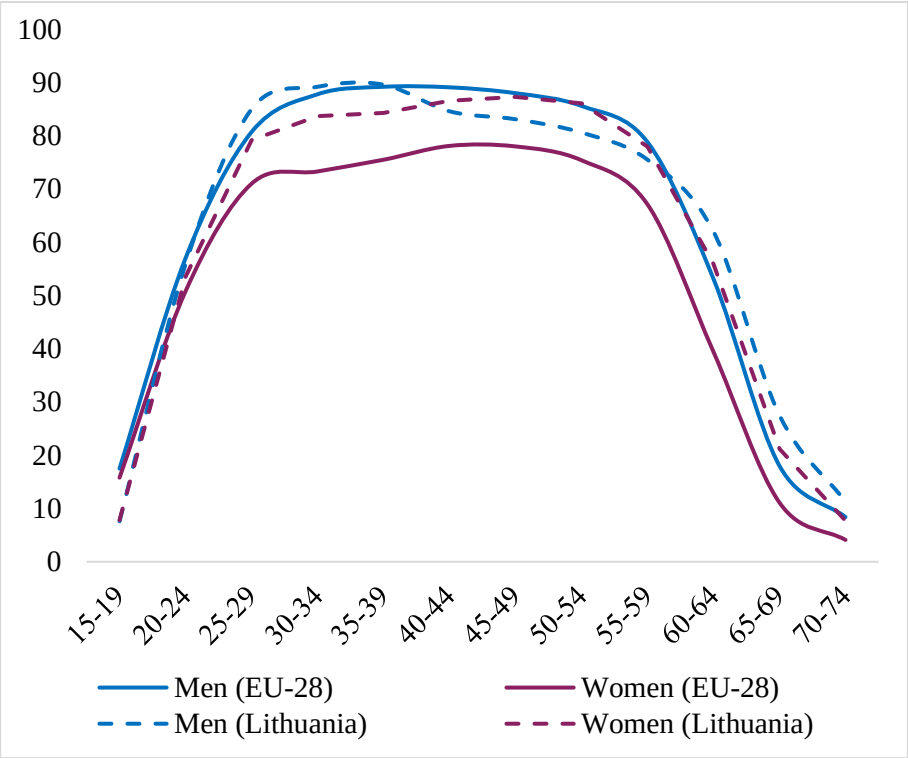
Source: Eurostat

The most common measure adopted in EU-28 countries to tackle with pension sustainability challenge was increasing pension ages with expectation that this would ensure higher employment rate by itself. Statistics show that employment rate of elderly increases in EU-28 countries, but still older people may face many difficulties because of limited work opportunities that will be discussed next.

Activity of older people tends to decrease with age. McNair et al. (2004) show that economic activity drops rapidly around the age of 60, and that the proportion of people still economically active between 60-65 falls to just over a third (35%); 17% of people between state pension age and 69 years are still economically active in Britain. Statistical data shows that in EU-28 countries employment rate decreases around the age of 55-59 years (Figure 8). The employment rate is higher among men than among women in EU-28 countries. Gender differences become apparent around the age of 30-34 years, when women begin to take career breaks to raise children.

In Lithuania, gender differences also become apparent around the age of 30-34 years. At the age of 40-44 the employment rate for men and women are equal. In the later age, the employment of women up to the age of 55-59 even exceeds that of men. Later, the employment of women aged 60 and over decreases, and is slightly lower than that of men.

Figure 8. Employment rate by age and gender (%) in EU-28 and Lithuania, 2019

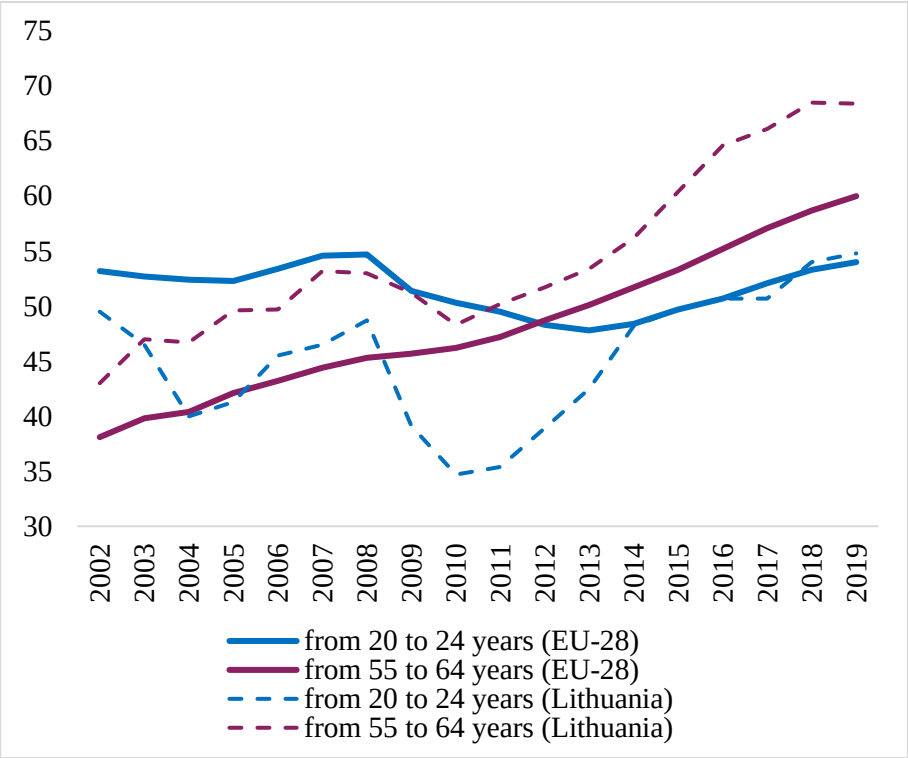


Source: Eurostat

In the European Union, the employment rate of people aged 55-64 has been increasing throughout the period under review since 2002 (Figure 9). Employment of young people aged 20 to 24 has been declining since the 2009 economic crisis but has also been rising since 2014. In the European Union, the average employment rate for people aged 55-64 is 60%, and for young people aged 20-24 it is 54%.

In Lithuania, since 2004, the employment of older people has been higher than that of younger people (Figure 9). After the crisis period of 2009, the employment rate of older and younger people also fell. The employment rate of younger people has fallen more than that of older people. Johnson & Butrica (2012) found that during the economic downturn since December of 2007 to June of 2009 layoffs were less common among older workers who had many years of service with their employers than among their younger counterparts who had less seniority, but older adults took longer to find work when they lost their jobs. During 2009 economic crisis younger workers experienced higher unemployment rates than older ones (Johnson & Butrica, 2012). This is discussed in more detail in subsection 5.2.

Figure 9. Employment rate of people aged 20-24 years and 55-64 years (%) in EU-28 and Lithuania, 2002-2019



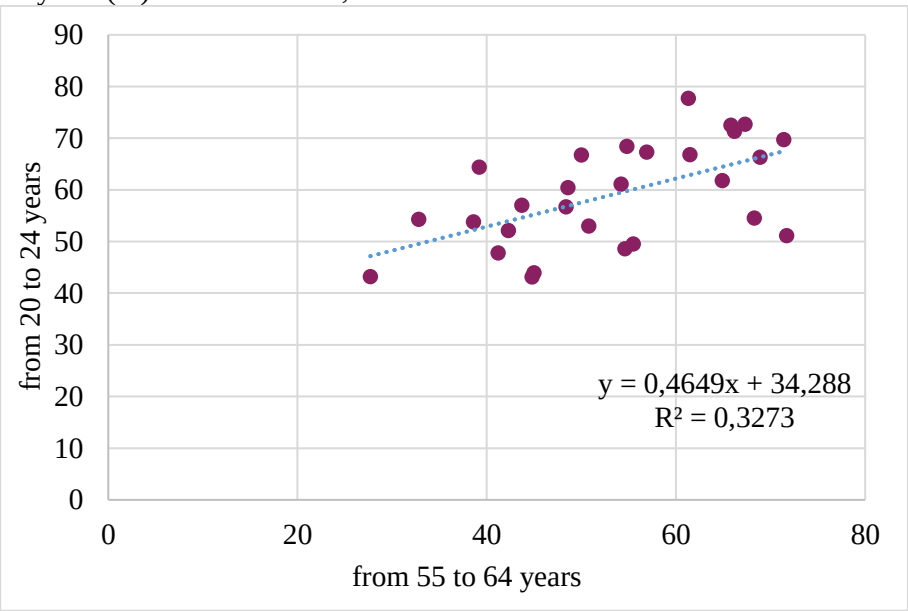
Source: Eurostat

One of the arguments often voiced in debates on extending working life is that the delayed retirement by older workers will result in higher unemployment among the young. Some authors find no evidence that increasing the employment of older persons reduces the job opportunities of younger persons (Munnell & Wu, 2012; Eichhorst et al., 2014; Kalwij et al, 2010). Munnell & Wu (2012) analyzed Chinese data and found that the employment of older people has no impact on labor market outcomes for other age groups. Eichhorst et al. (2014) also showed that there is no competition between young and older workers on the labor market. Kalwij et al. (2010) does not support the hypothesis that the employment of the young and old are substitutes and indicated that encouraging later retirement will have no adverse effect on youth employment. Other authors see some negative connection (Bertoni & Brunello, 2017; Boeri et al., 2016). They studied the case of Italy in increasing the retirement age and assessed the impact of this reform on youth employment. For example, Bertoni & Brunello (2017) indicated that adding one thousand additional senior individuals to the local labor supply reduces employment in the age group 16-34 by 189 units in Italy.

They also argued that the size of the negative effects on youth employment could depend on the selected sample period that is characterized by declining real GDP and stagnant total employment in their case.

Eurostat data on employment in the European Union shows that in countries with a higher employment of older people, there is also higher employment of younger people (Figure 10).

Figure 10. Employment rate of people aged 20-24 years vs. people aged 55-64 years (%) in EU countries, 2019



Source: Eurostat

One of the reasons for such an outcome may be the various labor market measures that can be used to increase employment of youth. For example in 2013 Hungary introduced large scale targeted employers' social security contribution cuts for the young, old, low-skilled, and other marginally attached members of the workforce, called the Job Protection Act. What they found later was that the Job Protection Act was highly effective in the young and low-skilled target groups with high self-financing ratios, while it was only marginally effective in the old target group. Thus, it is likely that it may be easier for countries to influence the employment of young people through a variety of measures than that of the old, as many approaches and certain stigmas exist. It is not easy to assess strictly the impact of the increase in older employment on youth employment; a separate analysis is needed here, which is not the main goal of this dissertation.

Thus, in summary, the employment of older people is growing both in other EU-28 countries and in Lithuania. The employment rate for men is higher than for women but the employment rate for both is declining with age. After increasing the retirement age, the employment rate increases, but if the situation of the elderly in the labor market is difficult, then increasing the retirement age will not necessarily lead to an increase in employment. Fears that older workers are displacing young people are not very valid, because where employment is higher among older people, it is higher among young people too.

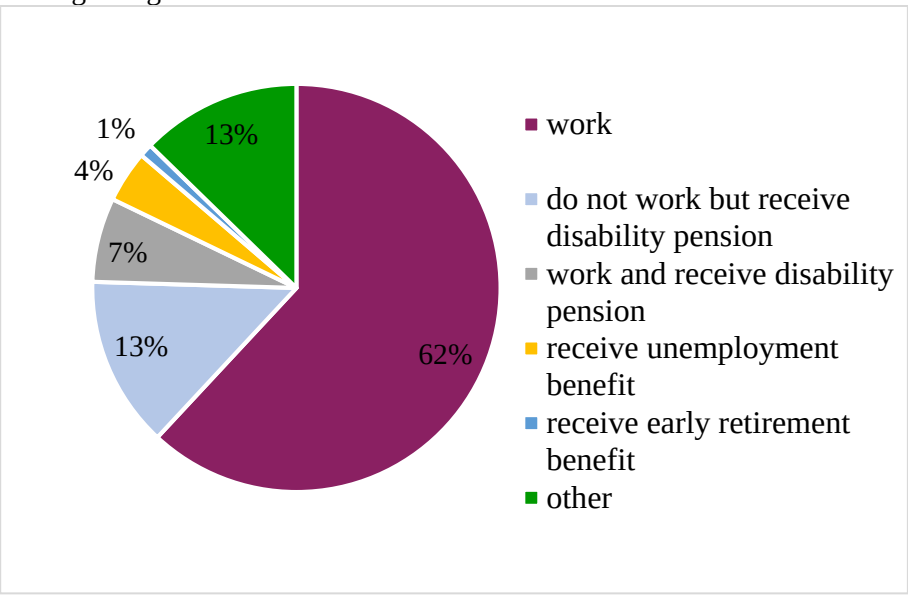
3.1.2 The employment of older people in Lithuania

To analyze the employment of older people, it is assessed what proportion of these people are working and what proportion have left the labor market and receive some social insurance benefits. Later, both those in employment and those receiving benefits are discussed separately by analyzing the trends and situations of these people. The structure of employed older people is analyzed simultaneously using the data of Statistics Lithuania on the number of older people in Lithuania at the beginning of 2020 and by checking the proportion of these people who receive one or another social insurance benefit. The data about people who work includes only employees, while self-employed people fall into the category called "others."

The analysis of those in employment and those receiving benefits below is based on time series as longer as possible, which allows for a detailed analysis of trends in the number of beneficiaries of social insurance benefits and the employment of older people. Moreover, in the descriptive part of the health situation of older workers in Lithuania, cases of the sickness with paid sick leave certificates from SSIF are analyzed. Thus, it is important to emphasize that cases of sickness that are not covered by the SSIF are excluded. Although it should be mentioned that according to the data of Statistics Lithuania, in 2020 there were 1,725 thousand people of working age in Lithuania, while 1,447 thousand people were insured with state social insurance, according to SSIF. Thus, the insured cover about 84 % of people of working age population. Thus, the analysis of the data identified certain trends in employment and the morbidity of older people, which are reviewed below.

Older people are quite active in the labor market, but one in five of pre-retirement aged people has a disability in Lithuania. Statistical analysis shows that the biggest share (62%) of people of pre-retirement age (55-64 years) are active in the labor market, but the remaining part (38%) do not work or work but also receive form of some benefits (Figure 11).

Figure 11. Employment of people of pre-retirement age in Lithuania (%) at the beginning of 2020[1]



Source: Statistics Lithuania and SSIF, author's calculation

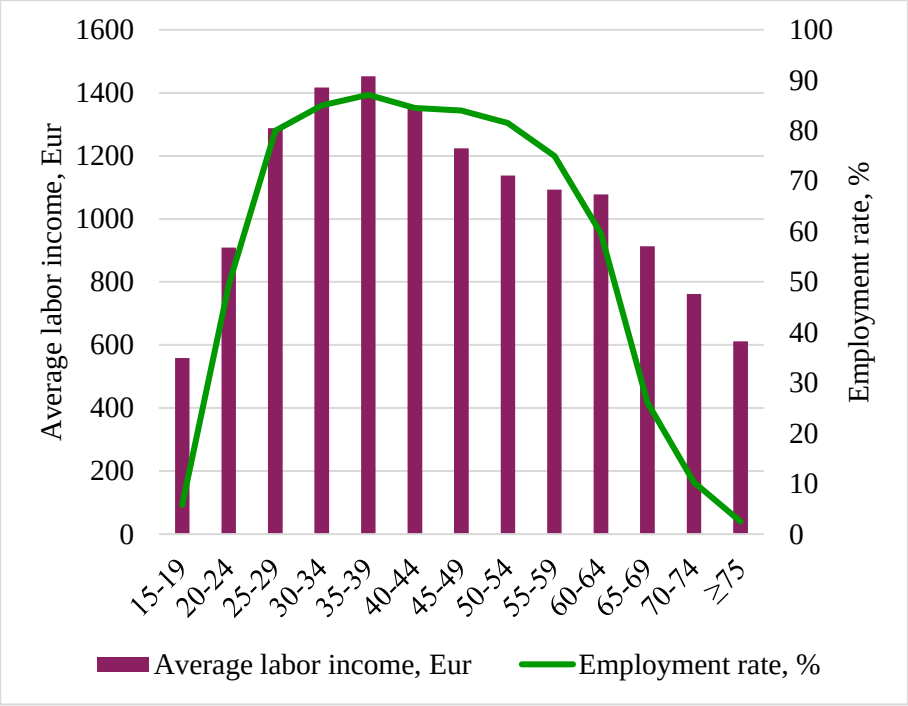
Thirteen percent of pre-retirement age people in Lithuania do not work but receive disability pensions, and 7% both work and receive disability pensions. Together, 20% of people of pre-retirement age receive disability pensions. This large number suggests that the disability pension in Lithuania is one of the more viable alternatives to labor income among older people, and reminds us at the same time that maintaining working capacity in old age is difficult due to health problems. Four percent of people analyzed receive unemployment benefits. About 1% of elders receive early retirement benefit. The rest 13% of the elderly are neither recipients of social insurance benefits nor employees. For example, these people can be long-term unemployed or recipients of social assistance benefits, but this remains undefined within the framework of this thesis.

As it was mentioned above, the employment increases until 35-39 years of life until it reaches its highest point at 87% (Figure 12). When people reach 35-39 years, their employment rate begins to decrease and in the 55-59 age period it falls to 76.9%. This correlates with McNair's (2004) results saying that employment is decreasing with age and drops rapidly around the age of

[1] In 2020, the retirement age for men is 64 years and for women 63 years. Therefore, men aged 55-63 and women 55-62 are included.

60. Not only the employment rate, but also the amount of labor income depends on age. When the employment rate is at its highest, at ages 35-39, the average labor income is the highest. When a person is 55-59 years old, their wages fall by 25% compared to those who are 35-39 years old.

Figure 12. Employment rate (%) in 2020 and average labor income of employees working full month (Eur) in January of 2020



Source: Eurostat and SSIF

Employment opportunities can be determined by the choice of occupation and the sector which people work in. Statistical data shows that the share of older workers in the budget sector is higher than in the non-budget sector. Older workers aged 55-64 hold a share of 32% of all employees in the budget sector, while in the non-budget sector older employees hold a share of 20% of all employees. This shows that in Lithuania the budget sector is more friendly for older workers and people see this sector as more desirable to work in when they reach old age.

Analyzing employment of older people by occupation, we see the largest share of the elderly (>45-50% of employees) being among unskilled workers, housekeepers, cleaners, bus drivers. The smallest share (<5% of employees) of the elderly is among waiters and various IT specialists (including application developers, IT, and communications services sales

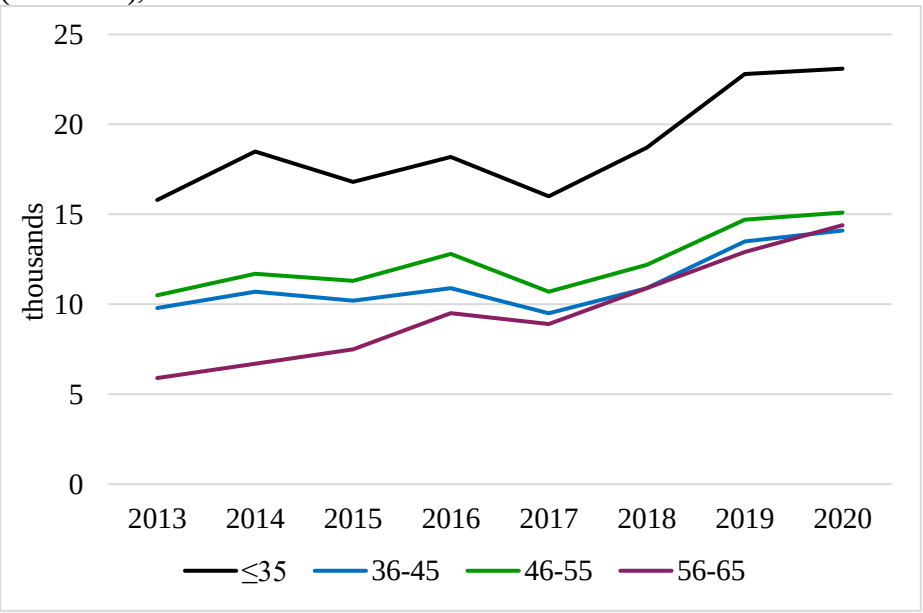
specialists). The low participation of older people in the information technology sector shows that older people seem to feel it more difficult to work in new economic activities. Among the reasons why this may be the case in Lithuania, there are also reasons mentioned by other authors (Villosio et al., 2008; Bussolo et al., 2015; Eurobarometer, 2012), such as the lower tendency of older people to learn, less interest in new challenges, and slower adaptation to new technologies.

Moreover, a significant proportion of older workers are among managers: one third of managers are older than 55 years. Most senior executives are (40-60% of employees) among municipal elders, childcare managers, education leaders, health service executives and legislators. The least senior executives are among (20% of employees) advertising and public relations executives, managers in the field of information technology and communications services, human resources managers, and heads of financial and insurance services. These facts show that for older workers it is easier to lead in fields where experience is more appreciated, but older workers feel not as comfortable in new fields where added value is growing rapidly and where new knowledge and skills to work with changing technologies are needed. This poses major challenges for Lithuania, as with the aging of population and the rapid change in technology, people should be able to upgrade their skills, adapt faster to changing job requirements and remain in demand in the labor market. However, a more detailed analysis would be useful to evaluate the impact of the technology and digital economy on older people (55+).

Facing unemployment in older age can be painful and takes more time to overcome than at a young age. Although most unemployment benefit recipients are young people, the number of senior unemployment benefit recipients has been growing most rapidly during the last years (Figure 13).

The number of recipients of unemployment benefits has increased among all age groups since the second half of 2017 due to legislative changes, when the conditions for payment of unemployment benefits were extended, length of service requirements were reduced, the benefit was increased, and the duration of its payment was extended. In the overall structure, senior recipients increased from 17% in 2013 to 23% in 2019. All these changes can be explained by the aging population, because in the structure of population the share of older people aged 55-64 has increased by the same 6 percentage points.

Figure 13. Number of unemployment benefit recipients by age groups (thousands), 2013-2020



Source: SSIF

Older people look for a job longer than younger ones. In 2020, the average duration of unemployment benefit payment was 4.8 months (in 2019 – 4.9 months). Older people aged 55-59 received unemployment benefits for almost 5.6 months, and people aged 60-65 years received them for almost 6.5 months on average. Legislative changes have had an impact here as well. For example, before the amendments to the law in June 2017, the average benefit period for people aged 55-60 was 4.6 months, while a year later, in 2018, the benefit duration for people aged 55-60 was 5 months.

To sum up, the rise in the number of older people among the recipients of unemployment insurance benefits is more related to the aging population than to the greater incidence of unemployment among these people. However, it is noticeable that older people tend to receive unemployment insurance benefits for a longer period than the younger people, indicating that elders are in a more difficult position in the labor market. The reasons why people of pre-retirement age are less active than at an earlier age will be discussed in detail below, with a stronger focus on the health factor and the discussion of pre-statutory norms, such as the option of early retirement.

3.1.3 Health problems and disability limit opportunities to work

One of the reasons why it is harder for people to work in older age are health problems. Older workers are more likely to receive longer-term sick pay than the younger ones (Table 7). Table 7 is prepared by showing the diseases that affect people in that age group the most (most cases during 2019) and by indicating the average duration of receiving the sickness benefit for those diseases. Older people are more likely to suffer from diseases that have more serious consequences, such as lumbar and heart disease. Meanwhile, younger workers are more likely to be sick with shorter-term, seasonal illnesses, for example, flu or colds.

Table 7. Top 5 diseases with paid sick leave certificates from SSIF budget, 2019

No.	Top 5 diseases	Average duration of one case (days)
25-54 years old		
1	Respiratory diseases, bronchitis	5.0
2	Acute tonsillitis	5.0
3	Acute pharyngitis	4.8
4	Acute nasopharyngitis (colds)	4.9
5	Flu with other respiratory lesions	5.4
55-64 years old		
1	Respiratory diseases, bronchitis	6.5
2	Diseases of the lumbar and other intervertebral discs with radiculopathy	25.4
3	Lumbar and sacral nerve root disorders, not elsewhere classified	16.0
4	Hypertensive heart disease without heart failure	10.3
5	Flu with other respiratory lesions	6.2

Source: SSIF, compiled by the author

Overall, the average duration of illness paid from SSIF for employed persons aged 25-54 years is 9.7 working days, while the average duration of illness for employed persons aged 55-64 years is 18 working days (13.9 and 17.7 working days in 2020, respectively). Longer periods of illness lead to more distraction and, in the long term, reduce the chances of staying in the labor market for longer. To sum up, older workers are sick for longer and they have more severe, chronic, and age-related diseases. Thus, the health status is an especially important factor restricting the employment of older people.

If people have more severe health problems, they can face work incapacity. Persons who have lost 45% or more of their capacity for work and have a minimum seniority may be entitled to a disability pension. The number of people receiving disability pensions has increased since 2000 and reached the peak during the period of 2009-2010 (Figure 14). Among all beneficiaries of disability pensions, almost 68% are older than 55 years. So, the probability to face incapacity increases very strongly when people reach 55 years.

Figure 14. Recipients of disability pensions (thousands), 2000-2020

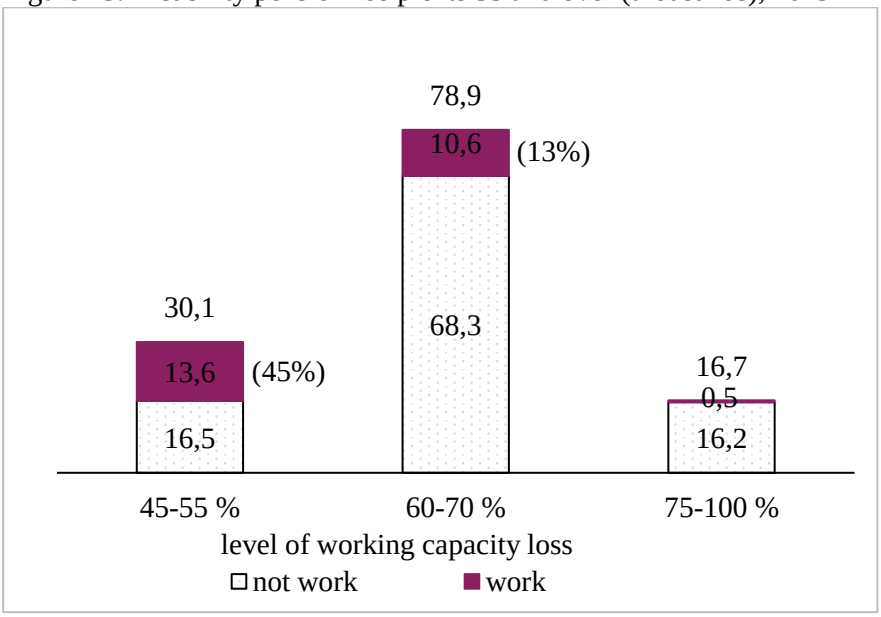
Source: SSIF

During the last 8 years the number of people receiving disability pensions has decreased. This decrease in a period of 2011-2017 was affected by many factors, including improving health, more strictly described disability determination procedures and economic growth. There are also changes in legal norms that have reduced the number of recipients of disability pensions in recent years. From 2019, amendments to the Law on Social Insurance Pensions came into force based on which when a person who has previously received a disability pension reaches retirement age, he or she becomes a beneficiary of an old-age pension (Social Insurance Pensions Law No. I-549 Law amending articles 6, 8, 19, 33, 59 and 60, date of amendment - 11/12/2018). As a result, the number of beneficiaries of disability pensions is declining. In 2020 there were 165 thousand beneficiaries of disability pensions in Lithuania. Sixty percent of all disability pension beneficiaries are aged 55-

65, 17% – aged 50-55, 10 % – 45-50, 6% – 40-45, and the remaining 8% are younger than 40.

More people with disabilities stay in the labor market and work. According to SSIF, one third of beneficiaries of disability pension still work. Participation in the labor market among the older recipients had increased from 18% in 2010 to 31% in 2019. Opportunities to work depend on the level of working capacity loss. Among older people who have lost 45-55% of their working capacity, almost half still work (45%). Among those who have lost 60-70%, those working comprise only 13%. Finally, almost all people who have lost most of their working capacity (75-100 %) do not work (Figure 15).

Figure 15. Disability pension recipients 55 and over (thousands), 2019



Source: SSIF

Disabled people in Lithuania earn 30% less than others. Most disabled people work as cleaners and housekeepers. Their average income is 16% less as that of others (Table 8). Disabled workers working as corporate executives earn 30% less than other corporate executives. There is also a significant difference in labor income between accountants and nursing professionals, with disabled people earning 13-19% less than others.

Table 8. Top 10 occupations of disabled people according to the number of employees

Occupation	Difference in labor income compared to all employed, (%)
Cleaners and housekeepers	-16%
Shop sellers	-12%
Unskilled workers	-6%
Heavy truck drivers	0%
Corporate executives	-30%
Nurses	-13%
Security staff	-16%
Accountants	-19%
Primary and secondary school teachers	-9%
Taxi drivers	-16%

Source: SSIF

Disabled heavy truck drivers and unskilled workers earn almost as much as the rest of the workforce. The small differences in unskilled labor income are attributable to paying a minimum wage to these people, not to productivity. These jobs are low-paid, so both disabled and non-disabled workers work for the same minimum monthly wage. The incomes of heavy truck drivers often do not reflect the real income, as they receive a large share of their labor income from non-taxable daily allowances. Data about daily allowances is not collected in official statistics because, as they are not taxable. Thus, it is difficult to compare the labor income of heavy truck drivers, as their potential real labor income is probably much higher than that seen in official statistics. Therefore, it is possible that the labor income of disabled people in this area is lower as well.

Therefore, the number of beneficiaries of a disability pension is decreasing in Lithuania, and people with disabilities are more active in the labor market. Although the income earned by disabled people from work is one third lower than others, the total income from the pension and wage (which is subject to a higher tax-free rate) is almost equal to the national average net income. For example, the average labor income for all employed persons was 811 euros, and for disabled people total income (wage plus pension) was 795 euros in the end of 2019. Thus, the social security system compensates lost income, and working disabled people may receive income close to the average labor income of the country, but a large proportion of the disabled people do not work at all, and their only source of income is disability pensions. This shows that these people face barriers to entering the labor

market and this results in these people having low incomes. This issue of employment should be better addressed, while disability itself interpreted in detail, as there will certainly be a number of cases where disability restricts one activity but does not really prevent another (for example, an individual unable to do manual work due to a disability may have the capacity for mental work). The society and policy makers should pay more attention to the employment of disabled people, as it is important not only as a source of income but also as a means of self-realization and feeling like full-flegded members of society.

3.1.4 Early retirement hides the problem of unemployment

In Lithuania a person is eligible for early retirement pension if he or she is less than 5 years before retirement age, has an obligatory retirement record, has no other income, and does not receive any other pension or benefit. Until 2021, a reduction of 0.4% has been applied for each month remaining until the retirement age, and after reaching the retirement age – for each month of receiving an early retirement pension. The thought of taking an early retirement benefit can look as an attractive opportunity to get an early leave from work, but it is worth pointing out that such a pension was being reduced. The early retirement pension was decreased by 0.4% per each early retirement month. After reaching the standard retirement age, the reduction was recalculated according to the number of months for which an early pension was paid; therefore, receiving an early retirement pension decreased old-age benefits. In September of 2019, the average early old-age pension was 250 Eur (one third less than the average old-age pension with the required record, which was 365 Eur). Since 2021, when calculating the amount of the early retirement pension, a reduction of 0.32% is applied for each month remaining until the retirement age or for each month of receiving the early retirement pension. Since 2021 amendments were adopted by the parliament according to which old-age pension is no longer reduced for long-term employees who have received an early retirement pension for no more than 3 years and have acquired a long pension insurance record (in 2021 not less than 40 years) at the time of granting this pension.

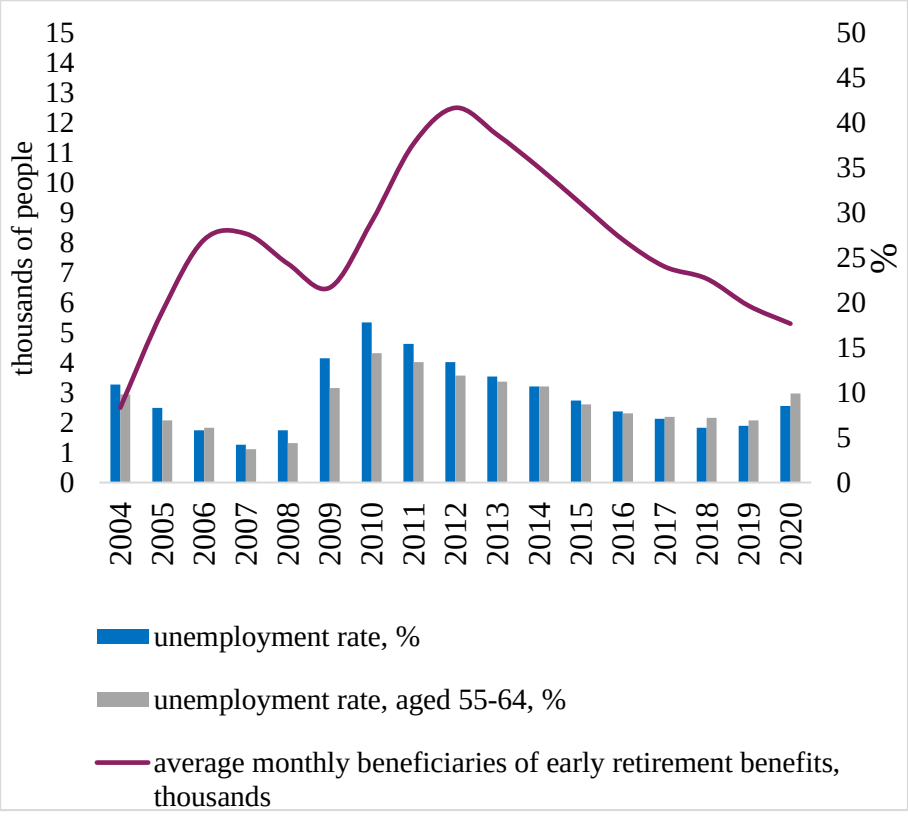
The early retirement scheme in Lithuania is similar to that in many EU countries. According to the MISSOC database,[2] in 17 of 27 countries early retirement benefits are reduced by fixed percentages (Austria, Croatia,

[2] Source: https://www.missoc.org/missoc-database/comparative-tables/results/

Cyprus, Czech Republic, Estonia, Finland, France, Germany, Greece, Italy, Latvia, Portugal, Romania, Slovakia, Slovenia, Spain, Lithuania), in 5 countries there is no early pension (Denmark, Ireland, Malta, Sweden, The Netherlands), in 2 countries (Hungary and Bulgaria) some different conditions exist, and in 3 countries no particular conditions exist for these pensions (Luxembourg, Poland, Belgium).

The scale of early retirement beneficiaries in Lithuania is small, but those receiving the pensions choose this alternative because of their inability to stay in the labor market. In Lithuania about 7 thousand people each year take up early old-age pensions, and this represents about 1% of all retirees. According to Eurostat, the beneficiaries of early retirement pensions make up about 1.7% of all pension beneficiaries in EU-27 countries. In Lithuania, the number of early retirement benefit beneficiaries increased after the financial crisis from 6,5 thousand in 2009 to 12,5 thousand in 2012 (Figure 16).

Figure 16. Average monthly beneficiaries of early retirement benefits (thousands) and unemployment rate (%), 2004-2020



Source: SSIF

This increase supports the idea that the correlation between early retirement benefit beneficiaries and the economic cycle is strong. Unemployment is rising in times of economic recesions, people of pre-retirement age are more likely to apply for an early retirement pension, and conversely, as the economy rises, unemployment is falling and people of pre-retirement age are less likely to be unemployed and do not opt for this pension.

On average, an early retirement pension is chosen three years before retirement; 27% of new early retirement benefit recipients receive their pensions 4-5 years before retirement, and just under 20% of new beneficiaries receive benefits 3, 2, or one year before retirement (Table 9). The proportions do not differ significantly between men and women.

Table 9. New beneficiaries of early retirement pension by years remaining until retirement age in 2019, (%)

Years	2019		
	Men	Women	Total
less than 1 year	16	15	15
1-2 years	18	20	19
2-3 years	17	19	18
3-4 years	20	20	20
4-5 years	29	26	27
Total	100	100	100

Source: SSIF

On average, 56% of beneficiaries of early retirement benefits do not have any labor income at all one year before they have been entitled to the benefit, and the other 44% of beneficiaries of early retirement benefits have very low income. For example, in 2017 their labor income was 450 Eur, when the average labor income of all employees was about 730 Eur. On average, beneficiaries of early-retirement benefits, before receiving this benefit, work as cleaners, housekeepers, shop sellers or sweepers, i.e., they are employed in unskilled or less-skilled work.

The vast majority (80%) of early-retirement benefit beneficiaries, before receiving this pension, are employed in the non-budgetary sector. This again demonstrates that the added value of the budget sector is due to its demonstrated sensitivity to employees. Older people facing unemployment are more likely to have worked in the non-budgetary sector, and unemployment is also the reason for choosing to get early retirement benefit when other sources of finance are lost.

Thus, in the pre-retirement age, some people become early retirees, or disability pension beneficiaries, or face unemployment – all of these

challenges are serious enough, and their occurrence at pre-retirement age is an important indicator of increasing difficulty in staying in the labor market with age. In the next section, a survival analysis will be conducted to examine the duration of survival of people of pre-retirement age in the labor market and the factors that lead to that labor market destiny being shorter than it might be.

3.2 Survival model for employment duration after 55 years

This subsection features the methodology for the survival analysis of employment duration in pre-retirement age. Sourced from guidance detailed in the literature review, a model to measure the probability of staying in the labor market after 55 years in Lithuania is considered. Firstly, a survival model is presented with its main features and limitations. Then data which are used in the case of Lithuania are discussed. Finally, the results of the survival model are presented.

3.2.1 Survival model

Econometric models of durations are models of the length of time spent in a given state until a certain event occurs (Cameron & Trivedi, 2005; Wooldridge, 2001). Survival analysis has many synonyms depending on the area in which it is used: *survival analysis* (length of time survived) in biostatistics, *failure time analysis* (length of time to failure of an item such as a light bulb or a machine part) in operations research, *life table analysis* in demography and actuarial studies (where leaving a state corresponds to death), and *hazard analysis* in insurance and accident theory (Cameron & Trivedi, 2005). In the work of other researchers examining persons' transitions from employment into retirement, this econometric model is called *a hazard based duration model* (Aranki & Macchiarelli, 2013; Pleau, 2010; Zucchelli et al., 2007; Tatsiramos, 2007; Papke, 2019; Reeuwijk et al., 2017; Burkert & Hochfellner, 2017). The main advantage of using survival analysis is that it allows modelling the length of time spent in a given state (employment) before moving into another state (retirement). Relative to other approaches such as those that focus on the unconditional probability of an event taking place (probit or logit models), focus here is on the conditional probability, or the probability that the spell of one particular status (employment) will end in the next period, given that it has lasted until recently. In this thesis, transitions out of work of people aged 55 will be analyzed over the period 2010-2020 in order to investigate the determinants of leaving labor market based on SSIF administrative data. But first, the survival model is presented in detail based on Cameron & Trivedi (2005), Wooldridge (2001) and Kartsonaki (2016).

Subjects in survival or duration analysis are tracked until an event happens (withdrawal from the labor market in the case of this research), or they are lost from the sample (censored observations, for example, death). Survival data are usually censored, as some spells are incompletely observed. Data may be right-censored, left-censored, or interval-censored. For right censoring, spells are observed from time 0 until a censoring time c. Some spells will have ended by this time anyway (completed spells), but others will be incomplete and all that is known is that they will end some time in the interval (c, ∞). Left censoring or censoring from below occurs when spells are known to end at some time in the interval $(0, c)$ but the exact time is unknown. Interval-censoring occurs when the completed spell length is observed but only in interval form such as in $[t_1^*, t_2^*]$ (Cameron & Trivedi, 2005).

Researchers analyzing employment duration are interested in how long people stay in the labor market and their risk of failure (hazard rates). So, recent treatments of duration (survival) analysis tend to focus on the hazard function. This function helps to approximate the probability of exiting the initial state within a short interval, conditional on having survived up to the starting time of the interval. Interpreted simply, the hazard rate is the probability that the event (withdrawal from the labor market) will happen at time t given that individual is at risk at time t.

Let T ≥ 0 denote the duration, which has some distribution in the population and t denotes a particular value of T. In survival analysis of employment duration after 55 years, T will be the length of time, measured in months, an individual receives labor income, it means he or she is employed.

It makes sense to conceptualize the length of each individual $j's$ employment spell as a random variable, T_j. Assuming T_j has a continuous probability distribution $f(t)$, where t is a realization of T_j, the cumulative distribution function of T is defined as:

$$\mathrm{F(t)} = \Pr(T_j \leq \mathrm{t}) = \int_0^t f(s)ds\,,\ \mathrm{t} \geq 0 \qquad (1)$$

Then the survival function for the *j-th* individual, or the probability that individual's employment spell T is of length at least equal to t, is:

$$\mathrm{S(t)} = 1 - \mathrm{F(t)} = \Pr(T_j > \mathrm{t}) = \int_t^\infty f(s)ds \qquad (2)$$

Conversely, the hazard rate (or instantaneous failure rate) for individual j at time t, is defined instead as the marginal probability of immediate leaving labor market, conditional on not leaving the labor market before time t:

$$h(t) = P\left(t < T_j < t + dt \middle| T_j > t\right) = \frac{f(t)}{1-F(t)} = \frac{f(t)}{S(t)} \quad (3)$$

That is, the higher the hazard, the lower the survival. Nonparametric estimation helps to see the shape of hazard or survival functions before parametric models with regressors are applied. In this study, the Kaplan-Meir and Nelson-Aalen estimators are applied to estimate hazard function.

The Kaplan-Meier method is a non-parametric method used to estimate the survival probability from observed survival times (Kaplan & Meier, 1958). It re-estimates the survival probability each time an event occurs. Kaplan-Meier curves can be used in simple analyses of which the aim is to compare survival times of two or more generally a small number of groups (Kartsonaki, 2016).

Another possible objective of the analysis of survival data may be to compare the survival times of two or more groups (Kartsonaki, 2016). A simple test of statistical significance is the log-rank test. It tests the hypothesis that survival functions of analyzed groups are equal. The log-rank test statistic compares the observed with the "expected" number of failures and has an asymptotic distribution under the null hypothesis (Kartsonaki, 2016).

For each duration, the number of observations at risk n_j and the number of events d_j can be determined. In non-parametric models the hazard function is calculated as the number of events as a proportion of the number of observations at risk:

$$\lambda(t_j) = \frac{d_j}{n_j} \quad (4)$$

Nelson-Aalen estimator of the cumulative hazard function is calculated by summing up hazard functions over time:

$$\Lambda(t_j) = \sum \frac{d_j}{n_j} \quad (5)$$

The Kaplan-Meier estimator of the survival function takes the ratios of those without events over those at risk and multiply that over time:

$$S(t_j) = \Pi\left(\frac{n_j - d_j}{n_j}\right) \quad (6)$$

An alternative basis for estimation and testing in survival analysis is the use of parametric models. Parametric methods are methods in which assumptions are made about the patterns of survival times (Kartsonaki, 2016). The hazard, as a function of time, has a particular type of shape, with its exact

shape being determined by one or more parameters which are estimated using the observed data. Some commonly used distributions in survival analysis are the exponential, the Weibull, and the log-logistic distribution (Cameron & Trivedi, 2005; Wooldridge, 2001; Kartsonaki, 2016).

One of the objectives of the analysis of survival data might be to examine whether survival times are related to other features. As Kartsonaki (2016) mentions, regression models can be used to assess the effect of covariates on the outcome. For this purpose, Cox proportional hazard model is widely used. A parametric survival model is one in which survival time is assumed to follow a known distribution (for example, the Weibull, the exponential (a special case of the Weibull), the log-logistic, the log-normal, etc.). The Cox proportional hazards model, by contrast, is not a fully parametric model. Rather it is a semi-parametric model, because even if the regression parameters are known, the distribution of the outcome remains unknown. The baseline survival function (any shape or form) is not specified in a Cox model. A Cox proportional hazards model has the form:

$$h(t;x) = h_0(t)e^{\beta x}\,, \tag{7}$$

where h_0 is the baseline hazard, x is a covariate and β is a parameter to be estimated, representing the effect of the covariate on the outcome. The baseline hazard is the hazard when, in the case of a single covariate, the covariate is equal to zero. As Kartsonaki (2016) emphasizes, the main assumption implied is the proportional hazards assumption is that the hazard ratio, that is the ratio of the hazard function to the baseline hazard, is constant over time. The use of the exponential function ensures that the hazard is positive (Kartsonaki, 2016). The hazard rate in the Cox proportional hazard model for the case of Lithuania is defined as:

$$h(t) = h_0(t) \times \exp(\beta_1 x_{gender} + \beta_2 x_{wage} + \beta_3 x_{sick} + \beta_4 x_{unemployment} + \beta_5 x_{disability} + \beta_6 x_{occupation}) \tag{8}$$

where, t represents the survival time on staying at labor market, *h(t)* is the hazard function determined by a set of x covariates (x_{gender}, x_{wage}, x_{sick}, $x_{unemployment}$, $x_{disability}$, $x_{occupation}$), the coefficients ($\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$) measure the impact (i.e., the effect size) of covariates on the staying at labor market. A positive coefficient means that as the independent variable increases, the time-to-event decreases (lower duration or more likely for the event to happen). A hazard rate of greater than 1 means that it is more likely

for the event to happen. For example, a hazard ratio of 2 (0,5) means that for a one unit increase in the x variable, the hazard rate (probability of event happening) increases by 100% (decreases by 50%).

***Limitations of survival models*.** Emmerson & Brown (2021) mention that survival or duration analyses have many strengths, but there are some cases where they are not feasible to use or cannot provide reliable results. Large sample sizes may be required to adequately power a comparison between the analyzed groups. The sample size may also need to be increased to observe sufficient events if the likelihood of subjects experiencing an event is small or if a large amount of dropout is anticipated (Emmerson & Brown, 2021). In the case of the Lithuanian survey, the population is large and the period under consideration is long, covering the retirement age, when most respondents leave the labor market, so these restrictions are likely to be avoided.

3.2.2 Data

As mentioned in subsection 3.1.1, labor market participation declines with age. Older workers face greater health problems, challenges in a rapidly changing labor market, and a lower desire to pursue new training. On the other hand, the employment rate of older workers is sometimes underestimated, and older workers have significant advantages, for example their job experience that they can share with younger labor market players. This study analyzed people aged 55 and how their employment rate changed over 10 years. The study allows to assess how the employment differs depending on people's gender, occupation, health, earned income and received social insurance benefits. One of the shortcomings of this study can be considered the fact that only one cohort was analyzed, and different cohorts may have different traits.

Eighteen point five thousand people who were born in 1955 and worked in 2010 when they were 55 years old were included into the model. Monthly data was collected for ten years from January 2010 to November 2020. Subjects were selected for the study based on whether they were employed in January 2010, whether they were 55 years old, and whether all complete data collected for the study were available for these individuals. The year 2010 was chosen for the study to analyze how the employment of employees aged 55 changes in the labor market over the years, and it was desired to have as long period as possible to evaluate employment in the pre-retirement age. For men born in 1955, the retirement age was 63 years and 8-10 months depending on the month of birth. For women born in 1955, the retirement age was 61 years 8 months or a full 62 years depending on the month of birth. Therefore, the

study covered individuals until their 65 years of life, which for some individuals was from two to three years after retirement.

The dependent variable in this model is the duration of time an individual works after the age of 55, expressed in months. Independent variables in this model are gender, wage (in January of 2010), sick cases (2005-2009), the disability factor (2005-2009), unemployment factor (2013-2020), and occupation (nine major occupational groups, ranging from unskilled workers to managers). These factors will be discussed in detail below.

Gender. It is known from the literature analysis that women face greater challenges in the labor market, so a gender factor has been added to this model to measure the duration of working life after the age of 55 separately for men and women. A value of 1 was assigned to men and a value of 0 was assigned to women. Ten point eight thousand women and 7.7 thousand men were included in the model.

Wage. Wage received in January 2010 was included into the model to compare the starting positions of individuals. In January of 2010, all subjects, included into the model, were employed and were 55 years old. People were divided into five categories according to the wage they earned: *(1)* less than or equal to 232 Eur (minimum monthly wage), *(2)* 233-577 Eur (average wage), *(3)* 578-1154 Eur (two average wages), *(4)* 1155-1731 Eur (3 average wages) and *(5)* more than 1731 Eur.

Sick factor. To measure the impact of health on participation in the labor market at the age of 55, the study collected data on the number of cases of the sickness covered by SSIF during the last five years, until the person turned 55 years. A value of 1 was assigned to the sickness factor, if an individual had more than 5 cases of the sickness in five years, and a value of 0 was assigned to the sickness factor when an individual had less than or equal to 5 cases of the sickness in five years, thus distinguishing between more and less sick. 5 cases were chosen experimentally determining when the factor influence is most statistically significant.

Disability factor. Another indicator of health and employment is the disability factor. To measure the effect of disability on staying employed, information was collected on whether an individual had received a disability pension in the last 5 years before the age of 55. If an individual had received a disability pension, he or she was assigned a value of 1, if an individual did not receive a disability pension, he or she was assigned a value of 0.

Unemployment factor. It is already clear from the descriptive analysis that older people receive unemployment benefits for a longer period of time, so it was decided to include the factor of receiving unemployment benefits in the study to measure this impact of receiving this benefit on pre-retirement employment. The period of 2013-2020 has been chosen because since 2013 the SSIF has been paying unemployment benefits and made these data available; until 2013 the payment of unemployment benefits was made by the Lithuanian Labor Exchange, and the SSIF does not have such statistics for previous periods.

Occupation. The occupational factor was also evaluated to determine whether an individual's occupation results in a longer duration of work if an individual does a higher-skilled job. According to the Lithuanian Classification of Occupations, nine main groups of occupations were included: occupation 1 refers to managers, 2 – professionals, 3 – technicians and associate professionals, 4 – clerical support workers, 5 – service and sales workers, 6 – skilled agricultural, forestry and fishery workers, 7 – craft and related trades workers, occupation 8 – plant and machine operators, and assemblers and 9 – elementary occupations.

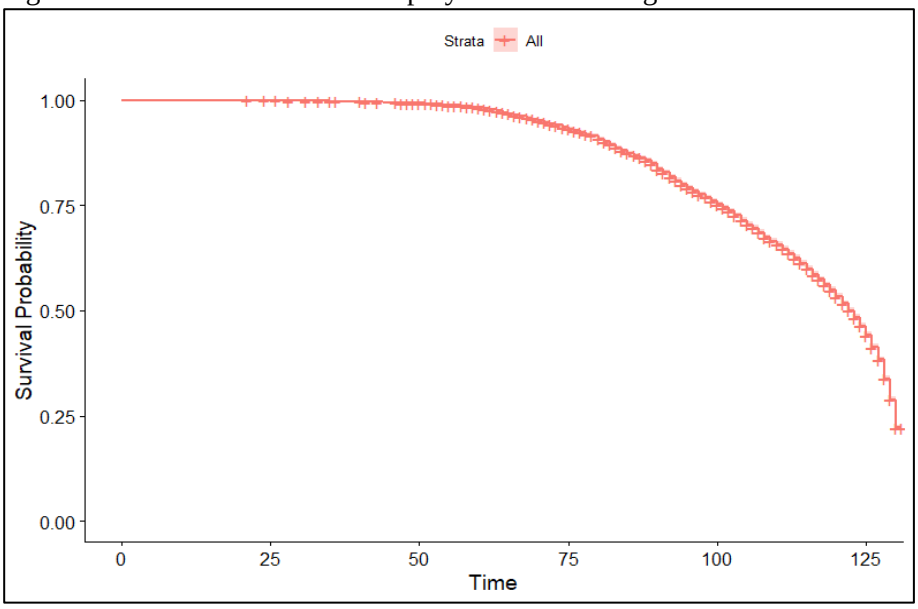
Thus, the results of this model and how survival in the labor market differs in the presence of these different factors will be discussed below.

3.2.3 Results

The results of the non-parametric analysis will be presented first, followed by the semi-parametric results.

Non-parametric analysis. To summarize the data and visualize the distribution shape of employment duration for the sample or for separate groups, estimations of the survival functions are presented. Firstly, the Kaplan-Meier estimator of the survival function is presented in Figure 17. The probability of survival is 1.00 in first months of this study period. After about six years, at the age of 61, the probability declines to 0.8, at about age 65 the probability of survival drops to 0.53. Finally, about 66 years the probability of survival decreases to 0.22 (Appendix 6). These changes are largely determined by the retirement age, which for most employees in Lithuania leads to withdrawal from the labor market.

Figure 17. Survival function in employment after the age of 55



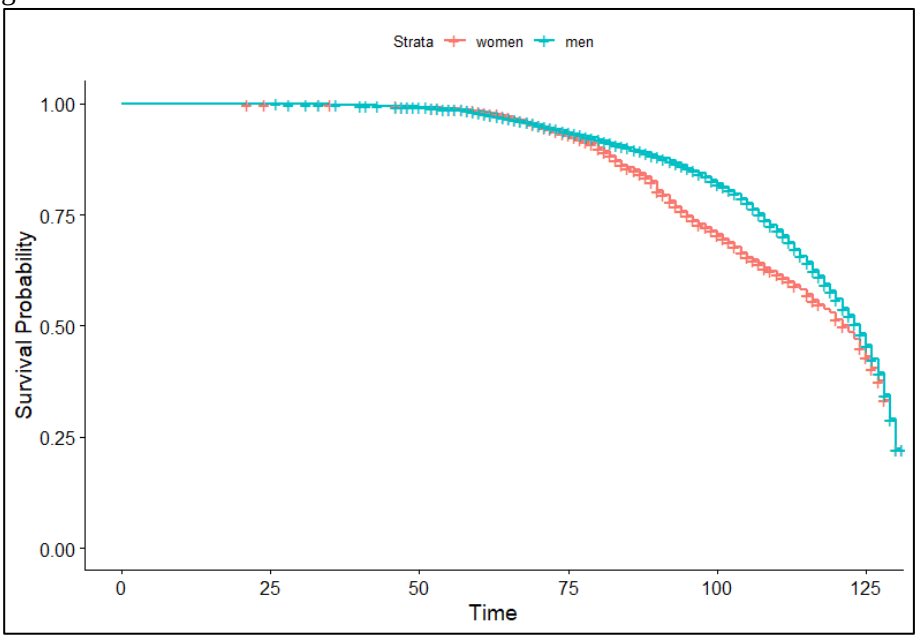
Source: compiled by the author

Beyond more institutional factors, the participation of elderly workers is also affected by a wide set of socio-economic and environmental variables such as gender and occupation.

The gender factor is important in determining employment in the labor market. The chances of staying in the labor market are remarkably similar for men and women up to the age of 61 years and seeks 0.93 for both men and women (Figure 18, Appendix 7).

When women reach retirement age, their survival function becomes lower than that of men, and the probability at staying in the labor market drops to 0.8 for women while men's probability is about 0.88 at the same time. At the age of 64, the probability of staying at labor market is 0.61 for women and 0.71 for men. Thus, gender differences appear after reaching retirement age, and until then the chances of being employed are similar for both men and women. In the 65th year of life, the probability of men and women to be in the labor market is equal and reaches 0.22. Gender differences were also confirmed by the Log-rank test, as the small value of p obtained (1e-0.6) allowed to reject the null hypothesis that the survival functions at job of men and women did not differ.

Figure 18. Survival functions in the labor market after the age of 55 by gender

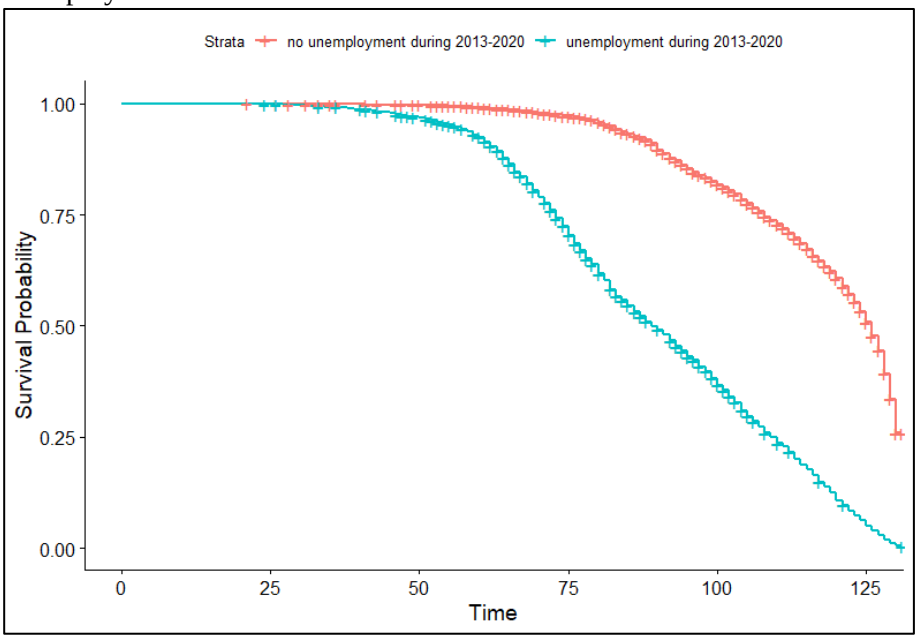


Source: compiled by the author

As the previous study and the statistics analyzed showed, the significant event determining the employment is the encounter with unemployment. This study included an indication of whether the person had received unemployment benefits during the period considered. Figure 19 presents the results. Survival functions up to 59 years are similar for those facing unemployment and not, but after 59 years and experiencing unemployment, survival function falls greatly.

Figure 19 and Appendix 8 show that the probability of survival at job is particularly different at the age of 62, when the probability of staying at labor market for those who have not been unemployed is 0.92, and for those who have received unemployment benefits has dropped to 0.51. The fact that the survival function declines quite rapidly to zero indicates that there is little chance that such people will return to the labor market later. Differences between people who faced unemployment and not were also confirmed by the Log-rank test, as the small value of p obtained (p= <2e-16) allowed to reject the null hypothesis that the survival functions did not differ.

Figure 19. Survival functions in the labor market after the age of 55 by unemployment factor



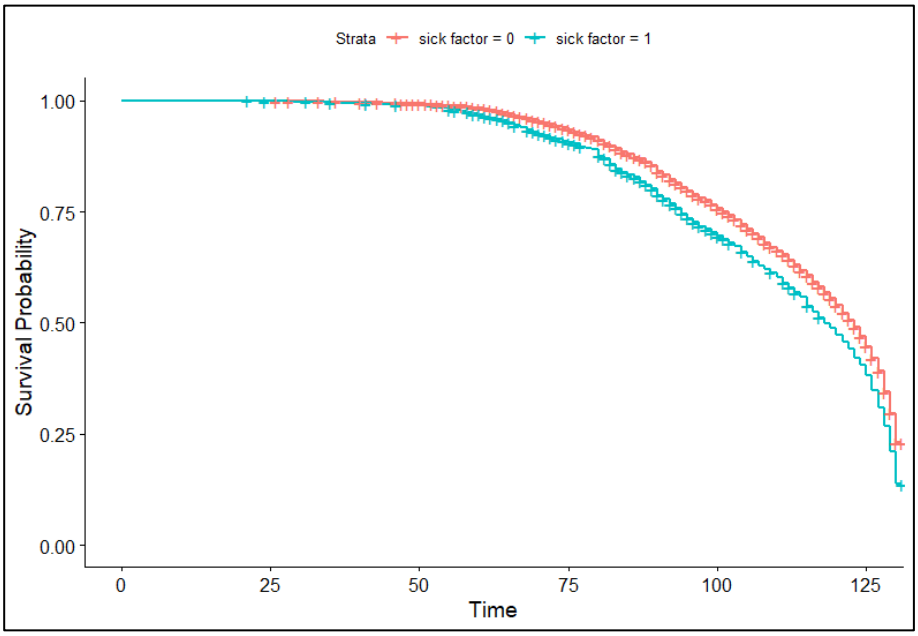
Source: compiled by the author

Health in all age groups remains an especially important determinant of opportunities to work. To measure the impact of health status on labor market participation, two factors were included in the survival analysis, namely the sickness factor and the indication that the person is receiving a disability pension. To measure the impact of health on employment at the age of 55, the study collected data on the number of disease cases covered by SSIF during the last five years, until the person turned 55 years. *1* was indicated as a disease factor if there were more than 5 cases of the disease, and *0* was indicated when a person had less than or equal to 5 cases of the disease in five years. Figure 20 presents the results.

Those who were sick before the age of 55 have a lower survival function in the labor market. From the age of 60, the chances of survival begin to vary between those who were sick under the age of 55 and those who were not. The most significant differences are from the age of 63, when the retirement age is reached, then the probability of those who were more ill in the past to remain in the labor market is 0.72, and the probability of those who are less ill is 0.78. And at the age of 64, probability of people being more sick is 0.58, while the probability of people with being less sick is 0.68 (Appendix 9). Differences between more and less sick people were also confirmed by the Log-rank test,

as the small value of p obtained (p= <2e-16) allowed to reject the null hypothesis that the survival functions did not differ.

Figure 20. Survival functions in the labor market after the age of 55 by sick factor

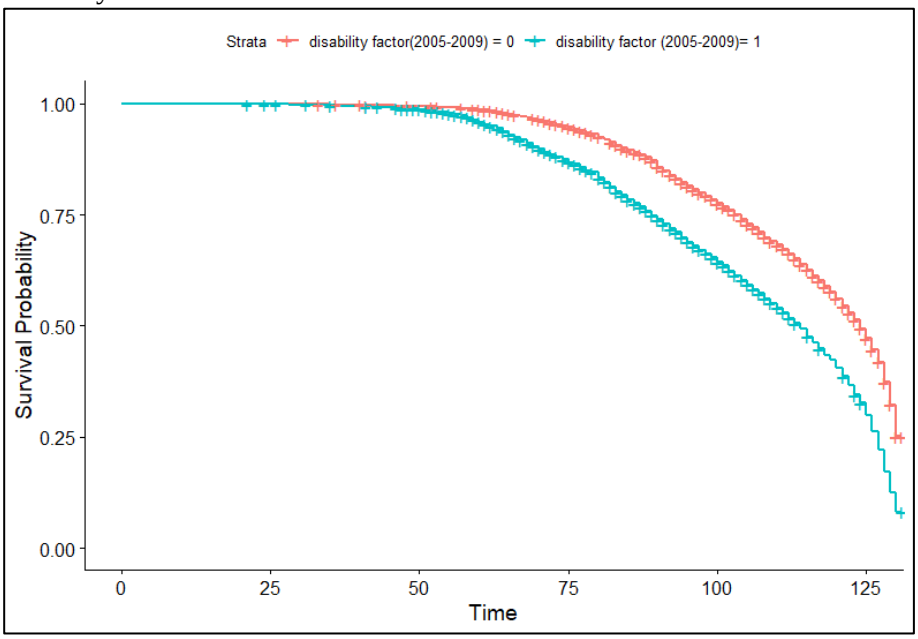


Source: compiled by the author

Analyzing the indication whether a person has received a disability pension, it was found that those who had a disability before the age of 55 have a lower survival function in the labor market. Figure 21 shows the survival functions of people who received a disability pension before their 55s and those that did not.

The most significant differences are from the age of 61 – at this period the probability of those who had received disability pensions in the past to remain in the labor market is 0.88, and the probability of those who had not received them earlier is 0.95. At the age of 64, the probability of those who received disability pensions in the past is 0.56, while the probability of those who did not receive it earlier is 0.69 (Appendix 10). The disability and illness factors suggest that health problems experienced before the age of 55 have an impact on the duration of staying in the labor market. Differences between disabled people and not were also confirmed by the Log-rank test, as the small value of p obtained (p= <2e-16) allowed to reject the null hypothesis that the survival functions did not differ.

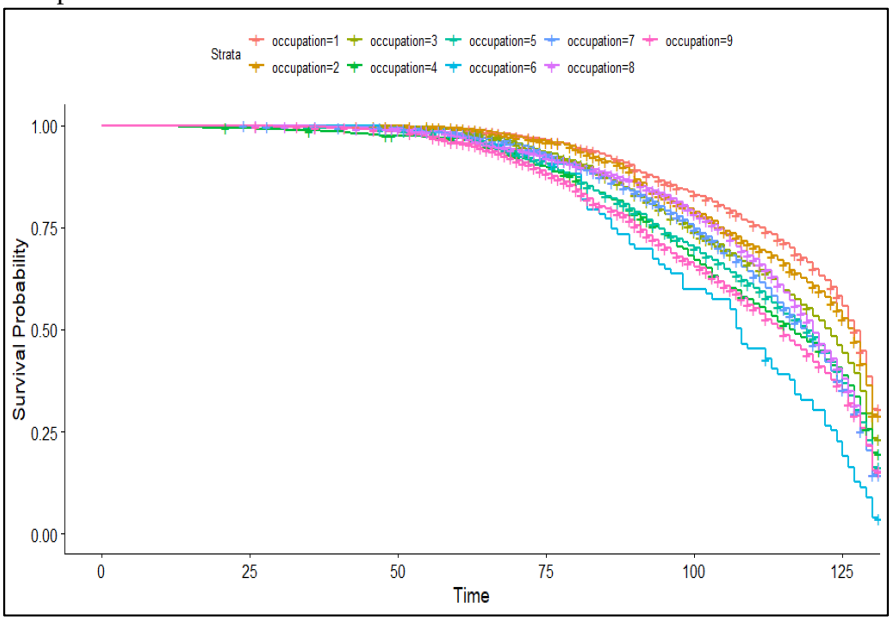
Figure 21. Survival functions in the labor market after the age of 55 by disability factor



Source: compiled by the author

Analyzing by occupation, Figure 22 shows that the highest probability of survival function is for managers. The survival function further decreases with the presence of technicians and junior professionals (occupational group – 3) and machine operators (occupational group 8). The lowest survival function was found for skilled agricultural, forestry and fisheries workers (occupation group – 6). There was also a small survival group for unskilled workers (occupation group – 9) (Appendix 11). Differences between occupations also confirmed by the Log-rank test, as the small value of p obtained (p= <2e-16) allowed to reject the null hypothesis that the survival functions did not differ.

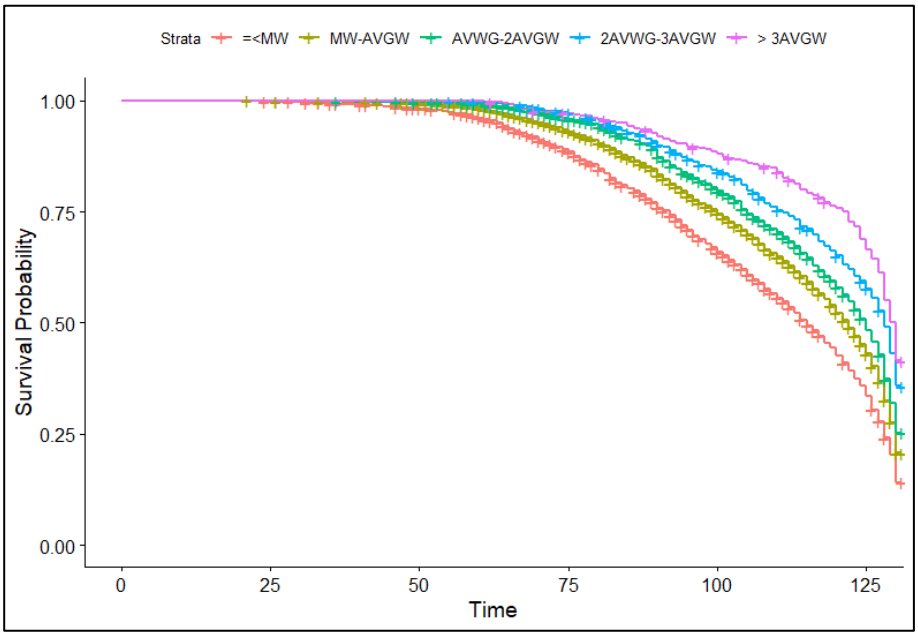
Figure 22. Survival function in the labor market after the age of 55 by occupation factor



Source: compiled by the author

Analyzing by wage category, Figure 23 shows that the highest probability of survival function is for people earning the highest wage, i. e., greater than 3 average wages in January of 2010 (greater than 1371 Eur). The higher the wage earned in 2010, the higher the survival function of staying at labor market. The lowest survival function was found for people who earned the lowest wages, i. e., the minimum wage or lower wage (less or equal to 233 Eur). (Appendix 12). Differences between people earning different wages also confirmed by the Log-rank test, as the small value of p obtained (p= <2e-16) allowed to reject the null hypothesis that the survival functions did not differ.

Figure 23. Survival function in the labor market after the age of 55 by wage factor



Source: compiled by the author

Examining the differences in survival functions by different traits, the following Cox regression is presented to investigate the impact of these factors on survival in the labor market.

Semi-parametric analysis. The estimated results from the Cox's proportional hazard model are reported in Table 10. The results show that all factors have statistically significant coefficients, except the occupation factor $x_{occupation\_2}$, which is discussed in more detail below (Table 10, Appendix 13). Factors and the interpretation of the hazard rate are discussed below. If the hazard rate is > 1, it indicates that the treatment group has a shorter survival than the control group, and if it is < 1, it indicates that the group of interest is less likely to have a shorter time to the event than the control group.

Table 10. Results of the Cox model

Variables	coef	exp(coef)	se(coef)	p
x_{gender}	-0.3095	0.7337	0.0209	< 2e-16 ***
x_{wage_2}	-0.1346	0.8740	0.0230	5.29e-09***
x_{wage_3}	-0.1141	0.8921	0.0274	3.23e-05***
x_{wage_4}	-0.2945	0.7448	0.0455	1.03e-10***
x_{wage_5}	-0.4083	0.6647	0.0674	1.41e-09***
x_{sick}	0.2684	1.3079	0.0334	1.01e-15 ***
$x_{unemployment}$	0.1576	1.1707	0.0019	< 2e-16 ***
$x_{disability}$	0.1622	1.1761	0.0295	4.18e-0.8 ***
$x_{occupation\_2}$	0.0029	1.0029	0.0311	0.924
$x_{occupation\_3}$	0.1879	1.2067	0.0412	5.11e-06***
$x_{occupation\_4}$	0.2433	1.2754	0.0460	1.27e-07***
$x_{occupation\_5}$	0.2680	1.3074	0.0387	4.71e-12***
$x_{occupation\_6}$	0.6730	1.9601	0.1170	8.82e-09***
$x_{occupation\_7}$	0.4108	1.5081	0.0364	<2e-16***
$x_{occupation\_8}$	0.3640	1.4391	0.0379	<2e-16***
$x_{occupation\_9}$	0.2891	1.3353	0.0367	3.39e-15***

Source: compiled by the author

Gender. According to results of the Cox model, men have a longer employment duration. Being a man (x_{gender} =1) reduces the hazard by 0.73-1 = 27%, meaning that women are more likely to leave labor market earlier than men. This is primarily due to women's earlier retirement age, which adjusts the fact that women have the right to retire earlier.

Wage. By including wage categories in the Cox model, the control category became the first category to which the persons with the lowest wages (less than or equal to 232 Eur) were assigned. Earning from 233 to 577 Eur (wage category 2) reduces the hazard to leave labor market by 0.87-1=13%, earning from 578 to 1154 Eur (wage category 3) reduces the hazard by 0.89-1=11%, earning from 1155 to 1731 Eur (wage category 4) reduces the hazard by 0.74-1=26%, and earning greater than 1731 Eur (wage category 5) reduces the hazard by 0.66-1=34% comparing to those earning the lowest wages. It means these people, earned higher wages than the minimum wage, are more likely to stay at labor market for longer, and the higher the wage, the higher the probability to stay. Thus, higher wages suggest that a person feels more comfortable in the labor market and can stay in it longer, and in the face of unemployment such a person is able to remain in this state for a shorter while.

This may be due to that higher-skilled work is paid more, which means that a higher-wage earner is less frequently replaced by another employee due to investment in the employee and acquired qualifications than low-skilled worker.

Sick and disability factors. People who were sick more before their mid 50s have shorter employment duration. For individuals who were sick more the hazard rates are 1.30-1=30% higher. People who had disability have shorter employment duration. For individuals who had disability the hazard rates are 1.17-1=17% higher. Thus, the health factor is crucial in being able to work longer, and the health problems experienced before the age of 55 already have an impact on pre-retirement workers, who are forced to leave the labor market sometimes before reaching retirement age due to poorer health.

Unemployment factor. The period during which unemployment benefits are received directly reduces the length of staying in the labor market. For individuals who received unemployment benefit, the hazard rates are 1.17-1=17% higher. This signals that older people are finding it difficult to return to the labor market.

Occupation. Individuals who work in lower-skilled jobs have shorter durations of employment. By including occupation categories in the Cox model, the control category became the occupation of managers. Occupations of professionals was not significant finding that where is no significant difference between managers and professionals in a context of staying at labor market for longer. Being technicians ($x_{occupation\_3}$) increases the hazard rate of leaving the labor market by 1.20-1=20%, being clerical support workers ($x_{occupation\_4}$) increases the hazard rate by 1.27-1=27%, being service and sales workers ($x_{occupation\_5}$) increases the hazard rate by 1.30-1=30%, being skilled agricultural, forestry and fishery workers ($x_{occupation\_6}$) increases the hazard rate by 1.96-1=96%, being craft and related trades workers ($x_{occupation\_7}$) increases the hazard rate by 1.50-1=50%, being plant and machine operators ($x_{occupation\_8}$) increases the hazard rate by 1.43-1=43%, and being unskilled workers ($x_{occupation\_9}$) increases the hazard rate by 1.33-1=33%. This means that, for example, an unskilled worker will tend to be in the labor market for less than a manager. Thus, higher-skilled workers remain in the labor market longer, while those with lower qualifications are more likely to withdraw from the labor market before or just after retirement age. This finding is especially important because it shows that those who are less qualified and who are more likely to live in poverty leave the labor market earlier and lose a basic source of income. This means that their occupation determines whether a person will be on demand in the labor market at an older

age. And a very important factor and solution in addressing this issue should be retraining, so that people in old age can change their occupations, acquiring new skills and thus being on demand in the labor market.

The results of this model show that survival rates in employment after 55 years are influenced by occupation, gender, health problems, periods of unemployment, and wages. One shortcoming of this study could be considered the used health factor, which was analyzed in counting how often sickness benefits were received from SSIF. Not all cases of illness are covered by SSIF. Cases of illness lasting up to two days or cases of illnesses when a person does not have sufficient experience to receive the benefit are excluded. However, the results analyzed together show that even the analyzed cases of illness paid only from the SSIF signal the importance of this factor in deciding the survival in the labor market. The following section will present a study that sought to analyze employment after retirement age, again using a dataset of factors that may have an impact on it.

4. POST-RETIREMENT EMPLOYMENT IN LITHUANIA

As people get older, they can or sometimes must make different choices related to pensions: to take an early retirement pension before retirement age, to retire when retirement age comes, to work and receive their old-age pension simultaneously, or to defer the payment of pension. This sector presents the situation of Lithuanian retirees: how their employment differs depending on age, gender, wage and many other factors. In the first subsection, a descriptive analysis is performed, distinguishing the trends of retirees' employment, the relationship of their employment with age and gender, and discussing the problem of poverty of retirees as a possible pull factor of bridge employment. The second subsection presents a hypotheses for bridge employment in Lithuania and the data used in the study, develops linear and binary probability models for Lithuania, and discusses the results of the models.

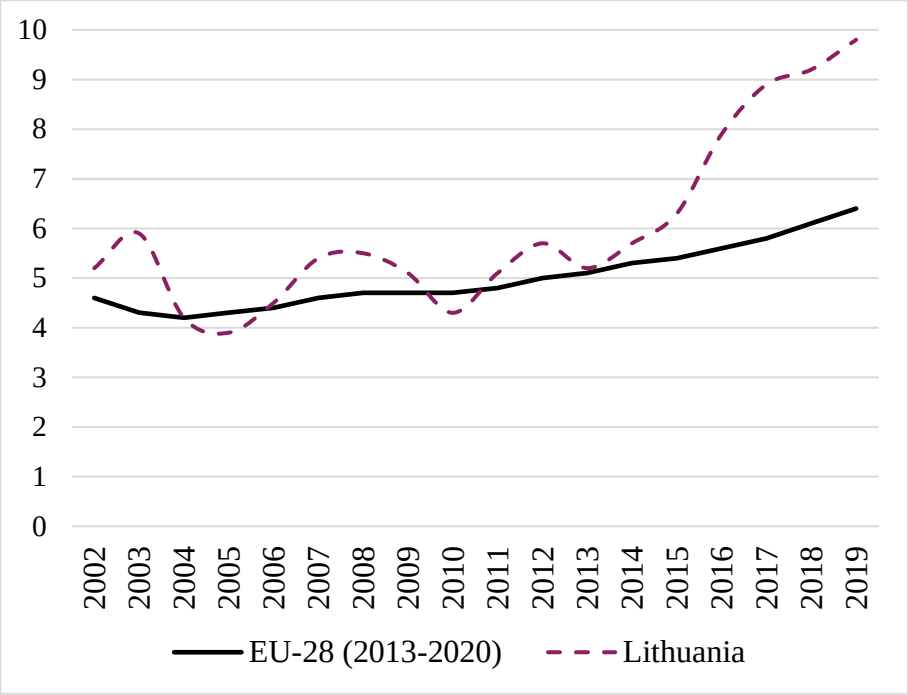
4.1 Descriptive analysis

This subsection discusses the situation of retirees in Lithuania: what share of them decide both to work and receive old-age pension benefits, to defer their old-age pensions, what is the relative share of those who choose to work part-time and what share of older people are under risk of poverty. The employment of retirees is further analyzed, distinguishing their gender, age, and financial situation, paying special attention to the problem of poverty risk among retirees in Lithuania.

4.1.1 Retirees' employment in EU-28 and Lithuania

The employment of retirees in Lithuania is increasing. In the European Union, employment of people aged 65 and over is increasing and in 2019 it has reached 6.5% (Figure 24). In Lithuania, by increasing the retirement age, the employment of people aged 65 and older has been significantly increasing since 2015. In 2019, the employment rate in Lithuania in this age group reached 9.8%, while the average employment rate of the European Union countries was 6.4%. The employment rate of people aged 65 and over is higher than the Lithuanian figure only in Estonia (14.2%), Ireland (12.0%), Portugal (11.5%), United Kingdom (11.0%), Latvia (10.4%) and Sweden (10.1%) (Appendix 14). The lowest employment rate of people aged 65 and over in EU-28 is recorded in Belgium (2.9%), Spain (2.4%), and Luxembourg (2.3%). Thus, the employment of people of retirement age is increasing both in European countries in general and in Lithuania, too.

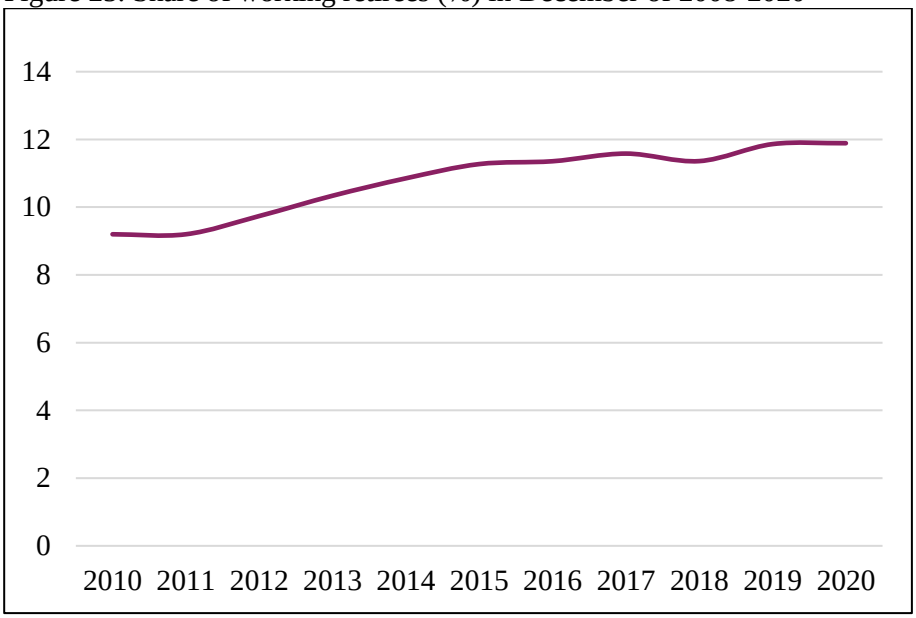
Figure 24. Employment rate by age of 65 years or over (%), 2002-2019



Source: Eurostat

In Lithuania, the law guarantees that old-age pension beneficiares can earn additional income without losing or decreasing their pensions and is a great incentive to work and receive old-age benefits simultaneously. Therefore, there is a growing number of retirees in Lithuania who decide to stay in the labor market at retirement age and receive old-age benefits (Figure 25). The employment rate among old-age retirement beneficiares in Lithuania increased from 9% in 2010 to 12% in 2020. These figures differ from those previously examined in Figure 24, as comparisons between EU-28 countries include employment among those aged 65 and over. As the retirement age in Lithuania is less than 65 years, not all Lithuanian retirees are included in the mentioned statistics and Figure 25 shows the employment of all Lithuanian old-age pension beneficiares in every year since 2010 according to SSIF data.

Figure 25. Share of working retirees (%) in December of 2008-2020



Source: SSIF

The share of working retirees increased due to the choice of new old-age pension beneficiaries to work. As it is seen from Table 11, the share of working retirees among new old-age pension beneficiares increased by 9 percentage points from 39% in 2010 to 48% in 2017.

Table 11. Share of new old-age pension beneficiaries working in 6 and 12 months after reaching retirement age (%)

Years	New beneficiaries, thousands	Employed in 6th month		Employed in 12th month	
		thousands	share, %	thousands	share, %
2010	21,8	9,0	41	8,5	39
2011	22,0	9,9	45	9,4	43
2012	16,7	8,1	48	7,7	46
2013	16,0	8,0	50	7,5	47
2014	15,3	7,7	50	7,2	47
2015	16,3	8,4	51	7,9	48
2016	16,2	8,2	51	7,5	46
2017	16,1	8,2	51	7,7	48

Source: compiled and calculated by the author, SSIF data

Deferment of old age pension is not widespread in Lithuania. The deferment of pension in Lithuania is similar to that in many EU-28 countries. According to the MISSOC database,[3] in 22 of 27 countries pensions are increased by a fixed percentage (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Lithuania, Malta, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden), while in 5 countries there is no pension deferment (Ireland, Latvia, Luxembourg, Poland, The Netherlands). In Lithuania, a pension is increased by 8% of the amount calculated at the moment of application for each full year of deferment (maximum for 5 years) after the right to draw pension is realized. In 2020 in Lithuania, almost 1 thousand workers received deferred old-age pensions. The average period of deferment is 2.3 years, the average increased percentage – 17.27%. Knowing that about 616 thousand people receive a retirement pension in Lithuania, one thousand individuals constitute a small part and thus show that deferring pensions is not yet a popular alternative.

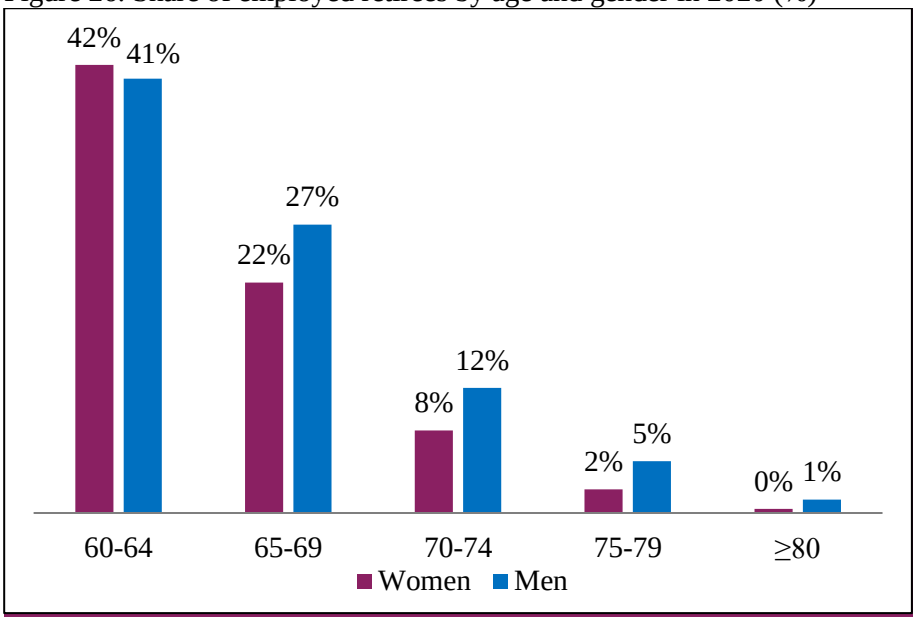
The share of working retirees is growing, and it can be said that every eighth retiree is working. However, the statistics do not reveal the reasons for staying in the labor market for longer: is it because of better living, when more people are able and willing to pursue a career, social relations with society, or a higher proportion of working retirees show their poor position when working is driven by efforts to avoid poverty. However, it is possible to examine the factors that help some individuals to stay at job longer than the others. This will allow a deeper view of the fundamental differences among separate groups of individuals and, accordingly, the formulation of policies to help certain fewer active groups to work as well.

4.1.2 Employment by age and gender

Naturally, participation in the labor market is determined by age and gender. Differences of bridge employment exist between men and women, finding that women are less likely to work beyond retirement in Lithuania. In a group of people aged 60-64 years, 41% of men and 42% of women work (Figure 26). Thus, it can be said that employment in this age group is identical for men and women, but it begins to change with age. In a group of people aged 65–69 years, 27% of men and 22% of women work, until eventually their employment reduces to a minimum in the ages of 75-79.

[3] Source: https://www.missoc.org/missoc-database/comparative-tables/results/

Figure 26. Share of employed retirees by age and gender in 2020 (%)



Source: SSIF

In 2020, 14.2% of retiring men and 10.7% of retiring women were employed (Table 12). During the last ten years employment among men increased more than among women. Since 2010, the share of employed men retirees increased by 3.9 percentage points while the share of women retirees increased by 2.0 percentage points (Table 12). Thus, the employment of men and women differs when people reach retirement age, and a higher proportion of men are employed than women.

Table 12. Share of employed retires by gender in 2010-2020 (%)

Year	2010	2015	2020
Men	10,3	13,1	14,2
Women	8,3	10,4	10,7

Source: SSIF

As mentioned earlier in the literature review, older workers tend to work part-time. Such work can be a great opportunity to reduce the workload in terms of health and not to drop out of the labor market at all, and to continue to feel needed by society. According to Eurostat, 35.3% of working people aged 65 an over are engaged in part-time work in Lithuania (Table 13). Among

working women aged 65 and over, 38.9% work part-time, and among men of the same age, 31.1% work part-time in Lithuania.

Table 13. Part-time employment as percentage of the total employment, by gender and age (%), in 2019

Lithuania			
Age	Total	Males	Females
From 15 to 24 years	15.4	12.2	18.9
From 25 to 49 years	4.7	3.4	6.2
From 50 to 64 years	7.3	5.7	8.7
65 years or over	35.3	31.1	38.9
EU-28			
Age	Total	Males	Females
From 15 to 24 years	31.6	24.6	40.1
From 25 to 49 years	16.2	6.5	27.4
From 50 to 64 years	19.1	7.8	32.2
65 years or over	52.5	47.6	60.2

Source: Eurostat

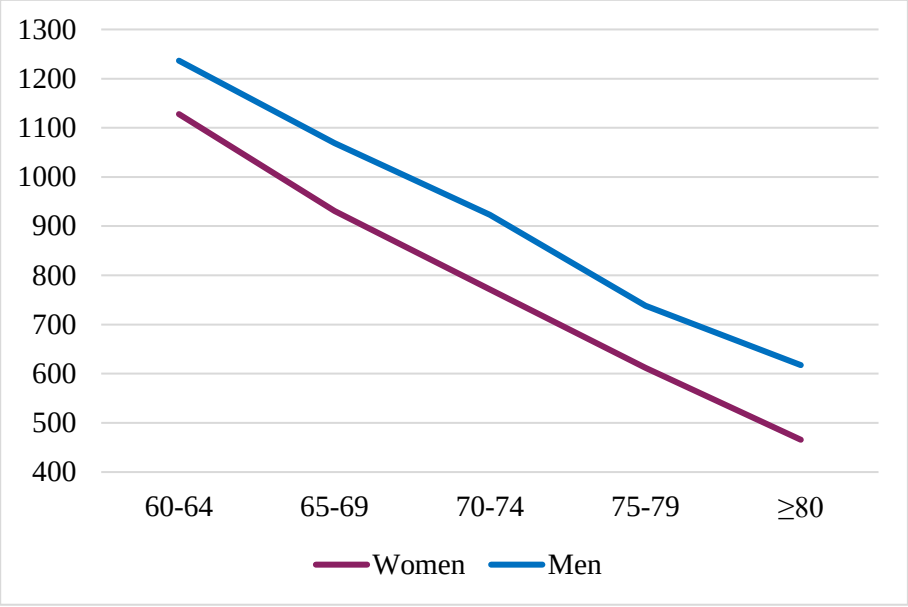
Part-time work is more popular among women than among men, and in Lithuania a smaller share of senior employees works part-time than averagely in the whole European Union. The overall European Union average is higher and reaches in total 52.5%. Among working women aged 65 and over, 60.2 % work part-time, and among men of the same age – 47.6%. In all age groups, the share of women working part-time is higher than that of full-time workers. However, in Lithuania this share is one of the smallest. By comparison, the highest share of part-time workers aged 65 and over is in the Netherlands (79.9 %), Austria (76.3 %) and Sweden (71.5 %) (Appendix 15). Comparing to Lithuania, the lower share of part-time workers aged 65 is in Spain (28.5%), Italy (27.7%), Latvia (26.9%), Greece (14.0%) and Bulgaria (9.4%). Thus, it seems that full-time jobs predominate in Lithuania among those who decide to work after retirement. While in the European Union, meanwhile, on average, half of working retirees do full-time jobs and half of them do part-time jobs.

4.1.3 Relationship between employment and income

Retirees in Lithuania mostly earn lower wages. In January of 2020, the average wage of people who were 60-64 years old and older was 819 Eur, and it was 17% smaller than the average wage of all insured persons. There are some reasons for the downward wage. Firstly, retirees are more likely to work

part-time jobs as was shown by the proportions discussed above (35.3% of working retirees do part-time jobs in Lithuania). Secondly, employment after retirement is in the hands of employers. As Mulders et al. (2014) point out, employers are considerably more likely to rehire employees who agree to accept a significantly lower wage after mandatory retirement because they probably want the post-retirement wage to be more related to workers' productivity. Thus, as age increases, wages fall (Figure 27).

Figure 27. Average wage of employed retirees (Eur), in January of 2020



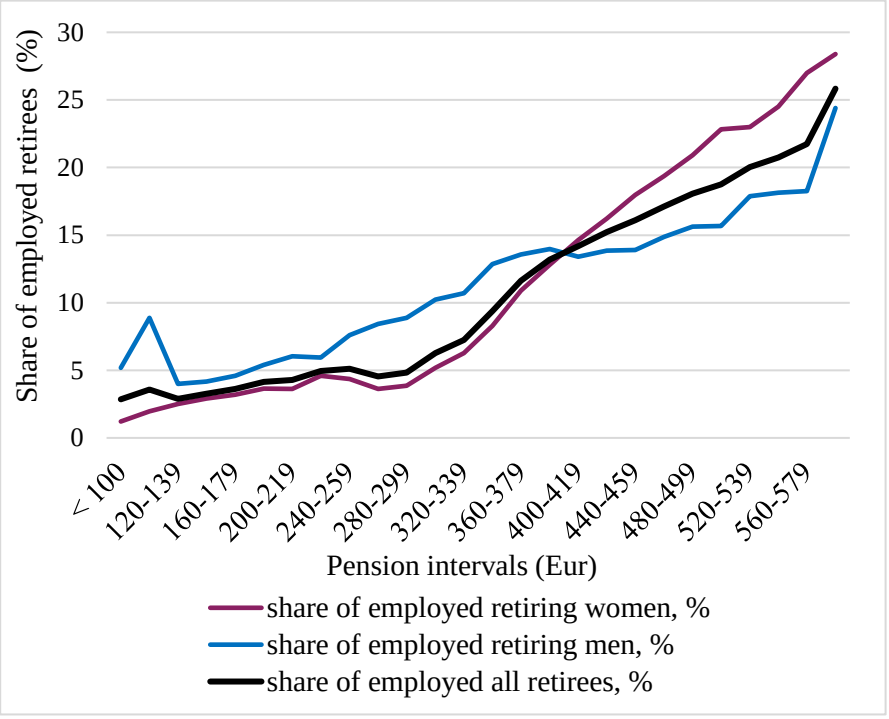
Source: SSIF

Unfortunately, it is not possible to determine from these administrative data whether lower earnings are due to age discrimination, lower productivity, reduction of duties or working hours.

The U-shaped link between pensioners' income and employment in Lithuania is not fulfilled, as the employment rate of small pensioners is low. Some authors found an existing U-shaped relationship between post-retirement employment and income status (Cahill et al., 2006). Under this connection, retirees with a low as well as high income status are likely to work after retirement, although probably for different reasons. To check whether a U-shaped relationship between income and employment exists in Lithuania, data on the share of retirees working according to the amount of their pension were collected.

Figure 28 shows that retiring men and women are more employed in the labor market if they receive a higher pension, which in turn reflects their higher lifetime earnings. The employment of women among those receiving pensions up to 300 Eur is remarkably similar, while the employment of men increases until their pension reaches 380 Eur. Later, the employment of men grows slowly, and the employment of women increases linearly starting from a pension of 280 Eur.

Figure 28. Share of employed retirees according to size of pension and gender (%)



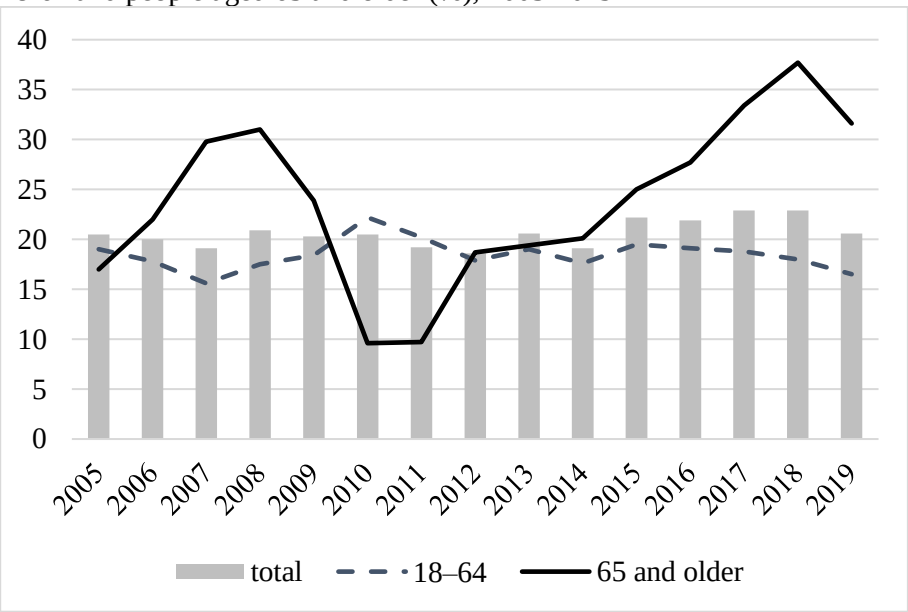
Source: SSIF

Thus, it is likely that the higher the pension, the more likely the person is to work. Meanwhile, among small pension beneficiaries, the employment rate is low, and judging by the small amount of the pension, it was the same before receiving the pension. Thus, in the case of Lithuania, it is difficult to substantiate the U-shape relationship between the amount of pension and post-retirement employment. It is true that retirees with higher pensions are more employed, but the employment rate of retirees who receive the lowest pensions is low, so it is not possible to see a U-shaped graph in the case of Lithuania.

4.1.4 Poverty of retirees

Poverty risk rates among older people remain high. Decreased incomes in old age increase the risk of falling below the at-risk-of-poverty line. The poverty risk rate of people aged 65 and older was decreasing during the period of 2008-2010, but since 2011, with increasing wages and frozen pensions, the situation began to worsen (Figure 29). In 2019, the at-risk-of-poverty rate of people aged 65 and over stood at 31.6% and, compared to 2011 (9.7%), grew by 21.9 percentage points, while the at-risk-of-poverty rate of employed persons decreased by 3.7 percentage points from 20.2% in 2011 to 16.5% in 2019. However, the relative poverty risk rate remains high compared to other age groups.

Figure 29. The at-risk-of-poverty rate of the total population, people aged 18-64 and people aged 65 and older (%), 2005-2019



Source: The Lithuanian Department of Statistics

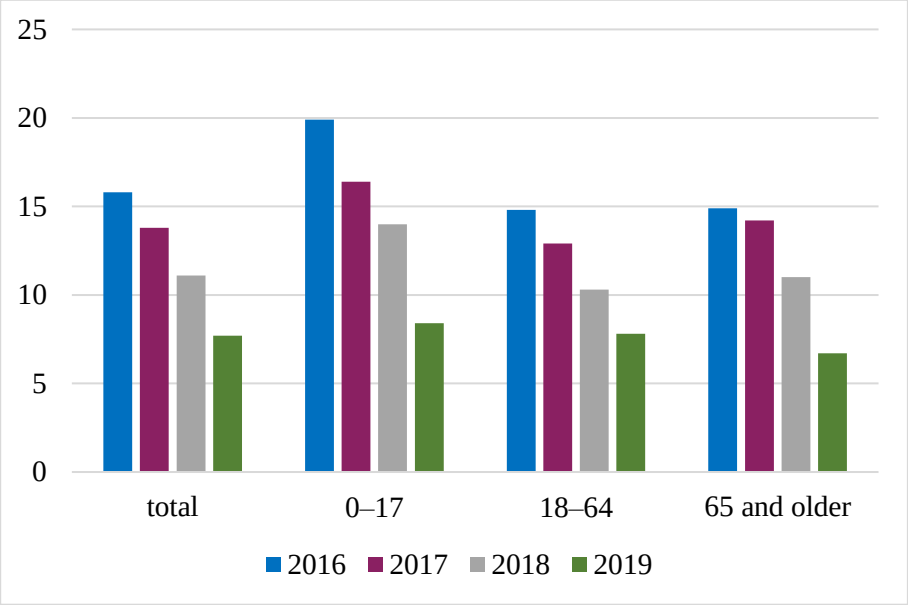
According to the data of 2019, after reaching the age of 65, 38.8% of women live below the at-risk-of-poverty line, while among men this share is half as low and reaches 17.7%. By comparison, the at-risk-of-poverty rate of people aged 18-64 stood at 16.5% and is identical between men and women.

It is important to note that single people of retirement age, most often women (due to the shorter life expectancy of men), are most at risk of poverty. The lower old-age pensions for women are due to the gender pay gap, which stood at 14.2% in 2017, and due to family responsibilities shared by domestic

agreements when women take longer career breaks to raise children or take care of their elderly or disabled family members.

Unlike the relative poverty rate discussed above, the absolute poverty rate is declining (Figure 30). In 2019, the absolute poverty line was 251 Eur per month per resident and 527 Eur per family consisting of two adults and two children under the age of 14.

Figure 30. Absolute at-risk-of-poverty-rate of the total population, people aged 0-17, 18-64, and aged 65 and older (%), 2016-2019



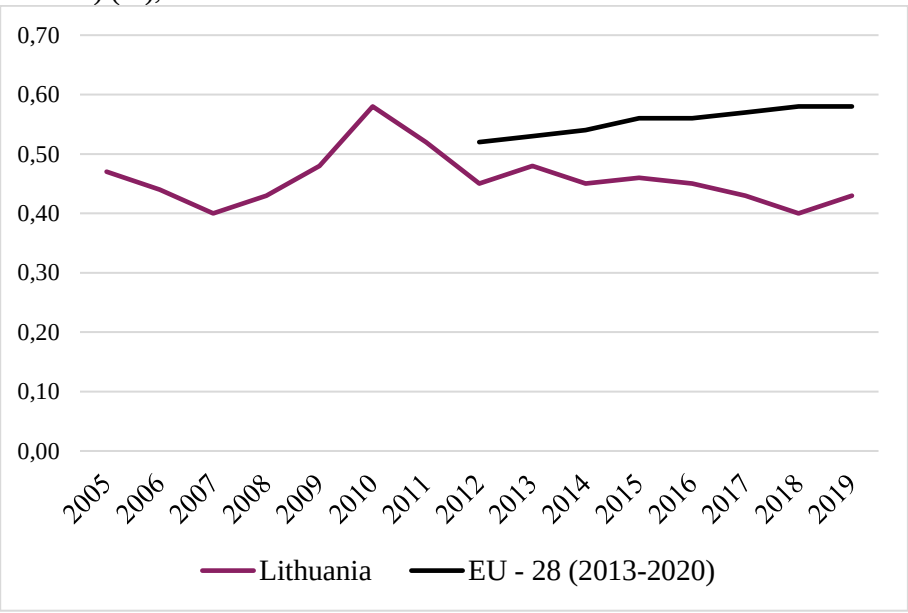
Source: the Lithuanian department of statistics

The existing gap between men and women's earnings is 12%, while both 16% of men and 16% of women arre below the at-risk-of-poverty rate. However, in old age, the income gap has even greater negative consequences. The old-age pension received by men is on average 19% higher than that of women. And among women aged 65 and over, 39% are poor, while among men, that number is half as low at 18%.

The government in Lithuania takes measures to reduce poverty among the nation's older residents, such as the indexation of old-age pensions (since 2018), pension supplements for beneficiaries of small pensions (since 2019 onwards), or the conversion of pensions for retirees with more than 30 years of an obligatory retirement record. People are encouraged to accumulate retirement savings in private pension funds (pension reforms in 2004, 2014, 2019).

The financial situation of retirees can be analyzed using the aggregate replacement ratio of old-age pensions, which is a measure of the median individual gross pension (including old-age and other pension benefits of people aged 65-74) relative to the median individual gross earnings (of people aged 50-59). The aggregate replacement ratio of old-age pensions for Lithuania and EU-28 is presented in Figure 31. In the period of 2007-2010, this ratio increased and reached 0.58 in 2010. The increase in the replacement ratio of old-age pensions was determined by the decrease of the average net wage during the crisis year. Next, in 2012-2016, the aggregate replacement ratio for pensions was about 0.45, while in 2018 it decreased to 0.4. In 2019, the replacement ratio for pensions increased due to pension indexation to 0.43.

Figure 31. Aggregate replacement ratio for pensions (excluding other social benefits) (%), 2005-2019



Source: Eurostat

The overall European Union average is higher and reaches 0.57. The highest aggregate replacement ratio for pensions is in Luxembourg (0.86), Greece (0.76) and Italy (0.73). This ratio of Lithuania is one of the smallest among EU-28 countries. A lower than this replacement ratio is in Slovenia (0.43), Romania (0.42), Cyprus (0.41), Croatia (0.39), Ireland (0.38), Latvia (0.38) and Bulgaria (0.37) (Appendix 16). In fact, in thirteen of the EU-28 countries, this replacement rate is less than 0.5. Thus, although in Lithuania this ratio is lower than the EU average, it is not far from the average.

In Lithuania, the indexation of pensions is linked to the growth of the fund of wages. From the beginning of 2018, all old-age pensions are indexed and increase as much as payroll increases. The pension indexation coefficient is determined by the average change in the earnings of all employees and the change of the number of employees in the country over seven years (three past years, current and three years ahead).

Beneficiaries of small pensions are supported by pension supplements. Premiums are paid if the amount of social insurance pensions, compensation for special working conditions, state pensions, and foreign pensions received by persons per month is less than the amount of minimum consumption requires. If a person has acquired the required length of service to receive a pension, he or she is paid the difference between the amount of the minimum consumption needs (for example, 257 Eur in 2020) and the pension he or she receives (pension amounts). If a person has completed the minimum length of service but does not have the required length of service, a proportionately lower part of the bonus is calculated for them.

This subsection finds that the employment of retirees in the labor market is growing in Lithuania. Older people are more likely to reduce their workload by working fewer hours; however, many working retirees work full time in Lithuania. Reduced working hours, perhaps more modest job offers from the employers and other reasons lead to the lower retirees' labor incomes as compared to the labor incomes of younger workers. The growing standard of living in Lithuania is leading to a decrease in the share of people living under the risk-of-poverty rate; however, the poverty rate of retirees remains much higher than that of the working population. Therefore, staying in the labor market for a longer time can be mentioned as a way to increase low income in old age.

4.2 Binary response models for bridge employment in Lithuania

This subsection develops hypotheses about the factors affecting bridge employment in Lithuania. After forming hypotheses and describing the administrative data used in this research, linear and binary probability models are formulated and, finally, the results of the models are discussed.

4.2.1 Hypotheses and data

Studying the participation of retirees in the labor market introduces various determinants of post-retirement employment determined by other authors, which were grouped by the author of this thesis into individual, financial, family, and other factors (Table 4). Here, factors that were explored

as being able to influence the choice of work in retirement in Lithuania in Table 4 are presented in Table 14 with family factors being excluded because SSIF administrative data do not include such information.

Table 14. Factors that are explored as being able to influence the choice of work in retirement in Lithuania

Individual factors	Financial factors	Other factors
Gender H_1 Health H_2 Occupation H_3 Work history H_4 Sector H_5	Wage H_6 Pension replacement rate H_7	Region H_8 Employment rate in region H_9 Unemployment benefit beneficiary H_{10} Disability pension beneficiary H_{11} Widow pension beneficiary H_{12} Macroeconomic situation H_{13}

Source: compiled by the author

Individual factors. According to descriptive analysis, women are in a worse financial position in old age than men: their pensions are lower and their risk of poverty is higher. Nevertheless, as it was mentioned above in Section 2, women are less likely to work beyond retirement than men because of social norms and women's responsibility for familial caregiving. In this research factor x_{gender} is equal to 1 for men, and 0 for women. In the light of the foregoing, the following hypothesis is formulated for Lithuanian retirees:

Hypothesis 1. Women are less likely to do bridge jobs than men in Lithuania.

As it was mentioned above, many studies showed that two most important motivators for retirees to work are financial pressure and good health, with financial pressure making retirees feel that they should engage in bridge employment and good health making it possible to do (Wang et al., 2008). Most researchers study the health factor from human surveys where people are asked to assess the state of their health (Zucchelli et al., 2007; Reeuwijk et al., 2017). This thesis avoids the assessment of human health by people themselves, as administrative data are used instead of surveys. The study uses data on sick cases paid from the budget of SSIF. By accumulating these cases over the last ten years before retirement, total amount of sick cases for every retiree is generated in the sample. The dummy variable of the sick variable is created where x_{sick_L} is equal to 1 meaning that an individual was

sick less than 10 times during the last ten years before retirement, and the factor x_{sick_H} is equal to 1 meaning that an individual was sick more than 10 times during the last ten years before retirement. It was determined 10 times experimentally according to the statistical significance of the factor. The following hypothesis states:

Hypothesis 2. People with fewer paid sick cases are more likely to work after reaching retirement age than those who had more sick cases in the past.

Literature analysis showed that occupation can also be one of the factors that will determine whether a person decides to work in old age. To measure the impact of occupation on bridge employment, the Lithuanian Classification of Occupations is used, which groups them from the most skilled to the least skilled occupations. This factor is included in the regressions along with the sector factor in the hope that it will better reflect differences between people of the same occupation but who work in different sectors. Supposedly, a manager in the budget sector is more likely to remain in retirement than a manager in the non-budgetary sector. In this thesis $x_{occupation\,1}$ denotes managers, $x_{occupation\,2}$ – professionals, $x_{occupation\,3}$ – technicians and associate professionals, $x_{occupation\,4}$ – clerical support workers, $x_{occupation\,5}$ – service and sales workers, $x_{occupation\,6}$ – skilled agricultural, forestry and fishery workers, $x_{occupation\,7}$ – craft and related trades workers, $x_{occupation\,8}$ – machine operators and assemblers, $x_{occupation\,9}$ – elementary occupations. Occupations such as skilled agricultural, forestry and fisheries workers are excluded in the final model, as more such workers are in the non-budgetary sector and the combined sectoral and occupational factor remains insignificant. Unskilled workers and civil servants are similarly excluded, as their factor with the sector also remains insignificant (it does not differ in which sector they work). However, when the occupation factor is not combined with the sector factor, the following hypothesis is formulated for Lithuanian retirees:

Hypothesis 3. Higher-skilled workers, such as managers and professionals, are more likely to work longer than unskilled workers.

Also, it can be assumed that a person who is in the labor market for longer is more likely to work beyond retirement than a person who is in the labor market for a shorter time, because he or she may have got more experience, better work skills and may have better chances to stay in the labor market for longer. The factor $x_{experience}$ means years of acquired retirement record. Next, the experience of second power $x_{experience^2}$ is used to evaluate

the decreasing influence of the retirement record. It is likely that with increasing the retirement record, the likelihood of bridge employment will increase (factor $x_{experience}$). However, at a relatively high retirement record, its influence is less pronounced (factor $x_{experience^2}$). The following hypothesis states:

Hypothesis 4. The longer a person has acquired retirement record, the more likely the person is to stay in the labor market in retirement.

The factor x_{sector} was rarely included in the analyzed articles. However, it can be assumed that there may be different opportunities to stay in the labor market when a person works in the budget and non-budgetary sectors. Workers in the budget sector may have better conditions to stay in the labor market for longer, as in the non-budgetary sector, employers will be willing to hire younger workers and will be more likely to dismiss older ones. The dummy variable of x_{sector} is included, with 1 if a retiree works in the budget sector and 0 if a retiree works in the non-budgetary one. In the case of using administrative data about a sector where a person has been employed, the next hypothesis is formulated:

Hypothesis 5. Individuals working in the budget sector are more likely to bridge employment in comparison to individuals working in the non-budgetary sector.

Financial factors. To measure financial preferences, two indicators are used: the replacement rate of old-age pension and average wage earned in the last three years prior to individual's retirement. A higher retiree's wage will mean that a person will want to maintain his or her level of lifetime consumption and will work in order not to live solely from a meager pension. Also, a higher wage will let assume that a person maintains a higher position at work and better opportunities to continue working even after retirement. Some authors state that a low old-age pension can signal that a person will be more likely to work to avoid the risk of poverty. But on the contrary, a lower pension may signal that a person has low qualifications and is no longer able to do the work for a variety of reasons, including health problems. To assess the financial incentives to work for individuals, the pension replacement rate was calculated by dividing the amount of the old-age pension by the wage the person received in the last year before retirement. Two dummy variables were formulated: $x_{pension\ replacement\ rate_L}$, indicating that a person's replacement rate is less than 30%, and $x_{pension\ replacement\ rate_H}$, indicating that a person's

replacement rate is greater than 30%. Related to this and literature reviewed, it can be ended up with hypotheses:

Hypothesis 6. The higher a retiree's average wage was, the more likely a retiree is to engage in bridge employment.

Hypothesis 7. The higher the retiree's pension replacement rate of old-age pension is, the less probable it is that a retiree will work beyond retirement.

Other factors. Sometimes the choice to work beyond the retirement can depend on region a person lives, because the employment rate is higher in a city than in a district. Factor x_{region} is a dummy variable that adopts the value 1 for a retiree living in a city and 0 for a retiree living in a district. In the light of the foregoing, the following hypotheses are formulated:

Hypothesis 8. Individuals who live in cities are more likely to bridge employment in comparison to individuals living in districts.

Hypothesis 9. A person living in a region with a lower employment rate is less likely to work beyond retirement.

There are other characteristics that can be important in trying to evaluate the probability of bridge employment. There are some social groups that may have different opportunities to post-retirement employment. For example, a person who was unemployed or has any disabilities is likely to have more difficulties staying in the labor market for longer. Finally, widows could be more interested in bridge employment because they are more likely to be under risk of poverty after their spouse's death. Thus, information on receiving social security benefits was included in the models. For this reason, the next hypotheses are formulated:

Hypothesis 10. A person who received unemployment insurance benefits before retirement is less likely to work beyond retirement.

Hypothesis 11. A person who received a disability pension before retirement is less likely to work beyond retirement.

Hypothesis 12. A person who receives a widow's pension is more likely to work beyond retirement.

After all, strong macroeconomic conditions and well-functioning labor markets are especially important for underpinning higher participation rates among older people (Sarfati, 2008). To analyze the possible effect of macroeconomic factors on the employment of retirees, data about GDP growth is used, formulating the hypothesis that:

Hypothesis 13. The better economic situation, the higher the GDP growth is when a person retires, the more likely they are to work after retirement.

In the next subsection, a linear model and binary response models for Lithuania are formulated.

4.2.2 Models

To answer the question which factors influence post-retirement employment, linear probability and binary response models are applied. The dependent variable in models estimating bridge employment is not a quantitative measure of some economic outcome, but an indicator of whether a person works after full retirement age. Hence, the response variable, or regressor, can take only two values, 1 if the person is in the labor market after he or she reaches retirement age and 0 if he or she is not.

Linear probability model (LPM). The regression factors of the linear model are described in Table 14. The linear probability model for binary response is specified as:

$$P(y = 1 \mid x) = \beta_0 + \beta_1 x_{gender} + \beta_2 x_{experience} + \beta_3 x_{experience^2} + \beta_4\, x_{pension\ replacement\ rate_L} + \beta_5\, x_{pension\ replacement\ rate_H} + \beta_6 x_{sick_L} + \beta_7 x_{sick_H} + \beta_8 x_{sector} \times x_{occupation\ 2} + \beta_9 x_{sector} \times x_{occupation\ 3} + \beta_{10} x_{sector} \times x_{occupation\ 5} + \beta_{11} x_{sector} \times x_{occupation\ 7} + \beta_{12} x_{sector} \times x_{occupation\ 8} + \beta_{13} x_{region} + \beta_{14} x_{unemp\_benefit} + \beta_{15} x_{disability} + \beta_{16} x_{widow\ pension} \times x_{gender} + \beta_{17}\, x_{employment\ rate} + u_i \quad (9)$$

The variable $x_{employment\ rate}$ shows the employment rate in a region retiree lives in. Variables $x_{unemp\_benefit}$, $x_{disability}$, $x_{widow\ pension}$ are dummy variables with being 1 when a retiree has received a relevant benefit or a pension and 0 if a retiree has not received such a benefit or a pension during the period considered. Combination $x_{widow\ pension} \times x_{gender}$ is included into regressions to evaluate the situation of widowed women to determine whether more socially vulnerable group in society is more likely to work or not.

Unless the range of x is severely restricted, the linear probability model cannot provide a good description of the population response probability $P(y = 1 \mid x)$. Linear probability model poses several problems as follows *(1) non-normality of the disturbances* u_i*, (2) heteroscedastic variances of the disturbances, (3) nonfulfillment of* $0 \leq E(y \mid x) \leq 1$ *and (4) questionable*

value of R^2 as a measure of goodness of fit which are discussed below (Gujarati, 2004).

Non-normality of the disturbances u_i. Although the ordinary least squares method does not require the disturbances (u_i) to be normally distributed, they are assumed to be so distributed for the purpose of statistical inference. But the assumption of normality for u_i is not tenable for the linear probability models because, like y, the disturbances u_i also take only two values; that is, they also follow the Bernoulli distribution. As the sample size increases indefinitely, statistical theory shows that the ordinary least squares estimators tend to be normally distributed generally. As a result, in large samples the statistical inference of the linear probability model will follow the usual ordinary least squares procedure under the normality assumption. So, linear probability model can be useful as a first step in the analysis of binary choices.

Heteroscedastic variances of the disturbances. Even if $E(u_i) = 0$ and $cov(u_i, u_j) = 0$ for $i \neq j$ (i.e. no serial correlation), it can no longer be maintained that in the linear probability model the disturbance are homoskedastic. Since $P = E\,(y \mid \boldsymbol{x}) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_K x_K$, the variance of u_i ultimately depends on the values of **x** and hence is not homoskedastic.

Nonfulfillment of $\mathbf{0} \leq E(y \mid \boldsymbol{x} \leq \mathbf{1}$. Since $E(y \mid \boldsymbol{x})$ in the linear probability models measures the conditional probability of the event y occurring given **x**, it must necessarily lie between 0 and 1. Although this is true a priori, there is no guarantee that $\widehat{y_i}$, the estimators of $E(y \mid \boldsymbol{x})$, will necessarily fulfill this restriction; this is the real problem with the ordinary least squares estimation of linear probability model.

Questionable value of R^2 as a measure of goodness of fit. Corresponding to a given **x**, y is either 0 or 1. All the y values will either lie along the x axis or along the line corresponding to 1. Generally, no linear probability model is expected to fit such a scatter well. As a result, the conventionally computed R^2 is likely to be much lower than 1 for such models. In most practical applications, the R^2 ranges between 0,2 to 0,6.

Until the availability to estimate the logit and probit models by computer packages, the LPM was used quite extensively because of its simplicity (Gujarati, 2004). Linear probability model is not incredibly attractive because it assumes that $P(y = 1 \mid x)$ increases linearly with x, i.e., the marginal or incremental effect of x remains constant throughout. So, the cumulative distribution function can be easily used to model regressions

where the response variable is dichotomous, taking 0 or 1 values (Gujarati, 2004; Cameron & Trivedi, 2005). Such models are logit and probit models, which will be presented next.

Logit and probit models. The two standard binary outcome models, the logit and the probit models, specify different functional forms for this probability as a function of regressors. The difference between these estimators is qualitatively similar to use of different functional forms for the conditional mean in least-squares regression.

Logit model is specified as:

$$\mathrm{P} = \mathrm{E}(\mathrm{y} = 1|\mathbf{x}) = \Lambda(\mathbf{x}'\beta) = \frac{e^{x'\beta}}{1+e^{x'\beta}}\ , \tag{10}$$

where **x** is vector of variables described in subsection 4.2.1 and Λ (·) is the cumulative distribution function of the logistic function.

The logit model for this study can be simply written as follows:

$$L_i = \ln(\frac{P_i}{1-P_i}) = \Lambda\,[\beta_0 + \beta_1 x_{gender} + \beta_2 x_{experience} + \beta_3 x_{experience^2} + \beta_4\, x_{pension\ replacement\ rate_L} + \beta_5\, x_{pension\ replacement\ rate_H} + \beta_6 x_{sick_L} + \beta_7 x_{sick_H} + \beta_8 x_{sector} \times x_{occupation\ 2} + \beta_9 x_{sector} \times x_{occupation\ 3} + \beta_{10} x_{sector} \times x_{occupation\ 5} + \beta_{11} x_{sector} \times x_{occupation\ 7} + \beta_{12} x_{sector} \times x_{occupation\ 8} + \beta_{13} x_{region} + \beta_{14} x_{unemp\_benefit} + \beta_{15} x_{disability} + \beta_{16} x_{widow\ pension} \times x_{gender} + \beta_{17}\, x_{employment\ rate} + u_i], \tag{11}$$

The logit model has these features (Gujarati, 2004; Cameron & Trivedi, 2005; Wooldridge, 2002):

1. As P goes from 0 to 1, the logit L goes from -∞ to +∞. That is, although the probabilities lie between 0 and 1, the logits are not so bounded.
2. Although L is linear in **x**, the probabilities themselves are not.
3. If L, the logit, is positive, it means that when the value of the regressors increases, the odds that the regressant equals 1 (meaning a person stays at labor market after he or she reaches retirement age) increases. If L is negative, the odds that the regressant equals 1 decrease as the value of **x** increases.

An alternative model is the probit model. Unobservable utility index I_i (also known as a latent variable), that is determined by one or more explanatory variables, say income x_i, in such a way that the larger the value

of the index I_i, the greater the probability of an individual to work after retirement. The index I_i is expressed as:

Utility index I_i is expressed as:

$$I_i = \beta_1 + \beta_2 \beta\, x_i \tag{12}$$

It is reasonable to assume that there is a critical or threshold level of the index, call it I_i^*, such that if I_i exceeds I_i^*, an event occurs, otherwise it does not.

Given the assumption of normality, the probability that I_i^* is less than or equal to I_i can be computed from the standardized normal cumulative distribution function as:

$$P_i = P(Y = 1|x) = P(I_i^* \leq I_i) = P(Z_i \leq \beta_1 + \beta_2 \beta x_i) = F(\beta_1 + \beta_2 \beta x_i), \tag{13}$$

where $P(Y = 1 \mid x)$ means the probability that a retiree will work given the values of the X or explanatory variables and where Z_i is the standard normal variable:

$$F(I_i) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{I_i} e^{-z^2/2}\, dz = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\beta_1 + \beta_2 \beta X_i} e^{-z^2/2}\, dz \tag{14}$$

To obtain information on I_i, the utility index, as well as on β_1 and β_2, is taken to obtain:

$$I_i = F^{-1}(I_i) = F^{-1}(P_i) = \beta_1 + \beta_2 \beta x_i \tag{15}$$

where F^{-1} is the inverse of the normal cumulative distribution function. The probit model for this study can be written as follows:

$$I_i = \Lambda\, [\beta_0 + \beta_1 x_{gender} + \beta_2 x_{experience} + \beta_3 x_{experience^2} + \beta_4\, x_{pension\ replacement\ rate_L} + \beta_5\, x_{pension\ replacement\ rate_H} + \beta_6 x_{sick_L} + \beta_7 x_{sick_H} + \beta_8 x_{sector} \times x_{occupation\ 2} + \beta_9 x_{sector} \times x_{occupation\ 3} + \beta_{10} x_{sector} \times x_{occupation\ 5} + \beta_{11} x_{sector} \times x_{occupation\ 7} + \beta_{12} x_{sector} \times x_{occupation\ 8} + \beta_{13} x_{region} + \beta_{14} x_{unemp\_benefit} + \beta_{15} x_{disability} + \beta_{16} x_{widow\ pension} \times x_{gender} + \beta_{17}\, x_{employment\ rate} + u_i] \tag{16}$$

Comparison of the models. In most applications logit and probit models are quite similar; the main difference is that the logistic distribution has slightly fatter tails. The conditional probability P_i approaches 0 or 1 at a slower rate in logit than in probit (Gujarati, 2004). Within the framework of generalized linear models, which are widely used in biostatistics, the logit model is the natural model as it corresponds to use of the canonical link for the binomial distribution. The interpretation of coefficients in terms of the log-odds ratio is also an attraction of the logit model. In practice many researchers choose the logit model because of its comparative mathematical simplicity. This was confirmed by the analysis of the models used by the investigated authors, as it was found that logit models were applied much more often. The linear probability model has the clear drawback of not being able to capture the nonlinear nature of the population regression function and it may predict probabilities to lie outside the interval [0,1]. Probit and logit models are harder to interpret but capture the nonlinearities better than the linear approach: both models produce predictions of probabilities that lie inside the interval [0,1]. Predictions of all three models are often close to each other (Hanck et al., 2019). So, there are no general recommendations which method to use.

When estimating probit and logit models, it is common to report the marginal effects after getting the coefficients. For linear probability models, the marginal effects are the coefficients, and they do not depend on x:

$$\frac{dp}{dx_i} = \beta_i \tag{17}$$

For the logit and probit models, the marginal effects are calculated as:

$$\frac{dp}{dx_i} = F'(\boldsymbol{x}'\beta)\beta_i \tag{18}$$

Marginal effects for the logit model:

$$\frac{dp}{dx_j} = \Lambda\,(\mathrm{x}'\,\beta)\,[1 - \Lambda(\mathrm{x}'\,\beta)]\,\beta_j = \frac{e^{x\prime\beta}}{(1+e^{x\prime\beta})^2}\,\beta_j \tag{19}$$

Marginal effects for the probit model:

$$\frac{dp}{dx_j} = \Phi\,(\mathbf{x}'\,\beta)\,\beta_j \tag{20}$$

Further in the work, like in most papers, marginal effects at the mean will be calculated and interpreted. The maximum likelihood method is used to estimate binary response models.

4.2.3 Results

Appendix 17 presents the estimates of the linear probability model (LPM) and the logit and probit models explaining participation in bridge employment versus full retirement based on individual, financial, and other factors.

By applying the binary models of the probability of being employed beyond retirement, it is found out that a higher obligatory pension record, a lower pension replacement rate, and living in a bigger city with a higher employment rate were positively associated with accepting bridge employment, while a higher sickness rate, being disabled or unemployed were inversely related to accepting such employment. Moreover, being a professional or manager increases the likelihood of bridge employment in comparison to unskilled workers. This probability increases even more if a person works in the budget sector. Finally, disabled people or widowed women are not likely to work beyond retirement and they are under a bigger risk of poverty. However, these coefficients of logit and probit models in Appendix 17 are not suitable to interpretation yet. For the interpretation, marginal coefficients at the mean are calculated and presented (Table 15). All three models explain 70% of variability.

Individual factors. All individual factors including *gender*, *health*, *occupation*, *experience,* and *sector* were significant in the models. The results of the models show that men are more likely to work than women when they reach retirement age. The probability of doing bridge employment for men is 1.0-1.3 percentage points higher than for women. This correlates with data shown in Figure 26, where it was found out that at retirement age, the employment rate of men and women is very similar, especially in the 60-64 age group (41% of men and 42% of women work), and only later it begins to vary with age (in a group of people aged 65-69 years, 27% of men and 22% of women work), and the employment of women decreases. In the models, the indication of whether a person is working is recorded 12 months after the retirement age. As it was mentioned above in this thesis, women receive a lower wage during their whole careers and have a lower workforce participation rate due to childcare or the care of other family members; they are less active in retirement, too. Finding that men's life expectancy in

Lithuania is lower than women's, and that women's pensions are lower, women are those who are most likely to be under the risk of poverty in their old age.

Table 15. Marginal effects of the models for bridge employment in Lithuania[4]

	LPM	Logit	Probit
intercept β_0	-0.6422	-1.1475	-0.7751
x_{gender}	0.0131	0.0120	0.0083
x_{sick_L}	0.0242	0.0236	0.0161
x_{sick_H}	-0.0522	-0.0486	-0.0325
$x_{experience}$	0.05	0.0474	0.0320
$x_{experience^2}$	-0.0005	-0.0005	-0.0004
$x_{sector} \times x_{occupation\ 2}$	0.0229	0.0216	0.0152
$x_{sector} \times x_{occupation\ 3}$	0.0538	0.0536	0.0369
$x_{sector} \times x_{occupation\ 5}$	0.0763	0.0761	0.0521
$x_{sector} \times x_{occupation\ 7}$	0.0893	0.0899	0.0622
$x_{sector} \times x_{occupation\ 8}$	0.1118	0.1143	0.0781
$x_{pension\ replacement\ rate_L}$	0.1016	0.1077	0.0722
x_{region}	0.0305	0.0309	0.0210
$x_{unemp\_benefit}$	-0.3489	-0.3135	-0.2167
$x_{disability}$	-0.0339	-0.0313	-0.0219
$x_{widow\ pension} \times x_{gender}$	-0.015	-0.0148	-0.0102
$x_{employment\ rate}$	0.0038	0.0037	0.0025

Source: estimated by the author

Support was found for *Hypothesis 2*, namely that a higher sickness rate was related to a lower likelihood of participating in bridge jobs. Bridge employment was a less likely option for people who took sick leaves more than ten times in the period of the last ten years. Individuals who were sick more than ten times in the period of last ten years were by 3.2-5.2 percentage points less likely to work than those who were sick less. According to Wang et al. (2008), the health status is one of two most important factors of bridge

[4] Reminder: $x_{occupation\ 2}$ – professionals, $x_{occupation\ 3}$ – technicians and associate professionals, $x_{occupation\ 5}$ – service and sales workers, $x_{occupation\ 7}$ – craft and related trades workers, $x_{occupation\ 8}$ – machine operators and assemblers.

employment. The fact that this study included only sick cases paid by the SSIF budget, and that these variables were significant, shows that the health status is very closely related to bridge employment.

The factor of the x_{sector} in which a person worked was included into regressions with the hypothesis saying that people in the budget sector should be more likely to work in retirement in comparison to the non-budgetary sector. The x_{sector} factor was significant and included in the models and thus led to the conclusion that individuals working in the budget sector were 2 percentage points more likely to stay in the labor market after retirement than those who have worked in the non-budgetary sector.

Higher-skilled workers are more likely to work after retirement. Almost one third of the employed retirees were professionals, 14% were managers, and 14% craft and related trades workers (Table 16). Most unemployed retirees (about 24%) were unskilled workers (Table 16). The factor $x_{occupation}$ included in the models leads us to the conclude that people employed in elementary occupations or skilled agricultural workers were about 20 percentage points less likely to work in comparison to managers, while technicians, clerical support workers, and plant and machine operators were about 14 percentage points less likely to work than managers.

Table 16. Employed and unemployed retirees by occupation (%)

Occupations	Employed retirees, %	Not employed retirees, %
Professionals	27.3	19.3
Managers	13.7	7.6
Craft and related trades workers	13.6	16.7
Elementary occupations	13.2	23.6
Plant and machine operators	11.4	11.0
Service and sales workers	9.2	9.5
Technicians	6.2	6.2
Clerical support workers	5.0	5.4
Skilled agricultural workers	0.4	0.7
Total	100	100

Source: SSIF

After the factors *occupation* and *sector* were combined, the results showed that the probability of managers, unskilled workers and skilled agricultural, forestry and fishery workers staying in the labor market at retirement age does not depend on the sector – it is always higher for managers, and it is significantly lower for unskilled workers than for other professions no matter in which sector an individual works. But the models

showed that professionals working in the budget sector are more likely by 1.5-2.2 percentage points, technicians – 3.7-5.3 percentage points, service and sales workers – 5.2-7.6 percentage points, craft and related trades workers – 6.2-8.9 percentage points, and machine operators – 7.8-11.1 percentage points to engage in bridge employment in the budget sector than people of these occupations in the non-budgetary sector. These estimations show that people in the budget sector are more assured of job opportunities in old age and can continue working more successfully beyond their retirement age, while in the non-budgetary sector, young workers are more in demand, with older ones being less attractive to employers.

Logit and probit models also showed that a higher acquired pension record is related to a higher likelihood of working bridge jobs, which supports *Hypothesis 4*. For each year of pension record, individuals are 3.2-5 percentage points more likely to work. However, since the acquired pension record is high, it does not increase and even decreases the likelihood of working.

Financial factors. The average wage prior to retirement of the employed retirees was 25% higher than of those who were not employed beyond the retirement (Table 17).

Table 17. Characteristics of employed and not employed retirees

	Employed	Not employed
Average wage prior to retirement, Eur	684	547
Average wage beyond retirement, Eur	736	0
Amount of average pension, Eur	308	284
Average experience, years	39	37
Share of worked in budget sector prior to retirement, %	34%	27%

Source: SSIF

Employed retirees had a higher acquired pension record, 39 years, while those not employed had an acquired pension record of 37 years; 34% of employed retirees before retirement worked in the budget sector, while in the non-budgetary sector, this share was only 27%. At first glance, one might get the impression that the average wage beyond retirement was higher than the average wage prior to retirement. However, it should be noted that the average wage prior to retirement was counted as the average wage of the last three years before retirement. If the wage growth is eliminated, the average wage prior or beyond retirement would be similar.

To assess the financial incentives to work for individuals, the pension replacement rate was calculated by dividing the amount of the old-age pension by the wage the person received in the last year before retirement. Factor $x_{pension\ replacement\ rate_H}$ was not significant, thus, only a factor $x_{pension\ replacement\ rate_L}$ was included in the final model. Results showed that people who had less replacement rate of pension are 7.2-10 percentage points more likely to bridge employment when those whose replacement rate is higher. Those who work for a high wage have a lower replacement rate.

Moreover, a higher average wage during an individual's last three years prior to retirement increases the likelihood of participating in the labor market after retirement, which supports *Hypothesis 6*. The result of logarithm of wage is the average change in the probability when wage increases by (about) 10% (because a change in the log of 0.1 is about a 10% increase in wage). Marginal effect was 0.06, so the probability increases by 0.006, or 0.6 percentage points, given a 10% increase in wage but average wage factor was not included into the final models because replacement rate of old age benefit was enough to evaluate financial drivers of bridge employment. The main interest of this research was to determine if a better work position before retirement helps to ensure workplace after retirement. And the results show that a person who had earned a higher average wage before retirement is more likely to stay in the labor market for longer.

Other factors. The models showed that people who received unemployment, disability, or a widow pension are less likely to work after retirement. Widowed women are 1-1.5 percentage points less likely to work beyond the retirement than widowed men. This research also shows that people with disabilities are 2.2-3.3 percentage points less likely to work than individuals without disabilities. One of the reasons of not choosing to work can be the long period of being unemployed, because if a person receives benefits for long time, it is more likely that a person will not start working beyond retirement. On the other hand, these results can show that people with disabilities have less opportunities to work, although they are motivated enough. This research cannot answer these questions, but the financial situation of these people in old age strongly depends on the size of their benefits.

Binary response models showed that the unemployment of a person during their working age can have big influence on their bridge employment, too. A person who has at least once received unemployment benefits in their working age are 21.6-34.8 percentage points less likely to enter post-retirement employment than a person who has not.

Moreover, the region where a retiree lives, as well as the employment rate of the region, can influence the choice whether to work or not. Living in city municipalities increases the probability of bridge employment by 2.1-3 percentage points. This also explains the importance of the employment rate of the municipality a retiree lives in. The results showed that if a retiree lives in a municipality where the employment rate is higher, they are 0.2-0.4% percentage points more likely to work than those who live in municipalities where the employment rate is lower. Therefore, not only individual factors such as occupation and health status are important, but also the place where a retiree lives. This may pose greater challenges in the future, as the gap between districts and big cities will increase as the population ages.

Finally, the time when a person retires can be important too. Macroeconomic factors such as GDP growth were insignificant, which rejects *Hypothesis 13*, but in some variants of the model, GDP growth was significant with a positive sign, showing that retirees will be more likely to work beyond the retirement in good economic times than in bad ones. This correlates with the situation where the share of working retirees decreased in 2009–2011, during the the economic crisis. This shows that older people deciding whether to retire are also affected by an economic environment that makes it easier for retirees to stay in work for longer in good times, but in more difficult times older people are more likely to be laid-off.

Summarizing the results of the binary response and survival models, the analyzed factors are divided into push and pull factors of employment in old age and the results are compared to the results of other authors (Table 18).

Table 18. Push and pull-factors of employment in old age in Lithuania

Push factors	Pull factors
Individual factors	
Older age. The older a person is, the less likely he or she is to stay in the labor market.	*Younger age.* The younger a person is, the more likely he or she is to work.
Bad health. People facing health problems are among the first to leave the labor market.	*Good health and active aging.* Healthier people are more likely to work in bridge jobs than those who have health problems, are less productive or less competent.
Women. Women are less likely to do bridge jobs than men.	*Men.* Men are more likely to work in old age.
Lower qualification. The lower the qualification, the less likely it is that a person will stay in the labor market because less skilled workers are more	*Higher qualification.* The higher the qualification, the more likely it is that a person will stay in the labor

vulnerable and their health deteriorates more quickly.	market because of the special skills and experience available.
Rural region. Living in rural areas decreases participation in labor market due to fewer job opportunities.	*Urban region.* Living in urban areas increases participation in labor market due to wider job opportunities.
Shorter acquired experience. The less years a person worked in labor market, the less the likelihood of working after reaching retirement age.	*Longer acquired experience.* The more years a person worked in labor market, the greater the likelihood of working after reaching retirement age.
Non-budgetary sector. People working in non-budgetary sector are less likely to work longer.	*Budget sector.* People working in budget sector are more likely to work longer.
Financial factors	
Higher pension replacement rate. People who have higher pension replacement rate are less likely to work beyond retirement.	*Higher wage.* Higher pay is associated with higher-skilled work and higher positions at work, so those who work for higher pay tend to stay longer in the labor market.
Other factors	
Facing unemployment. People are less likely to return to the labor market if they lose their job at a pre-retirement age.	*Good economic situation.* In better economic times, older people are more likely to stay in the labor market for longer, and in bad times, they are more likely to retire early or simply fully retire.
Receiving disability pension. Those receiving disability pension during their careers are less likely to work in old age.	
Receiving widow pension. Women receiving a widow's pension are less likely to work than men receiving widow pension.	

Source: compiled by the author

Summarizing the results of the models, it was found out that in the case of Lithuania ***older age***, ***bad health***, ***being a woman***, ***lower qualifications***, ***living in a rural region***, ***shorter acquired experience***, ***working in the non-budgetary sector***, ***a higher pension replacement rate***, ***periods of unemployment***, ***disability, and widowhood were signed out as push factors of employment in old age in Lithuania.***

***Older age*.** Results of this research show that the employment decreases with age, which correlates with the results of other authors (Gobeski & Beehr, 2009; Dingemans et al., 2016; Kim & Feldman, 2000). Age is associated with both deteriorating health and approaching a retirement age. Health is discussed separately in this dissertation in section 5.

Bad health. Poorer health is becoming the biggest limiting factor in labor market participation in old age. In case of Lithuania, sick cases of illness paid from the SSIF were analyzed. Although it was feared that not all cases of illness were covered by SSIF (due to non-compliance with seniority or other requirements, short cases when only employer pays the benefit, and incomplete coverage of insured persons (not all are entitled to sickness benefits), the number of sickness cases in both models for Lithuania was significant and allowed to assess the importance of the health factor in making decisions about the stay of the elderly in the labor market. Therefore, these studies, like those of other authors, reveal that health is an especially important factor determining work opportunities (Kalwij & Vermeulen, 2008; Van Solinge, 2014; Dingemans et al., 2016; Kim & Feldman, 2000; Wang et al., 2008; Damman & Henkens, 2015; Komp et al., 2010; Kalwij & Vermeulen, 2008; Reeuwijk et al., 2017; Zucchelli et al., 2007). This factor is also especially important considering that in Lithuania, after the age of 65, less than half of the remaining years are lived in a relatively healthy way.

Women. Due to the lower retirement age, a larger share of women draws out of the labor market earlier than men. Retired men in Lithuania are more active in the labor market than women. These results correlate with results of Komp et al. (2010), Maestas & Zissimopoulos (2010), Kim & Feldman (2000), Damman & Henkens (2018), Damman & Henkens (2015), Pleau (2010), Shacklock et al. (2009). The situation of women in the labor market is difficult: when men climb the career ladder, women take career breaks to raise children, and during that time their wages are frozen; later, women become even more active than men, but even in pre-retirement and retirement age women leave the labor market earlier than men. In Lithuania, this is determined by the different retirement age and probably family responsibilities, which again call on women to withdraw from the labor market faster. Finally, women live longer than men and at a later point in life must deal with lower pensions by themselves.

Lower qualification. The educational factor was investigated in the works of other authors (Grigoli et al., 2021; Dingemans et al., 2016; Komp et al., 2010; Leenaars, 2010). As in the case of Lithuania, such data is not included in the SSIF database; instead another factor was taken – the occupations of workers. Occupations are grouped into main nine groups

according to the Lithuanian Classification of Occupations. The results showed that low-skilled workers remain in the labor market for a shorter period, and they are less likely to work at retirement age.

Rural region. Living in rural areas also decreases participation in the labor market and this correlates with results of Grigoli et al. (2021). In the models for Lithuania, people living in the municipalities of large cities and those living in the remaining municipalities were analyzed separately. Research has shown that people living in towns and districts are less likely to stay in the labor market longer.

Shorter acquired experience. Work history has been explored by various authors from a variety of angles, ranging from the influence of the form of work (Mohring, 2018; Kim & Feldman, 2000) to career breaks (Bussolo et al., 2015; Dingemans et al., 2016). For example, Dingemans et al. (2016) found that particularly those who experienced an involuntary career exit were found to have a higher probability of being unsuccessful at finding bridge employment. Regarding work histories, the findings showed that retirees who had a steep upward career path in midlife are less likely to miss money/income, are equally likely to miss social contacts, and more likely to miss their status compared with those that did not experience upward mobility (Damman et al., 2015). In the case of Lithuania, the length of service acquired during the entire career for receiving an old-age pension was examined. In case of Lithuania it is expressed in years, but if a person does not earn 12 minimum wages per year, he or she is not credited with a full year of service; therefore, in individual cases it may be that the person has worked a part-time full year and has less than a year of service acquired to receive the old age benefit, but it would be equal to one year of experience. Such data is chosen because such administrative data are available, and they also reveal some significant trends. Individuals with lower length of service were less likely to work at retirement age. Thus, it is not those with low length of service and low pensions who work in retirement age more often, but those with long experience and higher pensions are more likely to work.

Non-budgetary sector. Models have shown that older workers in Lithuania work shorter in the non-budgetary sector. Fontaine et al. (2020) also calculated that the probability of a worker losing his job is higher in the non-budgetary sector. This stimulates a discussion about the differences between sectors and the fact that the non-budgetary sector is less friendly to older workers.

Higher pension replacement rate. Researchers' results differ when it comes to the impact of retirement on employment at retirement age. Some authors find that the higher old-age pensions are, the more attractive

retirement is (Sarfati, 2008; Bussolo et al., 2015). Some authors find that pension benefits are not significantly related to bridge employment (Kim & Feldman, 2000). To find out in the case of Lithuania whether the amount of the pension influences the decision to stay in the labor market longer, the replacement rate of the old-age pension was assessed. The results showed that if the replacement rate of the pension is higher, the person is less likely to work for a long time, and if the replacement rate is low, the person is more likely to work. As if theory dictated that a small pension should encourage work and additional income, but the results of the models showed that these people, who seem to have a greater motivation to work, either do not choose to work or do not get a job. So, as if a conclusion should be drawn the low income or poverty factor doesn't work in case of Lithuania. But, of course, such statements are valid only on the assumption that there is no shadow economy. The study does not cover the shadow economy because of the use of administrative data, and it is likely that low-pension earners are more likely to work illegally than those receiving higher pensions, so some caution is needed in interpreting this indicator. Perhaps beneficiaries of small pensions may work but more frequently informally.

Facing unemployment, receiving disability benefits or a widow's pension. The results of this study listed up to now are very close to the results of other authors, but what sets this work apart from others is the inclusion of factors such as being a beneficiary of various social insurance benefits and pensions. As the aim of this work was to deepen the research space through the use of administrative domains, the factors of receiving unemployment, widow and disability pensions were selected as a way to represent whether a person will stay in the labor market longer. The literature review did not find that the authors analyzed the receipt of social security benefits as a factor related to employment. However, it examined the factor of work history, which was partially revealed by the analysis of the period of receiving unemployment benefit. Like the results of Bussolo et al. (2015) and Dingemans et al. (2016), the results of this thesis showed that older workers who lose a job face the greatest challenge in finding a new one. Already statistics have shown that older people receive unemployment benefits for a relatively longer period of time, and an analysis of early retirees has shown that people retire early. This shows that some people find it difficult to reach retirement age and there are areas where employment issues should be addressed. Work history and unemployment periods have big impact on staying at labor market. Like the results of Bussolo et al. (2015), Dingemans et al. (2016), the results of this thesis showed that older workers who lose a job face the greatest challenge in reentering the labor market. The analysis of

the factor of receiving a disability pension allowed to see the importance of the health factor even more arguably, as people who received a disability pension before the pre-retirement age tended to remain in the labor market for a shorter time. The same is true of the widowhood factor, which is also significant, especially considering that in Lithuania women live longer than men and are less likely to work in old age.

Also, summarizing the results it was found that in the case of Lithuania ***younger age***, ***good health and active aging***, ***being a man***, ***higher qualification***, ***longer acquired experience***, ***living in an urban region***, ***working in the budget sector***, ***having a higher wage, and retiring in better economic times were signed out as pull factors of employment in old age in Lithuania.***

Younger age. As mentioned above, younger age contributes to a higher employment rate. Being younger faces fewer health restrictions and makes it easier to find a job. With age, as health deteriorates, employment begins to decline. It should be noted that the participation in the labor market after reaching the retirement age in the first year is often still similar, especially if there was no unemployment in the pre-retirement age. Later, as in other works, it is acknowledged that age dictates poorer health and a natural withdrawal from the labor market.

Good health and active aging. By analogy with the above, better health does not create additional barriers to exit the labor market. Thus, it is one of the most important factors that determines whether a person can work in general, and even in the presence of poor health is able to enter and stay in the labor market. Thus, the results of the study correlate with the statement that good health makes bridge employment possible to do (Wang et al., 2008). Active aging is also important in the context of these factors and is strongly related to the health factor. As it was mentioned above, active aging includes people's active contribution to society through volunteering, sports, healthcare, and the ability to live independently through adapted housing and infrastructure. Participation in public life, involvement in work and other activities contributes to improving health and, at the same time, to opportunities to work longer. Although it was not possible to measure this factor using administrative data, the health factor shows that health problems prevent higher employment in retirement very quickly, even before the retirement age, and promoting active aging could improve this situation.

Men. Men's careers can continue with fewer intermissions than those of women. When women drop out of the labor market due to raising children, men leave less in this respect and can thus accumulate their experience, skills and take care of wage growth more easily. Other researchers who analyzed

the gender factor found that different factors play on women and men's choice to bridge employment (Pleau, 2010; Beutell & Schneer, 2020; Shacklock et al., 2009). Unfortunately, due to a lack of data, the research in this dissertation did not include an analysis of family factors.

Higher qualification. As it was mentioned above, the occupation factor was included into the models, and the results showed that in Lithuania managers are more likely to stay in the labor market longer than others. This shows that these people are on demand in old age. This is partly related to the results of other authors, who have shown that those seeking higher education need more time to study and need to work later in life due to their long educational phase (Leenaars, 2010). On the other hand, perhaps managers in older age can retain their jobs more easily (have more power to direct such decisions and move them away), and if a person does not occupy a managerial position it is easier for them to be replaced by a younger worker. Such a discussion would require more detailed data, or rather survey data, because it is not possible to see in any way from administrative data whether older employees stay at work more often because of their distinctive features or because the manager's position by itself avoids greater change.

Urban region. Living in urban areas increases participation in the labor market and this correlates, as it was mentioned above, with the results of Grigoli et al. (2021). In the models for Lithuania, people living in the municipalities of large cities and those living in the remaining municipalities were analyzed separately. Research has shown that people living in big cities are more likely to stay in the labor market longer. There are more jobs in bigger cities and finding a job there is easier. This was also shown by the studied employment rate, when in municipalities where employment is higher, older people are also more likely to work longer.

Longer acquired experience. As mentioned above, the inclusion of the experience factor in the models showed that people with higher experience choose to work longer. This leads to the rejection of the motives that perhaps those who have a lower length of service and receive a lower pension are more likely to work in old age (Cahill et al., 2006). It would be difficult to agree with researchers Dingemans & Henkens (2019) and Sandor (2011) who argue that retirees may choose to work beyond the retirement to get life satisfaction, not to lose social relationships. The data are not sufficient to draw such conclusions as to whether they remain in the labor market because they want to extend social ties, or whether they simply have the opportunity to remain in the labor market and take advantage of it for financial reasons. Although the same motive is unclear, in the case of Lithuania a clear message emerges that those with a higher length of service and receiving a higher pension have

better opportunities to work longer, while those with a lower length of service and receiving a lower pension more often leave the labor market earlier.

Budget sector. In the budget sector, older workers stay in work longer. In general, the sector provides more benefits in terms of time worked, so it seems that even after retirement age, people have the opportunity to continue working. This could be a significant reflection in further discussions on possible measures that could be taken to encourage people to work longer. The budget sector seems to be an example to the private sector on how to enable older workers to work longer by assessing their experience and capabilities. This separation of sectors is not popular in the works of authors, but in the case of Lithuania it showed rather significant differences between these sectors.

Higher wage. The impact of wages is also assessed in different ways in works of other authors (Kim & Feldman, 2000; Cahill et al., 2006), but this is highly dependent on the conditions in the country for working retirees. Authors find a U-shaped relationship between the pension and employment rate, meaning that retirees with a low as well as high income status are likely to work after retirement (Cahill et al., 2006). The results of the models in this thesis show that those who have higher wages also have longer employment duration. This suggests that a person feels more comfortable in the labor market and can stay in it longer, and in the face of unemployment such a person is able to remain in this state for a shorter period. As it was mentioned above, this is due to higher-skilled work being paid more, which means that a higher-wage earner is less frequently replaced by another employee due to the investment in the employee and the acquired qualifications that a low-skilled worker would not possess.

Good economic situation. In better economic times, older people are more likely to stay in the labor market for longer, and in bad times, they are more likely to retire early or retire fully. Both in the survival analysis, when the situation of one cohort was examined, and in the binary response models, when cross-sectional data were used, this statement cannot be defended more strongly. However, a descriptive analysis and some of the factors included in the models suggest that time series research would prove that in good times older people work longer, but older workers face significant challenges in times of crisis. The situation of crisis is discussed in the next section when examining changes in the employment of older people during the Covid-19 pandemic.

Thus, the studied factors determining employment in old age in the case of Lithuania revealed a gap between two groups: those who work in higher-skilled jobs and earn higher wages and those who work in lower-skilled jobs

and who later receive a lower pension. This corresponds with insights provided by Bussolo et al. (2015). Lower-earned people are less likely to work possibly for a variety of reasons – health problems, possible negative attitudes towards older workers, lack of skills, etc. The attitude factor will not be examined from the administrative data, but other studied factors, such as health, the importance of the sector, and region suggest that there are still many conditions for addressing employment issues in old age that can be improved to increase that employment of older people. Recommendations for public policy will be formed in the section of conclusions and recommendations.

5. THE IMPACT OF THE COVID-19 PANDEMIC ON OLDER WORKERS IN LITHUANIA

The Covid-19 pandemic may affect not only public health but also economic, political, and social phenomena. During the first wave of the pandemic in 2020, when the first quarantine was announced in Lithuania, which lasted from the 16th of March to the 16th of June, labor market participants began to face difficulties: some sectors had to suspend their activities throughout the quarantine, others were able to operate, but their activities were severely affected by the entire pandemic situation in the country. A similar situation repeated after the introduction of the second quarantine which was announced on the 4th of November in 2020 and lasted until the 1st of July in 2021. The pandemic has led to an increase in the number of people who have been unable to work and the number of layoffs. This section discusses the impact of the Covid-19 pandemic on older workers' employment in Lithuania. Therefore, in the perspective of this thesis, it is important to make at least initial insights into the impact of the pandemic on the employment of elderly, as this health crisis is likely to affect the labor market in the long run, leaving new trends and new lessons learned.

In the first subsection, a literature review is presented, and in the second one a descriptive analysis of older people employment in Lithuania is done. Then binary response models are created for elderly employment during the pandemic in Lithuania, and the results are discussed in the third and fourth subsections respectively.

5.1 Literature review

Because of the higher mortality rate among older people infected with the Covid-19 virus, particularly among people over 60, including the baby boomer age cohort (approximately between the ages of 56 and 74), Covid-19 has been nicknamed the "boomer remover" virus (Whalen, 2020). One of the most concerning negative responses to older adults during the pandemic have been potentially discriminatory health care practices (Monahan et al., 2020). Countries who were faced with overcapacity and shortages of supplies in hospitals implemented medical triaging, where older adults were considered the lowest priority for care and access to life-saving resources (Monahan et al., 2020).

Thus, some older adults faced neglect and blatant displays of ageism and were considered the lowest priority patients for receiving healthcare during the pandemic (Monahan et al., 2020). Ageism is defined by the APA

Dictionary of Psychology as the tendency to be prejudiced against older adults and to negatively stereotype them (for example as unhealthy, helpless, or incompetent) and the resulting discrimination, especially in employment and in healthcare.

However, older workers are a very heterogeneous group (Fingerman & Trevino, 2020; Arya et al., 2020). As Fingerman & Trevino (2020) state, some older adults are disappointed that they had to cancel a mountain-climbing trip in Nepal, while other older adults may be medical personnel contributing in vital ways to dealing with the healthcare crisis; still other older adults are sick, frail and living either alone, in multigeneration households, or in nursing homes. Akkermans et al. (2020) found that particularly those older people who have previously worked in healthcare work more or even come out of retirement to help deal with the high demands in the pandemic.

Thus, the Covid-19 pandemic will have a wide range of effects on older people; two areas of exposure are most identified in this thesis: *health* and *economic consequences*, which are presented below.

Health effects on older people are examined in three dimensions: *(1) higher mortality, (2) more residual clinical damage,* and *(3) effects on mental health*.

(1) Older people have a higher mortality rate from the Covid-19 virus. It works primarily through the fact that higher rates of mortality from Covid-19 are among older people rather than younger ones (Zhou et al., 2020; Chan et al., 2020; Arya et al., 2020). Covid-19 kills an estimated 13.4% of patients 80 and older, compared to 1.25% of those in their 50s and 0.3% of those in their 40s (Zhou et al., 2020). Older patients, aged 60 years and over, had more systemic symptoms, extensive radiological ground-glass lung changes, lymphopenia, thrombocytopenia, and increased C-reactive protein and lactate dehydrogenase levels (Chan et al., 2020). Another aspect is the lower focus on other diseases, especially at the beginning of a pandemic. In April of 2020, Morrow-Howell (2020) noticed that "support services are jeopardized, the health-care system has narrowed its focus to managing Covid-19 cases, meaning other health-care appointments and procedures are being delayed" (p. 528). Thus, the pandemic has had and continues to have a higher direct impact on the health of the elderly and reduces access to healthcare for people with other diseases, especially during peaks of the Covid-19 pandemic.

(2) Older people have more serious residual clinical damage after Covid-19. Morrow-Howell (2020) noticed that "older adults who have contracted the coronavirus may have increased health vulnerabilities" (p. 528). Schumaker (2020) identified that "the long-term effects of being put on a ventilator could become a reality for hundreds of thousands of Americans."

Shi et al. (2020, p. 809) found that "cardiac injury is a common condition among patients hospitalized with Covid-19, and it is associated with a higher risk of in-hospital mortality." Thus, not only are older people at greater risk of more complicated recurrence, but they are also at higher risk of more serious residual clinical damage, which worsens people's health and well-being and, of course, reduces their chances of continuing to participate in the labor market.

(3) Covid-19 affects not only physical health but also mental health. Morrow-Howell (2020, p. 529) highlighted that "during this pandemic, older adults have received stricter directives on social distancing, as they were one of the first groups encouraged to stay home." Miller (2020) summarized that "local, regional, and national government actions taken to mitigate the spread of Covid-19 have thus served, in part, to shield older adults from the virus, though not without adverse side effects, including increased social isolation, enhanced economic risk, revealed ageism, delayed medical treatment, and challenges getting basic needs met." These difficulties and limitations affect psychological health, which is no less important than physical health.

The economic effect of a pandemic on older people is that while it has not affected them in any way more than other age groups, it, like other crises, becomes a major challenge for those who have lost their jobs anyhow, as it is more difficult for older people to return to work. The following is a discussion of ***(1) how the pandemic may affect the participation of older people in the labor market***, and ***(2) the challenges faced by those who still lose their jobs during the pandemic***.

(1) Recessions hit older workers less frequently than younger ones. Johnson & Butrica (2012) found that during the economic downturn, since December 2007 to June 2009 layoffs were less common among older workers who had many years of service with their employers than among their younger counterparts who had less seniority, but older adults took longer to find work when they lost their jobs. During the 2009 economic crisis, younger workers experienced higher unemployment rates than older workers (Johnson & Butrica, 2012). Eichhorst (2014) also argued that it is evident that young people have suffered most from the recent crisis in terms of rising unemployment and declining employment, while at the same time the employment rates of older workers have been more resilient and less responsive to the crisis, owing to the withdrawal of early retirement incentives and a more stable employment position compared to younger labor market entrants. There are those who argue that older workers were not harmed disproportionately in this pandemic. Munnell & Chen (2021) showed that this recession has not hurt older workers more than other groups. By analyzing the

employment outcomes, Munnell & Chen (2021) found that workers aged 55-64 and 65+ fared about the same as prime-age workers and better than younger workers.

(2) It will be more difficult to find a new job for an older worker if they lose it. During the great recession in 2009, unemployed older people had greater difficulty becoming reemployed; it is calculated that those in their fifties were about five times less likely than those aged from 25 to 34 to become reemployed (Neumark & Button, 2014; Johnson & Butrica, 2012). Workers unemployed for at least a month during the Great Recession experienced substantial pay cuts when they became reemployed (Johnson & Butrica, 2012). The earnings shortfall increased with age. For example, median monthly earnings declined 23% after an unemployment spell for reemployed workers aged from 50 to 61, compared with just 11% for workers aged from 25 to 34 (Johnson & Butrica, 2012). Morrow-Howell (2020) argued that the Covid-19 pandemic will lead to the same consequences: although younger workers might fare worse with initial job loss, older workers will fare worse in reentering the workforce. Morrow-Howell (2020) also predicted that if earlier before the Covid-19 pandemic older workers worked longer because they wanted to and because they needed to, after the pandemic more of them will "need to" to make up for lost income and savings.

There are also those who believe that this pandemic will affect older people more negatively than previous crises in many other ways. Older workers that are laid off but near retirement age may face difficulty finding new employment, while Covid-19 could act as a push factor towards retirement, particularly for those that are financially able to retire (Truxillo et al., 2020). Physical and psychological risks of the Covid-19 pandemic for older workers are not uniform but depend on the socioeconomic context. Kanfer et al. (2020) found that both the overall health risk and financial risk for older workers engaged in low-wage work is substantially higher than for high-wage workers. There are researchers who are looking at how older workers will be affected by working from home (Truxillo et al., 2020; Kanfer et al., 2020). Ability to work from home now becomes an important antecedent of work ability for workers of all ages, and given the known relationship between health and work ability, Covid-19 is likely to have stronger negative effects on work ability for older workers, especially for those who cannot work remotely (Truxillo et al., 2020) and who appreciate workplace sociality (Kanfer et al., 2020). Kanfer et al. (2020) argue that working from home becomes a challenge to sharing time between work and family, which may increase stress and family conflict (Kanfer et al., 2020).

The Covid-19 pandemic has hit the employment of women the hardest. Despite the fact that biologically women are not more at risk to Covid-19 than men are, it seems that women are taking higher risks in this crisis than men (ILO Monitor, 2020; OECD, 2020; Blasko et al., 2020). Firstly, women account for a large proportion of workers in front-line occupations, especially in the health and social care sectors (ILO Monitor, 2020; OECD, 2020). Long working hours in intensive care units, a lack of personal protective equipment and other resources, understaffing, and intense emotional stress expose health workers to higher risks of infection and transmission, especially in low- and middle-income countries (ILO Monitor, 2020). Secondly, women traditionally do a disproportionally large share of care work and other duties in households, and they are also likely to be more affected by increased care duties during the crisis (Blasko et al., 2020; ILO Monitor, 2020). The closures of early childhood education centers, care services and schools, along with the unavailability of older relatives to provide support, have exacerbated care demands during the crisis (ILO Monitor, 2020; OECD, 2020). Looks like Covid-19 will amplify women's unpaid work burdens. For example, the widespread closure of schools and childcare facilities will not only increase the amount of time that parents must spend on childcare and child supervision, but also force many to supervise or lead home schooling. Much of this additional burden is likely to fall on women. Similarly, any increases in time spent in the home due to confinement are likely to lead to increased routine housework, including cooking and cleaning. Fulfilling these demands will be difficult for many parents, especially for those that are required to continue working (OECD, 2020). These demands include the pressure on at least a small fraction of men to take over part of the traditional female duties; the increased visibility of several feminized and under-recognized occupations; and the rapid spread of telework opportunities, which could potentially reshape men and women's work-life balance in the future (Blasko et al., 2020). Thirdly, in contrast to previous crises, women's employment is at greater risk than that of men, particularly owing to the impact of the downturn on the service sector (ILO Monitor, 2020). In recent recessions such as the one in 2008, men lost their jobs more often than women. One of the reasons is that relatively more men work in industries affected by downturns while women work in less cyclical sectors such as education or health care (ILO, 2020). Women's labor supply is less volatile than men's labor supply. Moreover, for women, cyclical volatility constitutes a smaller fraction of total volatility compared to men; less of the variation in female labor supply is related to aggregate economic fluctuations (Alon et al., 2020). The ILO has rated four sectors as being at high risk of severe Covid-19 impact

in terms of job losses and a decline in working hours: accommodation and food services; real estate, business, and administrative activities; manufacturing; and the wholesale/retail trade (ILO Monitor, 2020). In 2020, 527 million women, representing 41% of total female employment, were employed in these sectors, compared to 35% of total male employment (ILO, 2020). Collins et al. (2020) found out that mothers with young children have reduced their work hours four to five times more than fathers and the gender gap in work hours has grown by 20-50%.

ILO identified four areas in which the crisis is disproportionately affecting women workers (ILO Monitor, 2020): *(1)* a large proportion of women work in sectors severely affected by the crisis; *(2)* women in domestic work have been highly vulnerable to containment measures; *(3)* most workers in the health and social work sector are women; *(4)* during the crisis, the unequal distribution of increased care demands affects women disproportionately.

Bui et al. (2020) noted that increased mortality among older people can also make older women more likely to become widowed. Burn et al. (2020) showed that the chance of becoming widowed increases poverty among older women, since widowed women face high poverty rates. Thus, pandemics may put older women at higher risk.

A pandemic can also bring some opportunities for the elderly. Positive changes can come from ***(1) increased levels of technology use***, ***(2) more valued family connections***, and ***(3) time management***.

(1) Even more interest in and learning to use technology. During the pandemic older adults with stronger skills for learning new technologies are likely to have greater success and less stress in making the transition to work in communication technology platforms (Kanfer et al., 2020). It is possible that the pandemic has led older people to become accustomed to information technology, as it has helped them to keep in touch with colleagues and family members living alone during the pandemic.

(2) Familial connections. In the absence of regular family dinners and celebrations, people were missing these interactions and started appreciating their importance more with younger people, creating opportunities to help older adults in need of ongoing social contact or grocery shopping (programs examples “Zoomers to Boomers” or “Students to seniors” (Morrow-Howell, 2020, p. 531).

(3) Time management. Separated from jobs, professional connections, volunteer and grandparent roles, and routine social gathering, people are learning how to use time (Morrow-Howell, 2020, p. 532). So, there are those who believe that a pandemic leaves a lot of lessons in both time planning and

communication organization and use of information technology, and these things can drive older people forward in the future and help them be more active. And if companies provide more opportunities to work flexibly after a pandemic, it can also be an opportunity for older people to work longer.

To provide some preliminary evidence on the impact of the pandemic on workers, some authors focus on an *analysis of such variables as the employment-to-population ratio, the unemployment rate, and the labor force participation rate* (Coibion et al., 2020; Bui et al., 2020), *layoffs during pandemic* (Munnell & Chen, 2021) or *only a theoretical discussion of the potential impact of a pandemic on older workers* (Truxillo et al., 2020; Morrow-Howell, 2020; Kanfer et al., 2020; Li & Mutchler, 2020). In the case of Lithuania, trends in activity, employment and unemployment rates by age and gender, and change in the number of insured persons will be discussed next.

5.2 Descriptive analysis

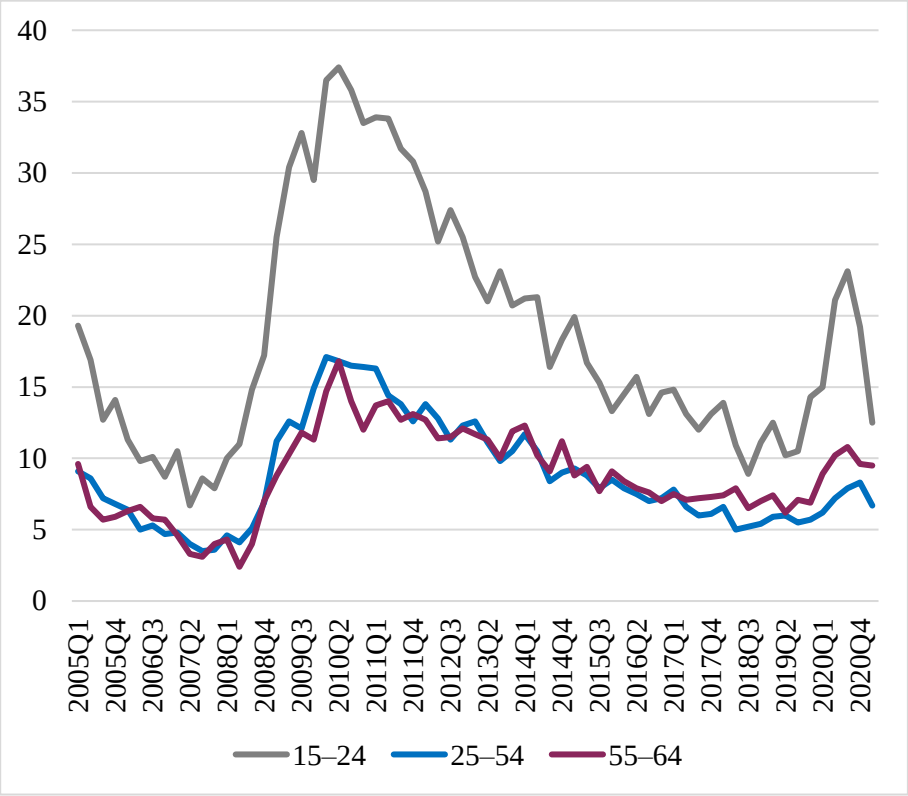
Due to the pandemic, with the introduction of quarantine and restrictions on economic sectors, the unemployment rate started to grow in Lithuania. In the second quarter of 2020, compared to the second quarter of 2019, the unemployment rate increased by 2.4 percentage points from 6.1 to 8.5% (Figure 32). In the third quarter of 2020, it rose to 9.3% and stood at 9% at the end of the year.

However, the unemployment rate did not grow uniformly in all age groups. The unemployment rate during the year (comparing 2020 Q2 with 2019 Q2) increased by 10.2 percentage points in the 15-24 age group, by 1.2 percentage points in the 25-54 age group, and by 4 percentage points in the 55-64 age group. At the end of 2020, the unemployment rate in the 15-24 age group was 19.2% (+ 4.9 percentage points compared to the end of 2019 when it was 14.3%), in the group of 25-54 years – 7.9% (+2.2 percentage points compared to the end of 2019 when it was 5.7%), and in the 55-64 age group – 9.6% (+2.7 percentage points compared to the end of 2019 when it was 6.9%). Thus, the unemployment rate increased the most among the youngest people in 2020, while the unemployment rate among older people aged 55-64 increased similarly to that in the 25-54 age group. Thus, unemployment rate data do not show a more negative impact on the elderly than on other workers.

The following analysis compares changes in employment rates with those at the beginning of the 2009 economic crisis, as other authors relied on an analysis of the situation of latest crisis to try to predict the impact that a pandemic may have on older workers. Table 19 summarizes the changes in all

activity rate, the employment and unemployment rates in 2019 Q3 to 2020 Q3 and shows changes in employment, activity rate and unemployment rates around the time of the Covid-19 crisis and during financial crisis in 2009.

Figure 32. Unemployment rate by age (%), 2005Q1-2021Q1



Source: Statistics Lithuania

During the recession at the end of 2009, the activity rate fell only among young people, and more among men than among women (-5.1 percentage points of men and -0.8 of women) (Table 19). Men's employment rate in the 15-24 age group fell twice as much as that of men aged 55-64 (-11.5 percentage points vs. -4.7 percentage points), while that of women aged 15-24 fell by 3.9 percentage points (23.8% in 2008 Q3 vs. 19.9 % in 2009 Q3), and the employment rate of women aged 55-64 fell by 1.6 percentage points (49.7% in 2008 Q3 vs. 48.1% in 2009 Q3). Unemployment has risen mainly among the youngest participants in the labor market. The unemployment of people aged 15-24 increased by 18.0 percentage points and unemployment rate of people aged 55-64 increased by 7.8 percentage points.

Comparing the impact of Covid-19 on activity and employment, the third quarters of 2020 and 2019 are compared. Activity rates during the Covid-

19 pandemic also fell more among young people than among older ones (Table 19).

Table 19. Activity rate, employment rate and unemployment rate (%) in 2008-Q3, 2009-Q3, 2019-Q3, 2020-Q3 by age groups and gender

	Ages 15-24			Ages 25-54			Ages 55-64		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
Activity rate									
2019 Q3	38.8	40.3	39.5	91.7	88.6	90.2	72.6	72.3	72.4
2020 Q3	36.8	36.4	36.6	90.3	88.7	89.5	76.6	75.3	75.9
p. p. change	-2.0	-3.9	-2.9	-1.4	0.1	-0.7	4.0	3.0	3.5
2008 Q3	36.5	27.9	32.3	87.6	84.4	85.9	61.7	51.6	56
2009 Q3	31.4	27.1	29.3	89.1	86.6	87.8	63.8	52.7	57.5
p. p. change	-5.1	-0.8	-3.0	1.5	2.2	1.9	2.1	1.1	1.5
Employment rate									
2019 Q3	33.9	36.9	35.4	85.9	84.4	85.2	66.7	67.7	67.3
2020 Q3	27.6	28.8	28.2	83.0	81.8	82.4	67.4	68.0	67.7
p. p. change	-6.3	-8.1	-7.2	-2.9	-2.6	-2.8	0.7	0.3	0.4
2008 Q3	31	23.8	27.5	83.2	80.0	81.5	58.9	49.7	53.7
2009 Q3	19.5	19.9	19.7	75.5	78.7	77.1	54.2	48.1	50.7
p. p. change	-11.5	-3.9	-7.8	-7.7	-1.3	-4.4	-4.7	-1.6	-3.0
Unemployment rate									
2019 Q3	12.7	8.2	10.5	6.3	4.7	5.5	8.1	6.3	7.1
2020 Q3	25.1	20.9	23.1	8.1	7.7	7.9	12.1	9.7	10.8
p. p. change	12.4	12.7	12.6	1.8	3.0	2.4	4.0	3.4	3.7
2008 Q3	14.9	14.7	14.8	5.0	5.2	5.1	4.5	3.6	4.0
2009 Q3	38.0	26.6	32.8	15.3	9.1	12.1	15.1	8.7	11.8
p. p. change	23.1	11.9	18.0	10.3	3.9	7.0	10.6	5.1	7.8

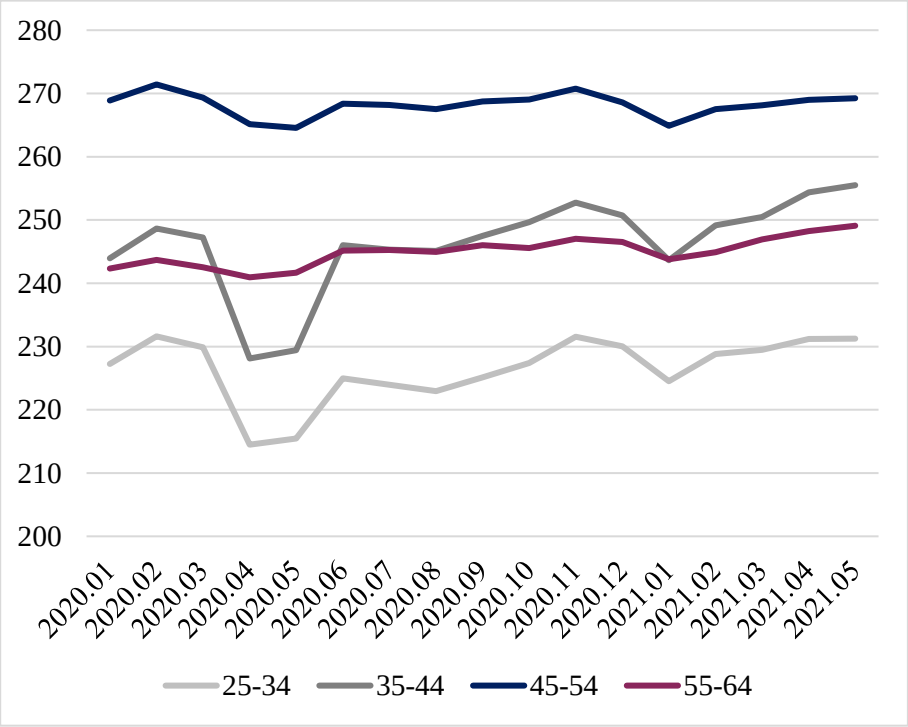
Source: compiled by the author, data of Statistics Lithuania

During the pandemic in 2020, the activity rate fell among people aged 15-24 and people aged 25-54 (-2.9 and -0,7 percentage points, respectively). Employment rates fell the most among people aged 15-24 (-7.2 percentage points). And in contrast to the third quarter of 2009, employment decreased more for women than for men (-8.1 and -6.3 percentage points, respectively). Unemployment has risen mainly among the youngest participants in the labor market. The unemployment of people aged 15-24 increased by 12.6

percentage points, while the unemployment rate of people aged 55-64 increased by 3.7 percentage points. Thus, as during the 2009 economic crisis, a higher increase in the unemployment rate was recorded among the young than among the elderly, but in contrast to the 2009, greater negative changes were recorded among women than among men, which may have been caused by the reasons reviewed in the literature analysis (increased need for childcare and a strong impact on the female-dominated service sector).

In the first months of quarantine, the number of insured persons who worked in Lithuania for the whole month decreased. The fall was different in different age groups, in April, compared to February, the number of insured persons aged 25-34 decreased by 7.4 %, those aged 35-44 – by 8.3 %, those aged 45-54 – by 2.3 %, 55-64 year – 1.1 % (Figure 33).

Figure 33. Number of insured persons who worked full month (thousand persons), from January of 2020 to May of 2021



Source: compiled by the author, data of SSIF

It is important to distinguish between economic activities in the analysis of a pandemic, as the existing restrictions differed according to what activities the company carries out and whether it can work through quarantine without any restrictions, and this has resulted in different effects of the pandemic on

different sectors. The following are the three activities with the largest decrease in the number of insured persons during the year from February of 2020 to February of 2021, and the three activities with the highest total number of insured persons, indicating how the total number of insured persons changed in these activities, including the number of insured persons aged 55-64 and the share of insured persons in that economic activity (Table 20).

Table 20. Change in the number of insured persons in economic activities (%), from February of 2020 to February of 2021

Economic activity	Annual change (%) in the total number of insured persons (2021.02 comparing to 2021.02)	Annual change (%) in the number of insured persons aged 55-64 (2021.02 comparing to 2021.02)	Share of insured persons aged 55-64 of total insured persons in that activity (%) in 2020.02
Activities where the number of insured persons decreased the most			
Accommodation and food service activities	-20.3	-12.5	15
Administrative and support service activities	-7.1	-6.5	22
Arts, entertainment, and recreation activities	-5.5	-0.7	24
Activities where the total number of insured persons is the highest			
Wholesale and retail trade, repair of motor vehicles and motorcycles	-3.2	0	17
Manufacturing	-2.6	-1.3	21
Transport and storage	0.4	-0.6	18

Source: compiled by the author, data of SSIF

Relatively, the highest share of insured persons aged 55-64 among all insured persons is in water supply activities (38%), electricity and gas supply (34%), education (33%) and human healthcare activities (30%), while the lowest in information and communication (7%) and financial and insurance activities (9%). During the year, the number of insured persons decreased the most in accommodation and food service activities (-20.3%), administrative and support service activities (-7.1%) and arts, entertainment, and recreation activities (-5.5%), and the number of insured persons aged 55-64 in these activities decreased by 12.5%, 6.5% and 0.7%, respectively. In these activities, the share of older insured persons amount to 15-24%. In the

activities where the largest number of insured persons work, for example wholesale and retail trade or manufacturing, the number of insured persons decreased by about 3%. Most insured persons aged 55-64 work in manufacturing, education and wholesale and retail trade. Thus, the share of older people working in the most affected quarantine activities is not very high, and their numbers in those activities have decreased at a similar rate as people in other age groups or less. Thus, these data also do not show a relatively greater negative impact on older labor market participants.

5.3 Models and data

The impact of the Covid-19 pandemic on employment is poorly modeled, and statistical analysis of data is mainly performed in the first half of 2021. In this dissertation, it was chosen to collect data and create binary response models to measure the probability of workers aged 55-64 to stay at their jobs during the Covid-19 pandemic. For the study, data were collected on insured persons aged 55-64 who worked in the non-budgetary sector throughout February 2020. Data were collected about the insured persons working in manufacturing, wholesale and retail trade, repair of motor vehicles and motorcycles (further abbreviated wholesale and retail trade), construction, accommodation and food service industries; administrative and support service industries, transportation and storage (further abbreviated transportation), as well as information and communication industries (economic sections according to the Classification of Economic Activities). The included insured persons comprise 77% of the total number of insured persons in this age group working in the non-budgetary sector. These activities were chosen either because of the largest number of insured people (for example, in the manufacturing, wholesale and retail trade industries) or because of the potentially greater impact of the pandemic on these sectors (for example, accommodation and food service industries). The comparison also includes information and communication activity, where the number of insured persons aged 55-64 is small and the impact on the sector is lesser, targeting to compare the situation of these people in relation to other activities as well. Data on insured persons were not included about working in human health and social work activities, education, professional, scientific, and technical activities, public administration and defence, financial and insurance activities, mining and quarrying, agriculture, forestry and fishing, electricity supply, water supply, etc. In total, data on 132 thousand insured persons were collected for the survey, of which 23.0 thousand did not work after a year. One point four thousand people of the unemployed were out of work because they

either began to receive an early retirement pension or a retirement pension. These 1.4 thousand people were excluded from the study.

The dependent variable is equal to 1 if an individual received wage in February of 2021 and is equal to 0 if an individual did not receive work income, it means he did not work. Gender, age, wage, unemployment benefit factor, economic activity were selected as independent variables (Table 21). A hypothesis is formulated and each factor is presented below.

Table 21. Factors that are explored as being able to influence the employment during pandemic

Individual factors	Financial factors	Other factors
Gender H_1 Age H_2 Economic activity H_3	Wage H_4	Unemployment benefit beneficiary H_5

Source: compiled by the author

Individual factors. Based on the literature analysis above, it can be expected that older women were more likely to lose their jobs than men due to increased need for childcare and a strong impact of the pandemic on the female-dominated service sector. In light of the foregoing, the following hypothesis is formulated for workers aged 55-64:

Hypothesis 1. Women are less likely to work one year after the start of the pandemic than men.

As it was mentioned above in literature review, the pandemic may be more dangerous for older people than for younger ones, so the older a person may have been, the more likely he or she may be to leave the labor market for health reasons, avoiding the virus, telecommuting challenges, or other reasons. This can be concluded with the following hypothesis:

Hypothesis 2. The older an individual is, the more likely they are to leave the labor market during a pandemic.

Economic activity is important in this analysis because different sectors were affected differently by the pandemic and ensuing quarantine. Some activities were more strictly restricted (such as accommodation and food service activity, administrative and support service activities, to which tourism enterprises belong), while others were less strictly limited (such as

manufacturing or wholesale and retail trade). In the light of the foregoing, the following hypothesis is formulated:

Hypothesis 3. Older workers working in the economic industries most affected by the introduction of quarantine, such as administrative and support service activities and the accommodation and food service activities, may be more likely to leave the labor market during the pandemic.

Financial factors. This study considers the wage received by a person in February of 2020. Low pay indicates less qualified work, while higher salaries signify higher qualifications. It is likely that even during the pandemic, those who earn more stay at jobs more easily and those who earned less were more likely to lose their income. Therefore, another hypothesis is formulated saying that:

Hypothesis 4. People who earn higher wages are more likely to maintain their jobs during the pandemic.

Other factors. If an individual loses their job and qualifies for unemployment benefits, they can receive these benefits for 9 months. The unemployment benefit factor is included to determine whether people who began receiving unemployment benefits last year returned to the labor market at the beginning of 2021. In the light of the foregoing, the following hypothesis is formulated:

Hypothesis 5. People who started receiving unemployment benefits at the start of the pandemic are likely to have not yet returned to the labor market after the year.

A linear probability model and binary probability models will be developed for Lithuanian data. The linear probability model is defined as follows:

$$P(y = 1 \mid x) = \beta_0 + \beta_1 x_{gender} + \beta_2 x_{age} + \beta_3 \ln(x_{wage}) + \beta_4 x_{unemployment} + \beta_5 x_{economic\ activity} + u_i \quad (21)$$

The variable x_{gender} is a dummy variable with being 1 if an individual is a man and being 0 if an individual is a woman. The variable x_{age} is an individual's age that is from 55 to 64. The variable $\ln(x_{wage})$ is a logarithm of wage in February of 2020. The reason for such transformation has to do with the functional form of the effect, as for a person earning a very low wage and a person earning a very high wage, the additional 100 Eur in salary do not

hold the same significance. Therefore, the logarithm is one way to capture such an assumption of diminishing returns. The variable $x_{unemployment}$ is a dummy variable with being 1 if an individual received unemployment benefit during pandemic and being 0 if an individual did not receive unemployment benefit. The variable $x_{economic\ activity}$ is a dummy variable being 1 for analyzed economic activity and being 0 for all other remaining activities. Each economic activity was included in the regression separately (with being 1), with all other economic activities being 0. In the results, this variable is denoted by abbreviations, which will mean: $x_{economic\ activity\_C}$ – manufacturing, $x_{economic\ activity\_F}$ – construction, $x_{economic\ activity\_G}$ – wholesale and retail trade, $x_{economic\ activity\_H}$ – transportation, $x_{economic\ activity\_I}$ – accommodation and food service activities, $x_{economic\ activity\_J}$ – information and communication, $x_{economic\ activity\_N}$ – administrative and support service activities.

The logit model for this study can be simply written as follows:

$$L_i = \ln(\frac{P_i}{1-P_i}) = \Lambda\,[\beta_0 + \beta_1 x_{gender} + \beta_2 x_{age} + \beta_3 \ln(x_{wage}) + \beta_4\, x_{unemployment} + \beta_5 x_{economic\ activity} + u_i], \quad (22)$$

The probit model for this study can be written as follows:

$$I_i = \Lambda\,[\beta_0 + \beta_1 x_{gender} + \beta_2 x_{age} + \beta_3 \ln(x_{wage}) + \beta_4\, x_{unemployment} + \beta_5 x_{economic\ activity} + u_i] \quad (23)$$

The results of these models will be discussed below.

5.4 Results

Appendix 18 presents the estimates of the linear probability model, logit and probit models explaining staying at labor market in year after the start of pandemic of people aged 55-64 based on individual, financial, and other factors. However, these coefficients of logit and probit models in Appendix 18 are not suitable to interpretation yet. For the interpretation, marginal coefficients at the mean are calculated and interpreted (Table 22).

Table 22. Marginal effects of the models[5]

	LPM	Logit	Probit
intercept β_0	0.8680	0.2339	0.2203
x_{gender}	-0.0434	-0.0428	-0.0409
x_{age}	-0.0045	-0.0045	-0.041
$\ln(x_{wage})$	0.1048	0.0900	0.0888
$x_{unemployment}$	-0.6835	-0.3500	-0.3621
$x_{economic\ activity\_C}$	0.0197	0.0216	0.0197
$x_{economic\ activity\_F}$	-0.0358	-0.0311	-0.0290
$x_{economic\ activity\_G}$	0.0326	0.0354	0.0332
$x_{economic\ activity\_H}$	-0.0304	-0.0291	-0.0272
$x_{economic\ activity\_I}$	0.0074·	0.0045	0.0034
$x_{economic\ activity\_J}$	0.0201	0.0311	0.0274
$x_{economic\ activity\_N}$	-0.0423	-0.0376	-0.0355

Source: estimated by the author

Individual factors. All individual factors including *gender*, *age*, and *economic activity* were significant in the models.

Gender. The results of the models show that women are more likely to stay in the labor market during pandemic. An analysis of the literature and an initial statistical analysis of the data showed that women faced problems at the beginning of the pandemic: in the companies most affected by quarantine, a relatively large proportion of workers were women, with unemployment rising faster among women than men. However, the number of insured women later started to increase again the probability of being in the labor market after a year was 4.0-4.3 percentage points lower for men than for women.

Age. Older age reduces the likelihood of being in the labor market a year after the beginning of pandemic. For each additional year, individuals are 0.41-0.45 percentage points more likely to leave labor market during the pandemic. It is likely that not long before retirement, a person may make

[5] Reminder: $x_{economic\ activity\_C}$ – manufacturing, $x_{economic\ activity\_F}$ – construction, $x_{economic\ activity\_G}$ – wholesale and retail trade, $x_{economic\ activity\_H}$ – transportation, $x_{economic\ activity\_I}$ – accommodation and food service activities, $x_{economic\ activity\_J}$ – information and communication, $x_{economic\ activity\_N}$ – administrative and support service activities.

decisions to leave the labor market due to a higher risk of illness. The survey could also include individuals who have not yet started to receive an early retirement pension or an old-age pension but have already applied for these benefits after leaving the labor market and have therefore not yet been excluded from the survey because they did not yet receive the benefit.

Economic activity. Those working in manufacturing and trade are 1.9-2.2 percentage points more likely to stay in the labor market than those working in the rest of the examined economic activities. The probability of staying at a job for persons working in information and communication companies was also 2.0-3.1 percentage points higher than for those working in other activities. Those working in construction, transport and administrative activities are 3-4 percentage points less likely to remain in the labor market than those working in the remaining economic activities. These activities were strongly affected by quarantine, so the model showed that it was also more difficult for older workers to keep their jobs in these activities. Accommodation and food service activities were also severely restricted, but this factor was not significant after the inclusion of these economic activities, possibly due to the small number of people employed in this sector.

Financial factor. The result of the logarithm of wage is the average change in the probability when wage increases by (about) 10% (because a change in the log of 0.1 is about a 10% increase in wage). The marginal effect is 0.09, so the probability increases by 0.009, or 0.9 percentage points, given a 10% increase in wage. Thus, the higher the wage, the more likely the person is to stay in the labor market during the first year of the pandemic.

Other factors. The probability to work after receiving unemployment benefits is 35 percentage points less than for those who have not received unemployment benefits during the pandemic. This shows that individuals do not return to the labor market so quickly; for example, if they have been laid-off in the second half of 2020, they are still receiving unemployment benefits (paid for a maximum of 9 months). Therefore, it is difficult to analyze in the middle of 2021 how people will be able to return to labor market after layoffs during a pandemic, as some people continue to receive them. In addition, subsidies were paid for downtime during the quarantine period, which also reduced layoffs, but it is not clear whether some of these people will not be laid off at the end of the quarantine. Thus, in this respect, the results of the study are still very new and inconclusive.

The advantage of the developed model is that it is one of the first studies of this type, as other authors only examine general statistical employment indicators. The disadvantage of such research is the time at which the study is conducted. The pandemic is still ongoing, and the study uses intermediate

data. In the future, it would be possible to study a longer period, comparing the effects of the pandemic on younger and older people.

Statistical analysis of the data showed that older workers were not more excluded from the labor market during a pandemic and, as in the previous economic crisis, younger workers were more affected. The developed binary response models showed that workers aged 55-64 who worked in the non-budgetary sector were more likely to drop out of the labor market if they worked in administrative and support service activities, transportation activities and construction. The Covid-19 pandemic is primarily a major challenge to the health of older people, and this can cause additional inconvenience to older labor market participants, forming certain fears of working and contracting the virus. On the other hand, it is important to understand that older people are a very heterogeneous and diverse group, so for some of them it will be more difficult, but yet for others the challenges of the pandemic will have the same effect as it has on younger workers. Much will depend on how flexible the labor market becomes after the pandemic, whether free work schedules are promoted, and greater opportunities to work from home are created, as these things would help older people guard themselves against the virus and not remain isolated at the same time.

CONCLUSIONS AND RECOMMENDATIONS

Outcomes of the research

1. ***As society ages, health, long-term care, social security systems and the labor market are under pressure to ensure adequate and sustainable incomes of older people and their good health and care, and pre-retirement and post-retirement employment become more and more important in contributing to the stability of these systems.*** The analysis of the literature has shown that the applied measures (pension reforms by expanding private accumulation of pensions, increasing retirement age, etc.) are not enough to ensure the adequate situation of older people and therefore more attention is paid to bridge employment, which helps *(1) avoid labor shortages for employers, (2*) *provide employees with bigger income in old age*, and *(3) ensure the financial stability of pension and health systems*.

2. ***After compiling the models for Lithuania, factors were identified that increase (pull-factors) and reduce the incentives (push-factors) to work longer in old age.*** Older age, bad health, being a woman, lower qualification, living in a rural region, shorter acquired experience, working in the non-budgetary sector, higher pension replacement rate, periods of unemployment, disability, and widowhood were singled out as push factors of employment, while younger age, good health and active aging, being a man, higher qualifications, longer acquired experience, living in an urban region, working in the budget sector, earning a higher wage and reaching retirement age in better economic times were signed out as pull factors of employment in old age in Lithuania.

3. ***The health factor is one of the most significant in making the decision to stay in the labor market for longer, as health begins to limit job opportunities with age.*** For individuals who are sick more before their mid 50s, the hazard rates of leaving the labor market are 1.30-1=30% higher than for those who are sick less, while for individuals who have disabilities the hazard rates of leaving the labor market are 1.17-1=17% higher than for those are not disabled. Whereas individuals who are sick more often before retirement are 3.2-5.2 percentage points less likely to engage in bridge employment than those who are sick less frequently. Thus, health is an essential factor without which, no matter how motivated by social or financial reasons an older person

would be, he or she will not be able to work. There is a general trend towards longer healthy life years in Lithuania, so it is likely that people will be able to work longer as it increases. However, adapting to the labor market and rapidly acquiring new skills will be important for a longer and more successful career.

4. ***Acquired higher qualifications lead to greater opportunities to continue working and secure higher incomes in old age.*** Managers remain in labor market for the longest time, followed by technicians and junior professionals, machine operators, ending with skilled agricultural, forestry and fisheries workers and unskilled workers who have the lowest employment rate in old age. People employed in elementary occupations or skilled agricultural workers are about 20 percentage points less likely to do bridge jobs in comparison to managers, while technicians, clerical support workers, and plant and machine operators are about 14 percentage points less likely to work than managers. Those who are less qualified and who are more likely to live in poverty leave the labor market earlier and lose a basic source of income, while higher-skilled workers stay in the labor market longer possibly due to the nature of their work (more mental than physical work, better health, etc.).

5. ***People in the budget sector are more assured of job opportunities in old age and can continue working more successfully beyond the retirement age***: professionals working in budget sector are 1.5-2.2 percentage points, technicians – 3.7-5.3 percentage points, service and sales workers – 5.2-7.6 percentage points, craft and related trades workers – 6.2-8.9 percentage points, machine operators – 7.8-11.1 percentage points more likely to engage in bridge employment than those working in the non-budgetary sector. The greater openness of the budget sector to older workers can be a good example for the non-budgetary sector, where younger workers are often more in demand and older workers are less attractive to employers.

6. ***Individuals who earn higher wages have longer durations of employment.*** A higher average wage received in the last few years before retirement increases the likelihood of participating in the labor market after retirement: people who earn a higher wage have a lower pension replacement rate, and they are 7.2-10 percentage points more likely to engage in bridge employment than those who earn lower wages and whose replacement rate is higher. Even though the theory would dictate that a small pension should encourage work, the results of the models showed that the people who seem to have a greater

motivation to work either do not choose to work or cannot get a job. So, it seems that a conclusion should be drawn that the low income or poverty factor does not work in the case of Lithuania. But such statements are valid only on the assumption that there is no shadow economy. The study does not cover the shadow economy because of the use of administrative data, and it is likely that low-pension earners are more likely to work illegally than those receiving higher pensions, so some caution is needed in interpreting this indicator. Perhaps beneficiaries of small pensions work but more frequently informally.

7. ***The opportunity to work in Lithuania at an older age is more a privilege for those who have attained higher positions throughout their careers, and in this way the gap is widening between two groups of older people: those who receive higher pay and secure higher career opportunities, and the other group, who engage lower-skilled work throughout their career and are reluctant to work and increase their small pensions.*** The question of whether individuals work at retirement age from personal incentives to feel socially important and maintain social ties, or yet from the need to avoid poverty and improve their financial situation, is unequivocally difficult to answer. But research has certainly shown that higher-skilled workers stay in the labor market longer, possibly due to the nature of the work and better health. Whatever the motive for higher-skilled workers, the gap between the more skilled and the less skilled exist.

8. ***Facing unemployment in old age becomes a big challenge for older labor market participants to return to the labor market and sometimes leads to the search for alternatives of work, such as early retirement benefits.*** The period during which unemployment benefits are received directly reduces the length of staying in the labor market. For individuals who received unemployment benefit the hazard rates are 1.17-1=17% higher. The probability of working after retirement if a person has received unemployment benefits in a person's working career is reduced by 21.6-34.8 percentage points compared to those who have not received unemployment benefits.

9. ***Women tend to leave the labor market faster than men due to their domestic responsibilities, lower retirement age, and their entirely shorter career history.*** The probability of doing bridge employment for men is 1.0-1.3 percentage points higher than for women. In society a woman is considered to be a family caregiver who must take care of the sick, youngest

and oldest members of the family. As a result, they are more likely to take career breaks, leading to longer income freeze periods, lower pensions later, and greater risk of poverty in old age.

10. ***Manifestations of active aging in Lithuania are low.*** As life expectancy increases, what matters is the quality of that prolonged life which is not strengthened enough. The length of a healthy life year in Lithuania is shorter than in other countries, with women aged 65 years expected to live relatively healthy about 32% of their remaining lifespan, while men aged 65 years are expected to spend about 41% of their remaining lifespan in relatively good health. Older people are less likely to work part-time and are also in poorer health. In Lithuania, the division of life into stages such as education, work, and pension is the most striking. But studies and research show that in the future, people will need to further develop their competencies throughout their careers, and lifelong learning will be an important factor to ensuring the better financial situations of individuals in old age. To sum up, Lithuania has a large field for improving human health and active aging.

11. ***The Covid-19 pandemic has not hurt older workers more than workers from other age groups.*** A descriptive analysis showed that the unemployment rate increased more among young people than among the older ones, and the share of elderly working in the sectors most affected by the quarantine and pandemic was relatively low. The results of the binary response models showed that people aged 55-64 who worked in administrative and support service activities, transportation and construction faced greater difficulties, as they were 4.2, 3.0 and 3.6 percentage points less likely to work a year after the start of the pandemic than those who worked in other sectors, respectively. Older age, being men and layoff during pandemic also increased the probability of falling out of the labor market (the probability of working was 35 percentage points lower for those who received unemployment benefits in 2020). And staying at the job was more likely if higher wages were earned before the pandemic: the probability of working increases by 0.9 percentage points, given a 10% increase in wage.

12. The Covid-19 pandemic is primarily a major challenge to the health of older people, and this can cause additional inconvenience to older labor market participants, forming certain fears of working and contracting the virus. But older people, like the rest of the population, are remarkably diverse:

there are some older people who are more likely to learn and adapt to innovations in the labor market, and there are some older people who have more health problems and who may leave the labor market. So, a pandemic leads to that in the future, the elderly will have to deal with new challenges in the labor market, as the effects of a pandemic will result in an increase in teleworking and communicating across different technology platforms. However, this will possibly be seen not only as a constraint but also as an opportunity for some older people, because greater flexibility in the labor market can improve the employment of older people, allowing them to combine work and leisure more freely and to protect themselves against viruses by avoiding isolation and ageism.

Recommendations for public policy

Understanding trends in labor force participation rates across older people and their drivers provide an opportunity to discuss how policies related to the employment of older people could be improved. Recommendations are formulated below:

1. ***Invest in health promotion.*** The results of the models showed that poorer health in pre-retirement age and the increasing risk of losing some work capacity with age lead to lower labor market participation and have to be recognized as a determinant of real opportunities to work longer. As the most important factor supporting employment, health is relevant in fostering it from a young age: a healthy lifestyle, sports, care for mental well-being state all improve people's quality of life, without which it is impossible to imagine increasing employment. As life expectancy increases, it is important that the number of healthy life years would increase as well. Sometimes the solution to the problem of aging is understood only as developing systems for providing long-term care. Thus, as the society ages, there is a need to train more nursing professionals and to organize care homes for the growing demand of the elderly. However, governments should formulate strategies not only on how to combat the consequences of aging, but also on how to ensure healthy aging, which can minimize those negative consequences. In light of the results of the thesis, which show that diseases get more complicated and longer in old age and that the risk of disability also increases, it is recommended to support prevention policies to avoid unhealthy behaviors. It is proposed to implement health promotion by focusing on two areas: *(1)*

supporting healthier lifestyles (includes all age groups) and *(2) strengthening health and long-term care systems* (ensuring quality services for older people).

2. ***Improve policy for active aging***. Active aging includes not only healthcare and protection but also the participation of older workers in the labor market and their involvement in social activities. Special programs should be organized to provide education and learning opportunities throughout a person's career. Learning and working throughout life as well as reconciling family responsibilities and leisure can help lead more productive and successful lives in the future for everyone. In this dissertation, after reviewing the literature and analyzing the employment of older people in Lithuania according to the acquired qualifications, and examining a smaller proportion of older people working part-time, the following recommendations are proposed for developing an active aging policy, including: *(1) lifelong learning programs, (2) promoting more part-time work*, thus facilitating the involvement of older people according to their abilities, and (3) *promoting volunteering*, which allows older people not to lose touch with society, to feel needed and thus to improve their emotional well-being.

3. ***Support and promote lifelong learning***. The results of the developed models for Lithuania correlate with the works of other authors, finding that those with higher education tend to work longer and have better career prospects than those with low education. On the one hand, people with higher educational levels can have better paid work, can be more attractive as employees, and thus increase their chances to be employed at old age; on the other hand, persons with a high educational level need to work in their later life due to their long educational phase. Lithuanian data confirmed that blue-collar workers and less-qualified workers are more likely to retire earlier than white-collar workers and more highly qualified workers. The data show that low-skilled people fall into certain traps: low pay at working age, subsequent low pensions, and low opportunities to increase their income in old age. This situation shows that highly skilled workers find more motivation to work longer, but low-skilled workers find themselves in a bigger trap. Lifelong learning is expected to become an important tool for avoiding obsolete skills and preventing premature exit from the labor market. The education system should be moving toward a model that encourages people to retrain more freely and to be more universal. Lifelong learning should become the basis of

the labor market, allowing for bolder job changes and freer choices to take on new challenges.

4. ***Increase opportunities for part-time work***. The data showed that a smaller share of people in Lithuania than in the EU work part-time. This is often a great solution for older people who would choose this type of work due to lower physical abilities, a slower pace of life, and a combination of work and leisure time. There is a lack of some flexibility in the Lithuanian labor market, and the requirement to either work at full speed or retire becomes a difficult choice for older people who are sufficiently motivated but no longer can spend so much time by working.

5. ***Exploit the reserves of the unemployed people, women and people with disabilities who could work but do not do this today***. The dissertation revealed that there are reserves of women, the disabled, and the unemployed who could be in the labor market but today face unemployment challenges and experience some difficulties in finding a job that would match their skills and abilities. Dealing with these problems should be the preference of politicians, as these people are outside the labor market today. More targeted investment should be made in retraining programs that allow the unemployed to return to the labor market more quickly. The issue of women's employment should be addressed by eliminating gender pay discrimination and providing more support for women in caring for their families (better infrastructure, more equal distribution of family responsibilities). People with disabilities today work mainly in unskilled jobs, and the potential of information technology is not being exploited to increase the involvement of people with disabilities in higher value-added sectors. There will certainly be a number of cases where disability restricts one activity but does not really prevent another (for example, an individual unable to do manual work due to a disability may have the capacity for mental work). Such people must be able to work within their opportunities, but they must not be excluded from the labor market in any way. The inclusion of people with disabilities in the labor market must be increased through employment programs and skills development courses. It is recommended not only for financial aspects, but also for social aspects.

6. ***Improve childcare infrastructure.*** Families raising children are facing major challenges today as they strive to reconcile career and family responsibilities at the same time. To improve the career prospects of these

people and thus strengthen their chances of staying in the labor market for longer, it is appropriate to ensure that the best possible conditions are created at this stage for raising children. Therefore, one of the proposals would be to invest in infrastructure, kindergartens, and schools to have good access to this service for all families. Creating good conditions for families for raising their children without sacrificing job opportunities would make them feel more secure in the labor market, especially for women, by making it easier for them to return to work.

7. ***Motivate employers to create more flexible working conditions for employees: conditions to work part-time, flexible schedules, teleworking***. In the process of an aging society, not only workers but also employers need to be involved in including older people in the labor market. Activating the workforce, enabling older workers to pass on their knowledge to future generations and being useful, and enabling young people to learn from older people, as well as having a team of all ages must be one of the social responsibilities of companies.

8. ***Carry out pilot programs to support the employment of older people in the budget sector.*** The results of the models developed in the thesis showed that the budget sector is friendlier to older workers, so the budget sector could be the one to set an example of how older workers are integrated into the labor market. Successful examples could be followed by the non-budgetary sector. Companies from the budget sector could form a special program to support the employment of older people. The public would be informed about the objectives, implementation, and results of the program. Such examples would also encourage the non-budgetary sector to undertake such programs.

9. ***Evaluate the possibility to introduce flexible retirement age in Lithuania.*** The share of retirees already in employment shows that some people choose to work after retirement (key drivers: good health, mental work) and some opt for early retirement (key drivers: poor health, difficulty finding work in old age, inability to continue doing physical work). At present, it is possible in Lithuania to retire early, to work and receive a pension, and to defer the payment of a pension. However, these measures are not effective. A very small proportion take the advantage of pension deferral. Some work and earn several times higher wage than their old age benefit, while others leave the labor market due to poorer health and take early retirement. The country could

introduce a flexible retirement age that would allow a person to decide when to retire. The later an individual will retire, the higher their pension will be. It will be important to inform individuals clearly how much the extra working year will increase a person's pension. Given the scope of this recommendation, it is recommended that a comprehensive study of the possible behavior of older people and the financial resources for its implementation be carried out as part of this measure. A flexible retirement age could be introduced by implementing the recommendations outlined above firstly.

This thesis emphasized that the employment of people of pre-retirement and post-retirement age is widely covered in global scientific literature. An analysis of literature and administrative micro-data of Lithuania has shown that today, and in the future, a great deal of attention will be paid to measures that would allow to work longer. As life expectancy and healthy life years increase, people should be more actively prepared to work longer. The slogan "live longer, work longer" should be adopted today to signify an increased emphasis on health and qualifications for work opportunities not only in the labor market of today but also in labor market of the future.

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APPENDICES

Appendix 1. Gender gap in life expectancy at age 65 (years) by country, 2019

Country	Males	Females	Gender gap
Estonia	15.8	21.1	5.3
Lithuania	**14.8**	**20.0**	**5.2**
Latvia	14.4	19.4	5.0
Poland	16.1	20.4	4.3
Spain	19.8	23.9	4.1
France	19.8	23.9	4.1
Slovakia	15.7	19.7	4.0
Bulgaria	14.2	18.1	3.9
Hungary	14.8	18.6	3.8
Portugal	18.5	22.3	3.8
Czechia	16.4	20.1	3.7
Romania	14.9	18.6	3.7
Slovenia	18.1	21.8	3.7
Croatia	15.9	19.5	3.6
Finland	18.8	22.3	3.5
EU - 28	**18.4**	**21.8**	**3.4**
Belgium	18.9	22.1	3.2
Italy	19.7	22.9	3.2
Luxembourg	19.2	22.4	3.2
Malta	19.4	22.5	3.1
Germany	18.3	21.4	3.1
Austria	18.7	21.7	3.0
Ireland	19.4	22.1	2.7
Greece	19.0	21.7	2.7
Denmark	18.4	21.0	2.6
Cyprus	18.9	21.5	2.6
Sweden	19.6	22.1	2.5
Netherlands	19.0	21.4	2.4
United Kingdom (2018 data)	18.9	21.1	2.2

Source: Eurostat

Appendix 2. Life expectancy at age 65 (years) by country, in 2000, 2005, 2010, 2015, 2019

Country	2000	2005	2010	2015	2019
Spain	18.8	19.3	20.9	21.1	22.0
France	19.3	20.1	21.3	21.6	22.0
Italy	18.9	19.4	20.4	20.6	21.4
Malta	17.0	18.0	19.9	20.3	21.1
Luxembourg	18.1	18.8	19.6	20.5	20.9
Sweden	18.6	19.2	19.8	20.2	20.9
Ireland	16.4	18.2	19.3	19.8	20.8
Belgium	17.8	18.6	19.6	20.0	20.6
Portugal	17.4	18.0	19.3	20.0	20.6
Finland	17.8	19.2	19.7	20.2	20.6
Greece	18.0	18.8	19.7	19.9	20.4
Cyprus	17.2	17.9	19.7	19.6	20.3
Netherlands	17.5	18.4	19.5	19.8	20.3
Austria	18.1	18.9	19.8	19.8	20.3
EU - 28	**-**	**18.3**	**19.4**	**19.7**	**20.2**
Slovenia	16.9	17.5	19.2	19.7	20.1
United Kingdom	17.6	18.4	19.6	19.8	20.1 (2018)
Germany	18.0	18.7	19.5	19.5	19.9
Denmark	16.9	17.7	18.4	19.4	19.8
Estonia	15.4	16.1	17.4	18.6	19.0
Poland	15.8	16.7	17.6	18.2	18.5
Czechia	15.7	16.3	17.4	17.8	18.4
Croatia	-	15.8	16.7	17.1	17.9
Lithuania	**16.1**	**16.0**	**16.7**	**17.1**	**17.9**
Slovakia	15.0	15.5	16.3	17.2	17.9
Latvia	-	15.1	16.1	17.0	17.4
Hungary	15.1	15.5	16.5	16.6	16.9
Romania	14.8	14.6	16.1	16.4	16.9
Bulgaria	14.1	14.7	15.6	16.0	16.3

Source: Eurostat

Appendix 3. Healthy life years at age 65 (years) by country, in 2005, 2010, 2015, 2019

Country	**2005**	**2010**	**2015**	**2019**
Sweden	10.9	12.9	16	16.2
Malta	10.9	11.9	13.7	14.8
Ireland	9.4	11	11.8	13.6
Spain	9.4	9.3	9.2	12.4
Germany	6.1	7.1	11.9	12.2
Denmark	13.7	12.4	11.5	11.3
France	9.1	9.4	10.3	11.0
Belgium	9.6	10	11.1	10.6
United Kingdom	10.9	11.3	10.3	10.4 (2018)
Italy	10	-	7.7	10.4
Luxembourg	9.3	11.5	9.8	10.4
EU-28	**8.6**	**8.8**	**9.4**	**10.0**
Bulgaria	-	9.4	9.2	9.9
Netherlands	10.8	9.5	9.9	9.9
Finland	6.5	8.8	9.1	9.5
Poland	9.5	7.2	8	8.6
Slovenia	8.1	6.9	7.9	8.6
Czechia	6.8	8.7	8.3	8.1
Greece	10.1	8.5	7.7	7.9
Austria	6.8	8.1	7.8	7.7
Cyprus	5.8	8.8	7.8	7.6
Portugal	5.8	6.4	6.1	7.3
Hungary	5.1	5.7	5.9	7.1
Estonia	3.6	5.5	5.3	6.9
Romania	-	5.5	6	6.6
Lithuania	**4.8**	**6.5**	**5.3**	**6.2**
Croatia	-	6.5	4.6	4.8
Latvia	5.3	5.3	4.1	4.7
Slovakia	5.2	3.1	3.9	4.7

Source: Eurostat

Appendix 4. Statutory and early retirement ages (in bracket)

	MALE					FEMALE				
	2008	**2013**	**2020**	**2040**	**2060**	**2008**	**2013**	**2020**	**2040**	**2060**
BE	65	65 (60.5)	65 (63)	67 (63)	67 (63)	64	65 (60.5)	65 (63)	67 (63)	67 (63)
BG	63	63.7 (63.7)	65 (65)	65 (65)	65 (65)	59.5	60.7 (60.7)	62.7 (62.7)	63 (63)	63 (63)
CZ*	61.8	62.7 (59.7)	63.7 (60)	66.5 (61.5)	69.3 (64.3)	56-60	59.7 (56.7)	61.7 (58.7)	66.5 (61.5)	69.3 (64.3)
DK*	65	65 (60)	66 (63)	70 (67)	72.5 (69.5)	65	65 (60)	66 (63)	70 (67)	72.5 (69.5)
DE	65	65.3 (63)	65.8 (63)	67 (63)	67 (63)	65	65.3 (63)	65.8 (63)	67 (63)	67 (63)
EE	63	63 (60)	63.8 (60.8)	65 (62)	65 (62)	60.5	62 (59)	63.8 (60.8)	65 (62)	65 (62)
IE	65	65 (65)	66 (66)	68 (68)	68 (68)	65	65 (65)	66 (66)	68 (68)	68 (68)
EL*	65	67 (62)	67 (62)	69.9 (64.9)	71.9 (66.9)	60	67 (62)	67 (62)	69.9 (64.9)	71.9 (66.9)
ES	65	65 (63)	65.8 (63)	67 (63)	67 (63)	65	65 (63)	65.8 (63)	67 (63)	67 (63)
FR	65	65.8 (60.8)	67 (62)	67 (62)	67 (62)	65	65.8 (60.8)	67 (62)	67 (62)	67 (62)
HR	-	65 (60)	65 (60)	67 (62)	67 (62)	-	60.8 (55.8)	62.5 (57.5)	67 (62)	67 (62)
IT*	65	66.3	66.8	68.4 (65.4)	70 (67)	60	62.3	66.8	68.4 (65.4)	70 (67)
CY*	65	65 (63)	65 (63)	67 (65)	69 (67)	65	65 (63)	65 (63)	67 (65)	69 (67)
LV	62	62 (60)	63.8 (61.8)	65 (63)	65 (63)	62	62 (60)	63.8 (61.8)	65 (63)	65 (63)
LT	62.5	62.8 (57.8)	64 (59)	65 (60)	65 (60)	60	60.7 (55.7)	63 (58)	65 (60)	65 (60)
LU	65	65 (57)	65 (57)	65 (57)	65 (57)	65	65 (57)	65 (57)	65 (57)	65 (57)
HU	62	62 (62)	64.5 (64.5)	65 (65)	65 (65)	62	62 (62)	64.5 (64.5)	65 (65)	65 (65)
MT	61	62 (61)	63 (61)	65 (61)	65 (61)	60	62 (61)	63 (61)	65 (61)	65 (61)
NL*	65	65.1 (65.1)	66.3 (66.3)	69.3 (69.3)	71.5 (71.5)	65	65.1 (65.1)	66.3 (66.3)	69.3 (69.3)	71.5 (71.5)
AT	65	65 (62)	65 (62)	65 (62)	65 (62)	60	60 (58.8)	60 (60)	65 (62)	65 (62)
PL	65	65.3 (65.3)	67 (67)	67 (67)	67 (67)	60	60.3 (60.3)	62 (62)	67 (67)	67 (67)
PT*	65	65 (55)	66.4 (55)	57.7 (55)	68.8 (55)	65	65 (55)	66.4 (55)	57.7 (55)	68.8 (55)
RO	63	64.7 (59.7)	65 (60)	65 (60)	65 (60)	58	59.7 (54.7)	61.4 (56.4)	63 (58)	63 (58)
SI	63	65 (58.3)	65 (60)	65 (60)	65 (60)	61	63.5 (58)	65 (60)	65 (60)	65 (60)
SK*	62	62 (60)	62.8 (60.8)	65.4 (63.4)	67.8 (65.8)	55-59	58.3 (56.3)	62.8 (60.8)	65.4 (63.4)	67.8 (65.8)
FI	62-68	68 (62)	68 (63)	68 (63)	68 (63)	62-68	68 (62)	68 (63)	68 (63)	68 (63)
SE	61-67	67 (61)	67 (61)	67 (61)	67 (61)	61-67	67 (61)	67 (61)	67 (61)	67 (61)
UK	65	65 (65)	66 (66)	66.7 (66.7)	68 (68)	60	61 (61)	66 (66)	66.7 (66.7)	68 (68)
EU	**64**	**65 (61)**	**65 (62)**	**67 (63)**	**67 (64)**	**62**	**63 (60)**	**64 (61)**	**66 (63)**	**67 (64)**

Source: European Commission (2009), European commission (2015)

Appendix 5. Employment rate of older workers aged 55-64, %

Country	2000	2005	2010	2015	2019
Sweden	64.3	69.4	70.4	74.5	77.7
Germany	37.4	45.5	57.8	66.2	72.7
Estonia	43.2	55.7	53.8	64.5	72.5
Denmark	54.6	59.5	55.5	63.0	71.3
Netherlands	37.9	43.2	52.9	61.7	69.7
Lithuania	**41.2**	**49.6**	**48.3**	**60.4**	**68.4**
Latvia	35.4	48.3	47.8	59.4	67.3
Finland	41.2	52.7	56.2	60.0	66.8
Czechia	36.1	44.5	46.5	55.5	66.7
United Kingdom	50.4	56.8	57.2	62.2	66.3
Bulgaria	22.1	34.7	44.9	53.0	64.4
Ireland	45.1	51.6	50.2	55.4	61.8
Cyprus	49.5	50.6	56.3	48.5	61.1
Portugal	51.4	50.4	49.5	49.9	60.4
EU - 28	**-**	**42.1**	**46.2**	**53.3**	**60.0**
Slovakia	21.5	30.3	40.5	47.0	57.0
Hungary	21.9	33.0	33.6	45.3	56.7
Austria	29.2	29.9	41.2	46.3	54.5
Italy	27.3	31.4	36.5	48.2	54.3
Spain	36.8	43.1	43.5	46.9	53.8
France	29.4	38.5	39.7	48.7	53.0
Belgium	25.0	31.8	37.3	44.0	52.1
Malta	28.6	31.9	31.9	42.3	51.1
Poland	29.0	27.2	34.1	44.3	49.5
Slovenia	22.3	30.7	35.0	36.6	48.6
Romania	52.0	39.4	40.7	41.1	47.8
Croatia	-	32.6	39.1	39.2	43.9
Greece	39.4	42.0	42.4	34.3	43.2
Luxembourg	27.2	31.7	39.6	38.4	43.1

Source: Eurostat

Appendix 6. Results of employment duration after 55

Due to the large volume, interim results for periods 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 130 are presented as they reveal the changes that have taken place during the year.

```
Call: survfit(formula = Surv(time, event) ~ 1)

 time n.risk n.event survival  std.err lower 95% CI upper 95% CI
   12  18493       1    1.000 1.08e-04        1.000        1.000
   24  18477       1    0.999 2.36e-04        0.999        0.999
   36  18435       3    0.997 3.97e-04        0.996        0.998
   48  18347       4    0.993 6.05e-04        0.992        0.994
   60  18100      25    0.982 9.84e-04        0.980        0.984
   72  17297      65    0.944 1.70e-03        0.941        0.947
   84  16056     130    0.880 2.40e-03        0.875        0.885
   96  14219     157    0.783 3.06e-03        0.777        0.789
  108  12197     216    0.674 3.49e-03        0.667        0.681
  120   9698     281    0.533 3.73e-03        0.526        0.541
  130   5071    1173    0.222 3.13e-03        0.216        0.228
```

Appendix 7. Results of employment duration after 55 analysis by gender factor

Due to the large volume, interim results for periods 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 130 are presented as they reveal the changes that have taken place during the year.

```
Call: survfit(formula = Surv(time, event) ~ gender)

                gender=0

time n.risk n.event survival  std.err lower 95% CI upper 95% CI
   12  10793       1    1.000 1.60e-04        0.999        1.000
   24  10782       1    0.999 3.34e-04        0.998        0.999
   36  10759       1    0.997 5.31e-04        0.996        0.998
   48  10719       3    0.993 7.89e-04        0.992        0.995
   60  10600      13    0.983 1.25e-03        0.980        0.985
   72  10157      45    0.943 2.24e-03        0.938        0.947
   84   9317     106    0.863 3.32e-03        0.856        0.869
   96   7946     120    0.737 4.26e-03        0.729        0.746
  108   6765     114    0.630 4.68e-03        0.621        0.639
  120   5563     146    0.515 4.85e-03        0.505        0.524
  130   3010     692    0.221 4.04e-03        0.213        0.229

                gender=1

 time n.risk n.event survival  std.err lower 95% CI upper 95% CI
   12   7700       1    1.000 0.000184        0.999        1.000
   24   7697       2    0.999 0.000318        0.999        1.000
   36   7676       2    0.997 0.000595        0.996        0.998
   48   7628       1    0.993 0.000943        0.991        0.995
   60   7500      12    0.980 0.001591        0.977        0.983
   72   7140      20    0.946 0.002597        0.941        0.951
   84   6739      24    0.905 0.003375        0.898        0.912
   96   6273      37    0.849 0.004136        0.841        0.858
  108   5432     102    0.738 0.005124        0.728        0.748
  120   4135     135    0.560 0.005826        0.548        0.571
  130   2061     481    0.223 0.004926        0.213        0.233
```

Source: compiled by the author

Appendix 8. Results of employment duration after 55 analysis by unemployment factor

Due to the large volume, interim results for periods 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 130 are presented as they reveal the changes that have taken place during the year.

```
Call: survfit(formula = Surv(time, event) ~ unemp_factor_2013_2020)

                unemp_factor_2013_2020=0

 time n.risk n.event survival  std.err lower 95% CI upper 95% CI
   12  15710       1    1.000 1.42e-04        0.999        1.000
   24  15701       1    0.999 2.29e-04        0.999        1.000
   36  15679       2    0.998 3.48e-04        0.997        0.999
   48  15657       2    0.997 4.36e-04        0.996        0.998
   60  15544      11    0.992 7.15e-04        0.991        0.993
   72  15194      20    0.976 1.22e-03        0.974        0.978
   84  14553     104    0.936 1.96e-03        0.933        0.940
   96  13099     136    0.846 2.91e-03        0.840        0.852
  108  11504     182    0.746 3.52e-03        0.739        0.753
  120   9383     235    0.606 3.96e-03        0.599        0.614
  130   5044    1158    0.259 3.57e-03        0.252        0.266

                unemp_factor_2013_2020=1

 time n.risk n.event survival  std.err lower 95% CI upper 95% CI
   12   2782       1  0.99964 0.000359      0.99894      1.00000
   24   2777       1  0.99784 0.000880      0.99612      0.99957
   36   2756       1  0.99137 0.001754      0.98793      0.99481
   48   2694       4  0.97154 0.003156      0.96538      0.97775
   60   2556      14  0.92439 0.005029      0.91459      0.93430
   72   2103      45  0.75999 0.008168      0.74415      0.77617
   84   1503      26  0.55712 0.009560      0.53869      0.57617
   96   1120      21  0.42197 0.009561      0.40364      0.44114
  108    693      34  0.25871 0.008564      0.24245      0.27605
  120    315      46  0.10676 0.006110      0.09543      0.11943
  130     27      15  0.00478 0.001377      0.00272      0.00841
```

Source: compiled by the author

Appendix 9. Results of employment duration after 55 analysis by sick factor

Due to the large volume, interim results for periods 12, 24, 36, 48, 60, 72, 84 , 96, 108, 120, 130 are presented as they reveal the changes that have taken p lace during the year.

```
Call: survfit(formula = Surv(time, event) ~ sick_factor)

                sick_factor=0

 time n.risk n.event survival  std.err lower 95% CI upper 95% CI
   12  17305       1    1.000 1.16e-04        1.000        1.000
   24  17294       1    0.999 2.24e-04        0.999        1.000
   36  17256       3    0.997 3.96e-04        0.997        0.998
   48  17174       3    0.994 6.10e-04        0.992        0.995
   60  16960      22    0.983 9.84e-04        0.981        0.985
   72  16230      61    0.946 1.72e-03        0.943        0.949
   84  15083     118    0.883 2.46e-03        0.878        0.888
   96  13391     146    0.788 3.14e-03        0.781        0.794
  108  11533     206    0.680 3.59e-03        0.673        0.687
  120   9229     254    0.542 3.85e-03        0.535        0.550
  130   4922    1111    0.231 3.28e-03        0.225        0.238

                sick_factor=1

 time n.risk n.event survival std.err lower 95% CI upper 95% CI
   12   1188       3   0.9975 0.00146       0.9946       1.0000
   24   1183       1   0.9958 0.00188       0.9921       0.9995
   36   1181       2   0.9941 0.00222       0.9898       0.9985
   48   1173       1   0.9882 0.00313       0.9821       0.9944
   60   1140       3   0.9645 0.00538       0.9540       0.9751
   72   1067       4   0.9124 0.00825       0.8963       0.9287
   84    973      12   0.8346 0.01088       0.8135       0.8562
   96    828      11   0.7201 0.01321       0.6946       0.7464
  108    664      10   0.5892 0.01457       0.5614       0.6185
  120    469      27   0.4016 0.01465       0.3739       0.4314
  130    149      62   0.0798 0.00819       0.0652       0.0975
```

Source: compiled by the author

Appendix 10. Results of employment duration after 55 analysis by disability factor

Due to the large volume, interim results for periods 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 130 are presented as they reveal the changes that have taken place during the year.

```
Call: survfit(formula = Surv(time, event) ~ disability_factor_2010_202
0)

250 observations deleted due to missingness

                    disability_factor_2010_2020=0

 time n.risk n.event survival  std.err lower 95% CI upper 95% CI
   12  14806       1    1.000 9.55e-05        1.000        1.000
   24  14796       2    0.999 2.43e-04        0.999        1.000
   36  14770       1    0.998 4.10e-04        0.997        0.998
   48  14722       4    0.994 6.21e-04        0.993        0.995
   60  14616      10    0.987 9.28e-04        0.985        0.989
   72  14196      47    0.957 1.66e-03        0.954        0.961
   84  13368     102    0.899 2.47e-03        0.895        0.904
   96  11982     128    0.806 3.26e-03        0.800        0.812
  108  10398     176    0.699 3.78e-03        0.691        0.706
  120   8390     229    0.561 4.10e-03        0.553        0.569
  130   4679    1038    0.251 3.60e-03        0.244        0.259


                    disability_factor_2010_2020=1

 time n.risk n.event survival  std.err lower 95% CI upper 95% CI
   12   3438       1    0.999 0.000411       0.9986       1.0000
   24   3433       1    0.998 0.000712       0.9969       0.9997
   36   3418       2    0.995 0.001197       0.9927       0.9974
   48   3390       3    0.988 0.001831       0.9848       0.9919
   60   3260      15    0.958 0.003419       0.9517       0.9651
   72   2945      17    0.885 0.005496       0.8746       0.8961
   84   2587      28    0.793 0.007045       0.7792       0.8068
   96   2173      29    0.680 0.008178       0.6640       0.6960
  108   1771      38    0.561 0.008776       0.5442       0.5786
  120   1291      52    0.405 0.008769       0.3885       0.4228
  130    382     135    0.081 0.004933       0.0719       0.0913
```

Source: compiled by the author

Appendix 11. Results of employment duration after 55 analysis by occupation factor

Due to the large volume, interim results for periods 12, 24, 36, 48, 60, 72, 84 , 96, 108, 120, 130 are presented as they reveal the changes that have taken p lace during the year.

```
Call: survfit(formula = Surv(time, event) ~ occupation)

                        occupation=1

 time n.risk n.event survival  std.err lower 95% CI upper 95% CI
   12   2315       1    1.000 0.000432        0.999        1.000
   24   2314       1    0.999 0.000611        0.998        1.000
   36   2313       1    0.999 0.000748        0.997        1.000
   48   2308       1    0.997 0.001141        0.995        0.999
   60   2298       3    0.992 0.001876        0.988        0.995
   72   2234       3    0.970 0.003571        0.963        0.977
   84   2141      15    0.930 0.005336        0.919        0.940
   96   1953      10    0.855 0.007368        0.840        0.869
  108   1765      29    0.768 0.008838        0.751        0.786
  120   1492      33    0.649 0.010024        0.629        0.669
  130    859     174    0.306 0.009724        0.288        0.326

                        occupation=2

 time n.risk n.event survival  std.err lower 95% CI upper 95% CI
   34   5470       2    0.999 0.000365        0.999        1.000
   48   5463       1    0.998 0.000548        0.997        0.999
   60   5426       5    0.993 0.001124        0.991        0.995
   72   5273      14    0.967 0.002433        0.962        0.971
   84   4997      36    0.917 0.003747        0.909        0.924
   96   4426      49    0.813 0.005298        0.803        0.824
  108   3885      59    0.716 0.006145        0.704        0.728
  120   3281      58    0.605 0.006672        0.592        0.619
  130   1928     390    0.290 0.006220        0.278        0.302

                        occupation=3

 time n.risk n.event survival  std.err lower 95% CI upper 95% CI
   29   1359       1    0.999 0.000736        0.998        1.000
   36   1357       1    0.998 0.001273        0.995        1.000
   46   1354       1    0.996 0.001798        0.992        0.999
   60   1341       1    0.987 0.003102        0.981        0.993
   72   1277       4    0.946 0.006140        0.934        0.958
   84   1190      13    0.881 0.008820        0.864        0.899
   96   1038      14    0.772 0.011471        0.750        0.795
  108    883      13    0.668 0.012927        0.643        0.694
  120    715      25    0.533 0.013763        0.507        0.561
  130    381      79    0.233 0.011731        0.211        0.257

                        occupation=4

 time n.risk n.event survival std.err lower 95% CI upper 95% CI
   13    937       1    0.997 0.00184        0.993        1.000
   24    932       1    0.993 0.00281        0.987        0.998
   37    925       1    0.986 0.00382        0.979        0.994
   47    916       2    0.975 0.00505        0.966        0.985
   61    904       4    0.964 0.00611        0.952        0.976
   72    854       7    0.911 0.00931        0.893        0.930
   84    776       7    0.833 0.01222        0.810        0.858
   96    669      13    0.717 0.01482        0.688        0.747
  108    543      13    0.580 0.01627        0.549        0.613
  120    428       3    0.467 0.01648        0.436        0.501
  130    231      53    0.197 0.01319        0.173        0.225
```

occupation=5

time	n.risk	n.event	survival	std.err	lower 95% CI	upper 95% CI
14	1752	1	0.999	0.000806	0.997	1.000
27	1749	1	0.997	0.001274	0.995	1.000
35	1744	1	0.994	0.001799	0.991	0.998
47	1737	1	0.990	0.002341	0.986	0.995
60	1707	4	0.977	0.003616	0.970	0.984
72	1596	9	0.920	0.006505	0.907	0.933
84	1440	16	0.831	0.009020	0.813	0.849
96	1251	13	0.728	0.010734	0.708	0.750
108	1068	20	0.621	0.011744	0.598	0.644
120	831	27	0.480	0.012137	0.457	0.505
130	383	110	0.164	0.009037	0.147	0.182

occupation=6

time	n.risk	n.event	survival	std.err	lower 95% CI	upper 95% CI
47	86	1	0.9884	0.0116	0.9660	1.000
63	82	1	0.9647	0.0200	0.9262	1.000
71	78	1	0.9287	0.0281	0.8752	0.985
84	65	1	0.7823	0.0454	0.6982	0.877
96	53	1	0.6356	0.0531	0.5396	0.749
108	41	3	0.4645	0.0551	0.3682	0.586
120	26	2	0.3020	0.0510	0.2168	0.421
130	7	4	0.0377	0.0214	0.0125	0.114

occupation=7

time	n.risk	n.event	survival	std.err	lower 95% CI	upper 95% CI
12	2216	1	1.000	0.000451	0.999	1.000
26	2213	1	0.999	0.000781	0.997	1.000
35	2209	1	0.998	0.001009	0.996	1.000
48	2197	2	0.994	0.001686	0.990	0.997
60	2159	3	0.981	0.002941	0.975	0.986
72	2070	12	0.944	0.004913	0.934	0.954
84	1900	19	0.875	0.007080	0.862	0.889
96	1686	14	0.785	0.008845	0.768	0.803
108	1402	31	0.654	0.010299	0.634	0.675
120	1008	45	0.462	0.010857	0.441	0.484
130	419	118	0.145	0.007730	0.131	0.161

occupation=8

time	n.risk	n.event	survival	std.err	lower 95% CI	upper 95% CI
28	1997	1	0.999	0.000501	0.999	1.000
36	1990	2	0.996	0.001414	0.993	0.999
47	1976	1	0.991	0.002117	0.987	0.995
60	1937	5	0.976	0.003443	0.969	0.983
72	1819	5	0.935	0.005572	0.924	0.946
84	1704	10	0.887	0.007180	0.873	0.901
96	1570	15	0.822	0.008712	0.805	0.839
108	1312	21	0.692	0.010592	0.672	0.713
120	956	51	0.493	0.011569	0.471	0.516
130	396	114	0.155	0.008453	0.139	0.172

occupation=9

time	n.risk	n.event	survival	std.err	lower 95% CI	upper 95% CI
16	2358	1	1.000	0.000424	0.999	1.000
23	2354	1	0.998	0.000947	0.996	1.000
37	2345	1	0.996	0.001339	0.993	0.998
48	2318	1	0.986	0.002388	0.982	0.991
60	2246	4	0.959	0.004106	0.951	0.967
72	2097	11	0.903	0.006127	0.891	0.915
84	1843	13	0.802	0.008292	0.786	0.818
96	1573	28	0.687	0.009694	0.668	0.706
108	1298	27	0.575	0.010386	0.555	0.596
120	961	37	0.421	0.010448	0.401	0.442
130	467	131	0.154	0.007703	0.140	0.170

Source: compiled by the author

Appendix 12. Results of employment duration after 55 analysis by wage factor

Due to the large volume, interim results for periods 12, 24, 36, 48, 60, 72, 84 , 96, 108, 120, 130 are presented as they reveal the changes that have taken p lace during the year.

```
Call: survfit(formula = Surv(time, event) ~ wage_category)

                wage_category=1

 time n.risk n.event survival  std.err lower 95% CI upper 95% CI
   12   3695       1    0.999 0.000383        0.999        1.000
   24   3687       1    0.997 0.000854        0.996        0.999
   36   3663       1    0.992 0.001427        0.990        0.995
   48   3622       2    0.983 0.002116        0.979        0.987
   60   3529      12    0.961 0.003208        0.954        0.967
   72   3276      16    0.901 0.004935        0.892        0.911
   84   2915      24    0.809 0.006537        0.796        0.822
   96   2499      45    0.696 0.007683        0.681        0.711
  108   2051      48    0.576 0.008297        0.560        0.592
  120   1529      63    0.425 0.008347        0.409        0.441
  130    692     206    0.141 0.005929        0.130        0.154

                wage_category=2

 time n.risk n.event survival  std.err lower 95% CI upper 95% CI
   12   7872       1    1.000 0.000180        0.999        1.000
   24   7866       1    0.999 0.000336        0.998        1.000
   36   7852       1    0.998 0.000538        0.997        0.999
   48   7820       2    0.994 0.000841        0.993        0.996
   60   7707      10    0.982 0.001488        0.979        0.985
   72   7348      30    0.943 0.002620        0.938        0.948
   84   6803      63    0.877 0.003733        0.869        0.884
   96   5997      71    0.777 0.004742        0.768        0.786
  108   5120      98    0.666 0.005395        0.655        0.676
  120   4042     124    0.523 0.005734        0.511        0.534
  130   2056     509    0.207 0.004681        0.198        0.217

                wage_category=3

 time n.risk n.event survival  std.err lower 95% CI upper 95% CI
   12   5397       1    1.000 0.000185        0.999        1.000
   24   5396       1    1.000 0.000262        0.999        1.000
   36   5390       2    0.998 0.000555        0.997        0.999
   48   5377       1    0.996 0.000806        0.995        0.998
   60   5340       2    0.991 0.001266        0.989        0.994
   72   5188      19    0.965 0.002519        0.960        0.970
   84   4916      36    0.917 0.003771        0.910        0.924
   96   4409      36    0.826 0.005199        0.816        0.836
  108   3832      56    0.719 0.006171        0.707        0.732
  120   3102      78    0.579 0.006802        0.566        0.593
  130   1659     345    0.253 0.006020        0.241        0.265

                wage_category=4

 time n.risk n.event survival  std.err lower 95% CI upper 95% CI
   36   1078       1    0.999 0.000927        0.997        1.000
   48   1077       1    0.998 0.001311        0.996        1.000
   60   1072       1    0.995 0.002071        0.991        0.999
   72   1047       2    0.975 0.004775        0.966        0.984
   84    997       7    0.932 0.007715        0.917        0.947
   96    914       5    0.863 0.010556        0.842        0.884
  108    816      14    0.767 0.013001        0.742        0.793
  120    690      13    0.650 0.014716        0.622        0.680
  130    444      75    0.357 0.014871        0.329        0.388
```

wage_category=5

time	n.risk	n.event	survival	std.err	lower 95% CI	upper 95% CI
60	452	1	0.998	0.00221	0.993	1.000
72	438	1	0.971	0.00788	0.956	0.987
84	425	3	0.942	0.01101	0.921	0.964
96	399	1	0.893	0.01460	0.865	0.922
108	377	1	0.848	0.01698	0.815	0.882
120	335	3	0.757	0.02034	0.718	0.798
130	220	38	0.415	0.02350	0.372	0.464

Source: compiled by the author

Appendix 13. Results of Cox model for employment duration after 55

```
Call:
coxph(formula = Surv(time, event) ~ wage_factor + gender +
occup_factor +
    unemp_benefit_number + sick_factor + disability_factor_2005_2009,
    method = "breslow")

  n= 18496, number of events= 13855

                        coef  exp(coef)  se(coef)       z Pr(>|z|)
wage_factor2        -0.134655  0.874017  0.023066  -5.838 5.29e-09 ***
wage_factor3        -0.114115  0.892156  0.027455  -4.156 3.23e-05 ***
wage_factor4        -0.294599  0.744830  0.045584  -6.463 1.03e-10 ***
wage_factor5        -0.408367  0.664735  0.067453  -6.054 1.41e-09 ***
gender              -0.309564  0.733767  0.020971 -14.762  < 2e-16 ***
occup_factor2        0.002988  1.002992  0.031198   0.096    0.924
occup_factor3        0.187942  1.206764  0.041212   4.560 5.11e-06 ***
occup_factor4        0.243335  1.275496  0.046055   5.284 1.27e-07 ***
occup_factor5        0.268046  1.307407  0.038768   6.914 4.71e-12 ***
occup_factor6        0.673016  1.960141  0.117007   5.752 8.82e-09 ***
occup_factor7        0.410854  1.508105  0.036429  11.278  < 2e-16 ***
occup_factor8        0.364026  1.439112  0.037924   9.599  < 2e-16 ***
occup_factor9        0.289181  1.335333  0.036718   7.876 3.39e-15 ***
unempemployment      0.157680  1.170791  0.001989  79.256  < 2e-16 ***
sick_factor          0.268439  1.307921  0.033448   8.026 1.01e-15 ***
disability_factor    0.162204  1.176100  0.029582   5.483 4.18e-08 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

                          exp(coef) exp(-coef) lower .95 upper .95
wage_factor2                 0.8740     1.1441    0.8354    0.9144
wage_factor3                 0.8922     1.1209    0.8454    0.9415
wage_factor4                 0.7448     1.3426    0.6812    0.8144
wage_factor5                 0.6647     1.5044    0.5824    0.7587
gender                       0.7338     1.3628    0.7042    0.7646
occup_factor2                1.0030     0.9970    0.9435    1.0662
occup_factor3                1.2068     0.8287    1.1131    1.3083
occup_factor4                1.2755     0.7840    1.1654    1.3960
occup_factor5                1.3074     0.7649    1.2117    1.4106
occup_factor6                1.9601     0.5102    1.5584    2.4654
occup_factor7                1.5081     0.6631    1.4042    1.6197
occup_factor8                1.4391     0.6949    1.3360    1.5502
occup_factor9                1.3353     0.7489    1.2426    1.4350
unemployment                 1.1708     0.8541    1.1662    1.1754
sick_factor                  1.3079     0.7646    1.2249    1.3965
disability_factor            1.1761     0.8503    1.1098    1.2463

Concordance= 0.653  (se = 0.003 )
Likelihood ratio test= 4803  on 16 df,   p=<2e-16
Wald test            = 7624  on 16 df,   p=<2e-16
Score (logrank) test = 9434  on 16 df,   p=<2e-16
```

Source: compiled by the author

Appendix 14. Employment rate of older workers, age group 65+, %

Country	2000	2005	2010	2015	2019
Estonia	7.3	9.8	8.5	11.3	14.2
Ireland	8.1	8.0	9.0	10.2	12.0
Portugal	18.1	17.9	16.5	11.3	11.5
United Kingdom	5.2	6.3	8.4	10.5	11.0
Latvia	6.6	8.1	5.8	7.4	10.4
Sweden	4.9	4.8	7.0	9.4	10.1
Lithuania	**7.8**	**3.9**	**4.3**	**6.3**	**9.8**
Cyprus	10.3	11.4	12.8	7.0	9.3
Netherlands	2.6	4.8	5.9	7.0	9.1
Denmark	2.5	5.5	6.8	8.1	8.5
Germany	2.6	3.4	4.0	6.1	7.8
Romania	38.2	14.6	12.4	8.9	7.5
Czechia	4.1	3.7	4.7	5.6	7.2
Bulgaria	2.9	2.5	2.9	4.0	6.5
Finland	2.3	2.8	4.1	6.2	6.5
EU - 28	**-**	**4.3**	**4.7**	**5.4**	**6.4**
Malta	-	2.0	3.6	5.0	6.1
Poland	7.6	5.6	4.7	4.7	5.5
Italy	3.1	3.1	3.1	3.8	5.0
Austria	2.9	2.8	5.1	5.3	4.6
Slovakia	0.8	1.3	1.6	2.5	4.6
Hungary	1.7	1.5	1.9	2.0	4.1
Greece	5.3	4.1	4.0	2.8	3.7
Croatia	-	7.0	5.4	3.3	3.5
France	1.1	1.2	1.5	2.6	3.3
Slovenia	7.4	7.8	7.3	4.2	3.1
Belgium	1.6	2.0	2.0	2.6	2.9
Spain	1.6	2.0	2.0	1.8	2.4
Luxembourg	1.6	-	3.4	3.1	2.3

Source: Eurostat

Appendix 15. Part-time employment as percentage of the total employment, by sex and age (%), 2019

	From 50 to 64 years			65 years or over		
	Total	Males	Females	Total	Males	Females
Netherlands	47.3	21.7	78.5	79.9	75.2	90.0
Austria	26.8	8.8	48.3	76.3	68.5	89.2
Sweden	19.9	10.7	29.7	71.5	67.2	77.6
Germany	29.3	9.0	51.5	71.2	65.1	80.8
Luxembourg	20.0	6.2	38.9	70.9	74.7	-
Finland	12.8	9.4	16.1	68.3	64.6	74.4
Belgium	29.9	13.6	49.1	67.2	65.3	71.0
Malta	13.4	6.1	26.4	66.7	69.7	57.3
United Kingdom	28.1	12.9	44.6	65.5	57.3	77.1
EU - 28	**20.3**	**8.4**	**33.9**	**55.1**	**49.5**	**63.9**
France	19.6	8.5	30.9	54.1	47.9	63.1
Denmark	18.8	9.4	29.3	52.4	45.9	68.5
Croatia	5.8	5.0	6.7	51.3	48.5	55.2
Czechia	6.2	3.4	9.4	51.1	42.2	63.3
Portugal	9.6	6.3	12.9	50.1	48.7	52.4
Hungary	5.8	3.0	9.0	50.0	47.5	53.4
Slovenia	8.0	5.5	10.8	48.9	47.3	51.7
Cyprus	9.9	6.1	15.0	43.6	42.4	47.7
Poland	7.7	5.3	10.7	43.5	36.0	56.3
Ireland	21.9	9.9	36.9	41.8	31.0	64.2
Romania	8.1	7.9	8.4	38.8	33.3	43.9
Slovakia	5.2	3.5	7.0	36.3	31.2	43.1
Estonia	11.1	9.0	12.8	36.0	27.2	42.1
Lithuania	**7.3**	**5.7**	**8.7**	**35.3**	**31.1**	**38.9**
Spain	11.5	3.9	21.0	28.5	23.8	35.0
Italy	16.0	6.3	29.0	27.7	25.9	31.6
Latvia	9.6	6.0	12.5	26.9	21.5	30.6
Greece	6.0	3.6	9.5	14.0	12.1	17.6
Bulgaria	2.0	1.7	2.3	9.4	6.1	14.1

Source: Eurostat

Appendix 16. Aggregate replacement ratio for pensions (excluding other social benefits) in 2019

Country	Aggregate replacement ratio, percentage
Luxembourg	0.86
Greece	0.76
Italy	0.73
Spain	0.70
Portugal	0.68
France	0.65
Austria	0.65
Poland	0.60
Malta	0.58
EU - 28	**0.57**
Hungary	0.55
Sweden	0.55
Slovakia	0.53
Finland	0.52
Netherlands	0.51
Denmark	0.48
Czechia	0.47
Belgium	0.46
Germany	0.44
Estonia	0.44
Lithuania	**0.43**
Slovenia	0.43
Romania	0.42
Cyprus	0.41
Croatia	0.39
Ireland	0.38
Latvia	0.38
Bulgaria	0.37

Source: Eurostat

Appendix 17. Results of linear model, logit and probit model for bridge employment

	LPM	Logit	Probit
intercept β_0	-0.6422***	-5.6356***	-3.3667***
x_{gender}	0.0131*	0.0589	0.0358
x_{sick_L}	0.0242**	0.1160**	0.0702**
x_{sick_H}	-0.0522***	-0.2385***	-0.1413***
$x_{experience}$	0.05***	0.2328***	0.1391***
$x_{experience^2}$	-0.0005***	-0.0027***	-0.0016***
$x_{sector} \times x_{occupation\ 2}$	0.0229**	0.1063*	0.0661**
$x_{sector} \times x_{occupation\ 3}$	0.0538**	0.2631*	0.1604**
$x_{sector} \times x_{occupation\ 5}$	0.0763***	0.3737***	0.0521***
$x_{sector} \times x_{occupation\ 7}$	0.0893**	0.4415*	0.2263*
$x_{sector} \times x_{occupation\ 8}$	0.1118**	0.5615**	0.2699**
$x_{pension\ replacement\ rate_L}$	0.1016***	0.5289***	0.3134***
x_{region}	0.0305***	0.1516***	0.0913***
$x_{unemp\_benefit}$	-0.3489***	-1.5399***	-0.9416***
$x_{disability}$	-0.0339	-0.1537*	-0.0951*
$x_{widow\ pension} \times x_{gender}$	-0.015	-0.0726	-0.0444
$x_{employment\ rate}$	0.0038***	0.0182***	0.0109***

Source: compiled by the author

Appendix 18. Results of linear model, logit and probit model for employment of people aged 55-64 during pandemic

	LPM	Logit	Probit
intercept β_0	0.8680***	2.3534***	1.2647***
x_{gender}	-0.0434***	-0.4313***	-0.2351***
x_{age}	-0.0045***	-0.0452***	-0.0237***
$\ln(x_{wage})$	0.1048***	0.9062***	0.5097***
$x_{unemployment}$	-0.6835***	-3.5206***	-2.0780***
$x_{economic\ activity\_C}$	0.0197***	0.2174***	0.1130***
$x_{economic\ activity\_F}$	-0.0358***	-0.3135***	-0.1664***
$x_{economic\ activity\_G}$	0.0326***	0.3573***	0.1909***
$x_{economic\ activity\_H}$	-0.0304***	-0.2932***	-0.1564***
$x_{economic\ activity\_I}$	0.0074·	0.0455	0.0198
$x_{economic\ activity\_J}$	0.0201**	0.3128***	0.1571***
$x_{economic\ activity\_N}$	-0.0423***	-0.3786***	-0.2040***

Source: compiled by the author

SANTRAUKA

ĮVADAS

Temos aktualumas. Mažas gimstamumas ir ilgėjanti gyvenimo trukmė tiek Lietuvoje, tiek visame pasaulyje spartina demografinius pokyčius. Darbingo amžiaus žmonių mažėja, o pensininkų daugėja. Ši demografinė tendencija neigiamai veikia pensijų ir sveikatos sistemas bei darbo rinką. Pensijų sistema susiduria su dideliais iššūkiais: mažėja asmenų, mokančių socialinio draudimo įmokas, daugėja gaunančiųjų išmokas (iššūkis pensijų tvarumui užtikrinti, angl. *pension sustainability*), todėl gali mažėti išmokos ir išmokų pakeitimo norma (iššūkis pensijų adekvatumui užtikrinti, angl. *pension adequacy*). Senėjant visuomenei, reikia daugiau slaugos ir įvairių ligų gydymo paslaugų, o tai lemia didesnį ir platesnį sveikatos sistemos funkcijų poreikį. Be to, dėl senėjančios visuomenės darbdaviai susiduria su darbo jėgos trūkumu. Tai skatina atkreipti įmonių dėmesį į vyresnio amžiaus darbuotojus. Galiausiai žmonės susiduria su mažų pensijų problema ir skurdo rizika senatvėje.

Neigiamoms visuomenės senėjimo pasekmėms šalinti siūlyta daug priemonių (socialinio draudimo įmokų didinimas, našumo didinimas, išmokų mažinimas, pensinio amžiaus didinimas ir kt.), tačiau nė viena iš jų negali pašalinti visų neigiamų minėto proceso padarinių. Dažniausiai rekomenduota priemonė – pensinio amžiaus didinimas. Minėtina, kad beveik visos Europos šalys jau padidino pensinį amžių senatvės pensijai ir išankstinei senatvės pensijai gauti. Taip pat, siekiant užtikrinti finansinį pensijų sistemų tvarumą ir didesnes pensijas Europos šalyse, buvo pasiūlyta struktūrinių reformų, pavyzdžiui, pereiti nuo apibrėžtų išmokų (angl. *defined benefit pension schemes*) prie apibrėžtų įmokų pensijų sistemų (angl. *defined contribution pension schemes*) ar pereiti nuo vienos pakopos pensijų sistemos prie daugiapakopės sistemos, siekiant sumažinti einamojo finansavimo pensijų sistemos (angl. *pay-as-you-go system*) dalį ir padidinti žmonių aktyvumą kaupti pensijai privačiuose pensijų fonduose. Europos šalys linkusios neskatinti ankstyvo išėjimo į pensiją, nes ankstyvas pasitraukimas iš darbo rinkos gali sukelti didėjantį disbalansą tarp metų, praleidžiamų darbo rinkoje ir pensijoje. 2009 m. ekonomikos krizė išryškino kai kurių pensijų sistemų trūkumus ir paneigė mitą, kad tik pensijų sistemų reformos priemonėmis galima susidoroti su visomis neigiamomis visuomenės senėjimo pasekmėmis. Be to, tapo aišku, kad padidinus pensinį amžių taip pat negalima visiškai pašalinti neigiamo visuomenės senėjimo poveikio pensijų sistemoms.

Vienas iš sprendimų senėjančios visuomenės poreikiams užtikrinti – skatinti žmones ilgiau likti darbo rinkoje. Tai leistų darbdaviams išvengti

darbo jėgos trūkumo, darbuotojai užsitikrintų didesnes pajamas senatvėje, šalims būtų lengviau užtikrinti pensijų ir sveikatos sistemų finansinį stabilumą. Senatvės pensinio amžiaus sulaukusių asmenų dalyvavimas darbo rinkoje įvairiomis formomis, įskaitant darbą ne visu etatu, darbą visą ar ne visą darbo dieną, savarankišką veiklą, dažnai apibrėžiamas kaip „pereinamasis darbas“ (angl. *bridge employment*), reiškiantis „perėjimą“ nuo darbo pensiniame amžiuje iki laiko, kai asmuo nebedalyvauja darbo rinkoje ir yra pensijoje. Užimtumas senatvėje vertinamas skirtingai: darbdaviai atsargiau vertina vyresnio amžiaus žmonių galimybes dirbti taip pat produktyviai kaip ankstesniame amžiuje, o patys darbuotojai, nors ir vertina galimybes dirbti vyresniame amžiuje dėl palaikomų socialinių ryšių ir papildomų pajamų, linkę dirbti ne visą darbo dieną. Diskusijos apie „pereinamąjį darbą“ ir aktyvų senėjimą tampa vis svarbesnės, teigiant, kad ateityje darbas, mokymasis visą gyvenimą ir kita veikla prisidės prie ilgesnio žmonių gyvenimo, nes leis jiems jaustis visuomenėje reikalingiems, toliau puoselėti socialinius ryšius ir didinti pajamas, būnant vyresnio amžiaus. Visa tai lemia šios disertacijos, kurioje detaliai nagrinėjami „pereinamojo darbo“ ir aktyvaus senėjimo faktoriai, aktualumą.

Minėtina, kad nauju iššūkiu darbo rinkos dalyviams tapo ir 2020 m. prasidėjusi COVID-19 pandemija. Disertacijoje COVID-19 pandemija aptariama pabrėžiant iššūkius, su kuriais vyresnio amžiaus žmonės, norėdami ilgiau išlikti darbo rinkoje, gali susidurti ateityje, ypač jei pandemija tęsis.

Mokslinė problema ir tyrimo objektas. Pagrindinis tyrimo objektas – priešpensinio ir pensinio amžiaus žmonių užimtumas Lietuvoje ir veiksniai, lemiantys skirtingą žmonių užimtumo lygį senatvėje. Pagrindinė tiriama mokslinė problema orientuota į veiksnius, kurių vieni riboja, o kiti skatina žmonių pasirinkimą dirbti ilgiau. Visuomenės senėjimo ir pandemijos kontekste tikslinga nustatyti, kurie veiksniai riboja, o kurie skatina žmonių išlikimą darbo rinkoje ilgiau, kad būtų galima imtis priemonių ribojantiems veiksniams šalinti ir užimtumą skatinantiems veiksniams Lietuvoje palaikyti.

Tikslas ir uždaviniai. Darbo tikslas – nustatyti veiksnius, kurie skatina ir riboja priešpensinio ir pensinio amžiaus žmonių užimtumą Lietuvoje, ir pasiūlyti sprendimus, kaip padidinti žmonių užimtumą vyresniame amžiuje. Tikslui pasiekti suformuluoti šie uždaviniai:

1. Kritiškai įvertinti demografines tendencijas ir Europos Sąjungos šalių įgyvendintas priemones, siekiant sumažinti visuomenės senėjimo padarinius.
2. Atlikti išsamią ankstesnių tyrimų nagrinėjama tema apžvalgą ir nustatyti pagrindinius kitų tyrėjų išskiriamus veiksnius, skatinančius ir ribojančius asmenų užimtumą vyresniame amžiuje.

3. Siekiant ištirti 55 m. amžiaus žmonių užimtumo trukmę Lietuvoje, sudaryti išlikimo modelį (angl. *survival model*).
4. Siekiant išmatuoti individualių, finansinių ir kitų veiksnių poveikį užimtumui pensiniame amžiuje Lietuvoje, sudaryti binarinius tikimybinius modelius (angl. *binary response models*).
5. Naudojant binarinius tikimybinius modelius, įvertinti galimą COVID-19 pandemijos poveikį vyresnio amžiaus darbuotojams.
6. Apibendrinti tyrimų rezultatus ir pateikti rekomendacijas, kaip pagerinti vyresnio amžiaus žmonių užimtumą Lietuvoje.

Tyrimo metodai. Siekiant išanalizuoti veiksnius, kurie riboja ir skatina užimtumą vyresniame amžiuje individualiu lygiu, empirinėje disertacijos dalyje taikoma išlikimo analizė (angl. *survival analysis*) ir binariniai tikimybiniai modeliai (angl. *binary response models*). Išlikimo analizė leidžia modeliuoti laiką, praleistą tam tikroje būsenoje (užimtumas), prieš pereinant į kitą būseną (išėjimas į pensiją). Šiame darbe išlikimo modelis naudojamas asmenų, sulaukusių 55 m., užimtumui Lietuvos darbo rinkoje įvertinti ir veiksniams, lemiantiems ilgesnį išlikimą šioje rinkoje, nustatyti. Binariniai tikimybiniai modeliai naudojami Lietuvoje užimtumą pensiniame amžiuje skatinantiems ir ribojantiems veiksniams nustatyti. Minėti modeliai taip pat naudojami COVID-19 pandemijos poveikiui 55–64 m. amžiaus žmonių užimtumui nustatyti. Darbe taikyti abu metodai, nes jie leidžia nustatyti užimtumą lemiančius veiksnius naudojant administracinius Lietuvos mikrolygio duomenis.

Ginamieji teiginiai:

1. Sveikata – pagrindinis veiksnys, lemiantis, ar žmogus gali dirbti ilgiau (angl. *enabling factor*), o aukštesnė kvalifikacija – veiksnys, padedantis ilgiau išlikti darbo rinkoje (angl. *allowing factor*).
2. Lietuvoje didėja atotrūkis tarp dviejų galimų išskirti vyresnio amžiaus žmonių grupių: pirmajai grupei skirtini žmonės, per visą savo darbinę karjerą gavę didesnius negu kiti atlyginimus, užsitikrinę aukštesnes karjeros galimybes, dirbantys ilgiau ir didinantys savo ir taip didesnes pajamas senatvėje; antrajai grupei priklausytų žmonės, per visą savo karjerą dirbę žemesnės kvalifikacijos darbus, – jie vyresniame amžiuje dirba rečiau ir mažiau papildomomis darbo pajamomis prisideda prie savo ir taip mažų pensijų.
3. Moterys ir žmonės, turintys negalią, galėtų ilgiau likti darbo rinkoje, tačiau šiandien jie greičiau pasitraukia iš darbo rinkos negu kiti darbo rinkos dalyviai.
4. Lietuvoje nepakankamai skatinama aktyvaus senėjimo politika.

5. Vyresnio amžiaus darbuotojai Lietuvoje nebuvo labiau paveikti COVID-19 pandemijos negu kiti darbo rinkos dalyviai. Jei tokios pandemijos kaip ši kils ateityje, jos vyresnio amžiaus žmonėms gali sukelti ir apribojimų, ir suteikti galimybių.

Darbo mokslinis naujumas ir teorinė reikšmė. Darbo mokslinis naujumas ir teorinė reikšmė grindžiami trimis aspektais: *(1) analizuoti unikalūs duomenys, (2) tirta didžioji populiacijos dalis, ne imtis, (3) sudaryti pirmieji modeliai, įvertinantys pandemijos poveikį vyresnio amžiaus žmonių užimtumui Lietuvoje*.

(1) Disertacijoje pirmą kartą Lietuvoje priešpensinio ir pensinio amžiaus žmonių užimtumą lemiantys veiksniai nustatyti naudojant administracinius duomenis. Daugumoje socialinių mokslų tyrimų, kuriuose nagrinėjamas vyresnio amžiaus darbuotojų išėjimas į pensiją, remiamasi apklausų duomenimis (pavyzdžiui, „Europos sveikatos, senėjimo ir išėjimo į pensiją tyrimas“ (angl. *The Survey of Health, Aging and Retirement in Europe*) (Kalwij ir Vermeulen, 2008; Komp ir kt., 2010; Boersch-Supan ir kt., 2013; Dingemans ir kt., 2016; Dingemans ir Mohring, 2018; Dingemans ir Henkens, 2019), „Europos Sąjungos darbo jėgos tyrimas“ (angl. *European Union Labor force survey*) (Aliaj ir kt., 2016)) arba anketinėmis pačių tyrėjų atliktomis apklausomis (Kim ir Feldman, 2000; Hult, 2008; Deller ir kt., 2009; Gobeski ir Beehr, 2009; Shacklock ir kt., 2009; Maxin ir Deller, 2010; Mulders ir kt., 2014; Van Solinge, 2014; Damman ir kt., 2015; Damman ir Henkens, 2015, 2018). Lietuvoje daugiausia tyrimų atlikta analizuojant statistinius (Okunevičiūtė-Neverauskienė ir Moskvina 2008, 2013; Okunevičiūtė-Neverauskienė ir Pocius, 2017) ir atliktų apklausų duomenis (Moskvina ir Skučienė, 2014; Brazienė ir Mikutavičienė, 2015; Lengvinienė ir Rutkienė, 2016; Vilkoitytė ir Skučienė, 2020). Šioje disertacijoje naudojami administraciniai Lietuvos valstybinio socialinio draudimo fondo (toliau – VSDF) biudžeto duomenys.

(2) Naudojant unikalius mikroduomenis, analizuota ne imtis, kaip daugumos kitų tyrimų atveju, bet tirta didžioji populiacijos dalis. Siekiant nustatyti, kaip sveikatos, profesijos, finansinės padėties ir kiti veiksniai lemia asmenų užimtumą pensiniame amžiuje, ištirti 26 tūkst. pensininkų duomenys. Dar 18,5 tūkst. asmenų duomenų ištirta naudojant išlikimo analizę. Nustatyta, kaip išlikimo darbo rinkoje tikimybė keičiasi kasmet, asmeniui sulaukus 55 m. amžiaus.

(3) Siekiant nustatyti COVID-19 pandemijos poveikį vyresnio amžiaus žmonių užimtumui, 132 tūkst. 55–64 m. amžiaus žmonių, dirbančių nebiudžetiniame sektoriuje, duomenys buvo ištirti naudojant binarinius tikimybinius modelius. Kadangi COVID-19 pandemija vis dar tęsiasi,

norėdami įvertinti galimą pandemijos poveikį asmenų užimtumui, kiti tyrėjai dažniausiai atlieka statistinę analizę – esamos pandemijos laikotarpio užimtumo rodikliai lyginami su 2009 m. ekonominės krizės rodikliais (Bui ir kt., 2020; Coibion ir kt., 2020; Munnell ir Chen, 2021) arba teoriškai diskutuojama apie galimą pandemijos poveikį vyresniems žmonėms (Kanfer ir kt., 2020; Li ir Mutchler, 2020; Morrow-Howell, 2020; Truxillo ir kt., 2020). Disertacijoje pandemijos poveikis vyresnio amžiaus žmonių užimtumui Lietuvoje modeliuojamas naudojant unikalius VSDF administracinius mikroduomenis. Tai leidžia daryti gilesnes išvadas, kaip pandemija veikia 55–64 m. amžiaus darbuotojus Lietuvoje. Taigi disertacija atskleidžia galimybes atlikti darbo rinkos Lietuvoje vertinimus, naudojant mikroduomenų analizę, ir taip nustatyti tobulintinas užimtumo politikos sritis.

Praktinė darbo reikšmė. Praktinė darbo reikšmė grindžiama dviem aspektais: *(1) rekomendacijomis asmenims* ir *(2) rekomendacijomis politikos formuotojams*.

(1) Asmenų elgesio tyrimas mikrolygmeniu yra svarbi priemonė, padedanti atskleisti, kaip kovoti su gyventojų senėjimo padariniais, ir leidžianti praktiškai planuoti reformas, siekiant paremti priešpensinio ir pensinio amžiaus asmenis. Disertacijoje daugiausia dėmesio skiriama veiksniams, lemiantiems užimtumą darbo rinkoje vyresniame amžiuje, ir praktinių rekomendacijų formavimui. Ištirti Lietuvos duomenys rodo, kad asmenys turėtų skirti daugiau dėmesio sveikatai stiprinti ir profesijai pasirinkti, taip pat rengtis mokymuisi visą gyvenimą ir nuolatiniam profesiniam tobulėjimui.

(2) Glaustai ir aiškiai apibrėžus vyresnio amžiaus žmonių užimtumo tendencijas Lietuvoje, parengtos rekomendacijos politikos formuotojams, galėsiantiems jomis vadovautis sprendžiant visuomenės senėjimo keliamas problemas. Rekomenduojama stiprinti paramą aktyviam visuomenės senėjimui, įgyvendinti bandomąsias vyresnio amžiaus žmonių užimtumo programas biudžetiniame sektoriuje ir apsvarstyti lankstaus pensinio amžiaus įvedimo galimybes, įgyvendinus kitas pateiktas rekomendacijas.

Tyrimo apribojimai ir duomenų prieinamumas. Disertacijos apribojimų kyla dėl administracinių duomenų ribotumo. Kaip jau minėta, administracinių duomenų naudojimas šioje disertacijoje yra unikalus ir išskiria tyrimą iš kitų Lietuvoje atliktų tyrimų, tačiau kai kurių duomenų trūkumas neleidžia daryti tam tikrų atskiras sritis apimančių išvadų. Pavyzdžiui, disertacijoje nėra nagrinėjami šeimos veiksniai, tokie kaip vaikų skaičius, sutuoktinio užimtumo statusas, kurie taip pat, galima manyti, prisideda prie asmenų sprendimų ilgiau likti darbo rinkoje. Minėtina ir tai, kad kai kurie veiksniai, tokie kaip sergamumas ir nedarbo poveikis, buvo

analizuojami naudojant socialinio draudimo išmokų gavėjų duomenis. Tačiau tiek ligos, tiek nedarbo išmokas gauna asmenys, atitinkantys stažo reikalavimus ir draudžiami socialiniu draudimu, todėl asmenims, negaunantiems ligos arba nedarbo išmokų iš VSDF biudžeto, minėti veiksniai nebuvo fiksuoti, nors asmenys galėjo ir sirgti, ir būti bedarbiai.

Disertacijos struktūra. Pirmoje disertacijos dalyje apžvelgiamos demografinės tendencijos tiek Lietuvoje, tiek visoje Europoje, aptariamas visuomenės senėjimo ekonominis poveikis ir politinės priemonės, kurių imtasi siekiant pašalinti neigiamas visuomenės senėjimo pasekmes. Antroje dalyje pateikiama mokslinės literatūros, analizuojančios priešpensinio ir pensinio amžiaus žmonių užimtumą, apžvalga. Išskiriami sunkumai, su kuriais susiduria vyresnio amžiaus darbuotojai, aptariamas skirtingas darbdavių požiūris į vyresnio amžiaus darbo rinkos dalyvius, konkretizuojami veiksniai, lemiantys, ar vyresnis asmuo ilgiau dalyvaus darbo rinkoje. Trečioje dalyje pristatoma išsami priešpensinio amžiaus žmonių užimtumo Lietuvoje analizė, atlikta naudojant aprašomąją duomenų analizę ir taikant išlikimo analizę, leidžiančią įvertinti asmenų, sulaukusių 55 m. amžiaus, užimtumo trukmę. Ketvirta dalis skirta išsamiai Lietuvos pensinio amžiaus žmonių analizei, atliktai naudojant aprašomąją duomenų analizę ir taikant binarinius tikimybinius modelius, siekiant įvertinti, kurie veiksniai turi įtaką sprendimui dirbti pensiniame amžiuje. Nustatant pagyvenusių žmonių užimtumo tendencijas ir joms įtaką darančius veiksnius, minėtina COVID-19 pandemija, kuri, skirtingai negu ankstesnės krizės, grasina darbo rinkai naujais ilgalaikiais padariniais. 2020 m. pradžioje prasidėjusi COVID-19 pandemija sukėlė ne tik sveikatos sektoriaus, bet ir darbo rinkos didesnį neapibrėžtumą. Penktoje dalyje analizuojamas COVID-19 pandemijos poveikis darbo rinkai, akcentuojami kai kurie senyvų žmonių apribojimai ir galimybės. Šioje dalyje atskirai pateikiama mokslinės literatūros nagrinėjama tema analizė, taip pat aprašomoji Lietuvos užimtumo rodiklių analizė, sudaromi binariniai tikimybiniai modeliai, galiausiai aptariami modelių rezultatai. Visi disertacijos tyrimų rezultatai ir rekomendacijos išsamiai aptariami išvadose.

Disertaciją sudaro įvadas, penkios dalys, išvados ir rekomendacijos. Disertacijos apimtis – 199 puslapiai, joje pateiktos 22 lentelės, 33 paveikslai, 18 priedų.

1. DEMOGRAFINĖS TENDENCIJOS IR POLITINIS ATSAKAS

Šioje dalyje apžvelgiamos gyventojų senėjimo tendencijos, jų poveikis ekonomikai. Apibendrinama, kokios politinės priemonės taikytos kaip atsakas į šias tendencijas.

Pirmiausia pristatomos demografinės tendencijos. Išskiriami gyventojų struktūros ir tikėtinos gyvenimo trukmės pokyčiai Europos Sąjungoje ir atskirai Lietuvoje. Aptariamas senėjimo poveikis ekonomikai, atsižvelgiant į tris pagrindines grupes: *1) viešuosius finansus, 2) darbo rinką, 3) skurdą ir nelygybę*. Apžvelgiama, kaip Europos Sąjungos šalys reformavo savo pensijų sistemas, kad sumažintų neigiamą senėjimo poveikį pensijų išlaidoms.

1.1. Gyventojų senėjimo tendencijos Europoje ir Lietuvoje

Demografinis senėjimas reiškia procesą, kai darbingo amžiaus žmonių dalis tarp visų žmonių mažėja, o vyresnio amžiaus žmonių dalis – didėja (Corporate authors, 2019). Remiantis „Ageing Europe“ ataskaita, vyresnio amžiaus žmonės apibrėžiami kaip 65 m. ar vyresni (Corporate authors, 2019). 85 m. ar vyresni asmenys laikytini labai senais žmonėmis (Corporate authors, 2019). Analizuojant, kaip žmonės pasitraukia iš darbo rinkos į pensiją, šioje disertacijoje ypatingas dėmesys skiriamas dviem amžiaus grupėms: 55–64 m. ir atskirai 65 m. ir vyresniems žmonėms.

Lietuvoje, kaip ir visoje Europos Sąjungoje, tikėtina gyvenimo trukmė ilgėja, įskaitant sveiko gyvenimo metų skaičių. 2005 m. Lietuvoje asmenų, sulaukusių 65 m., vidutinė tikėtina gyvenimo trukmė siekė 16 m., 2019 m. – 17,9 m. (Europos Sąjungoje – atitinkamai 18,3 m. ir 20,2 m.). Minėtina, kad Lietuvoje asmenų, sulaukusių 65 m., tikėtina gyvenimo trukmė yra viena mažiausių Europos Sąjungoje. 2019 m. vyrų, sulaukusių 65 m., tikėtina gyvenimo trukmė Lietuvoje siekė 14,8 m., moterų – 20 m. (Europos Sąjungoje – atitinkamai 18,4 m. ir 21,8 m.). Lietuvoje, kaip ir kitose Europos Sąjungos šalyse, dėl ilgesnės gyvenimo trukmės 65 m. amžiaus moterų sveiko gyvenimo metai sudaro mažesnę tikėtinos gyvenimo trukmės dalį negu vyrų: 65 m. amžiaus moterų tikėtina sveiko gyvenimo metų trukmė siekia vidutiniškai 6,4 m. (32 proc. tikėtinos gyvenimo trukmės), o vyrų – 6 m. (arba 41 proc. tikėtinos gyvenimo trukmės).

2019 m. pradžioje 65 m. ir vyresni žmonės sudarė penktadalį visų Lietuvos gyventojų. Prognozuojama, kad vyresnio amžiaus žmonių dalis ateinančiais dešimtmečiais toliau augs. Remiantis Eurostato ir Jungtinių Tautų prognozėmis, ši gyventojų dalis palaipsniui didės. Prognozuojama, kad

2100 m. vyresnio amžiaus žmonių dalis sieks 31–32 proc. Taip pat manoma, kad Lietuvoje vyresnio amžiaus gyventojų santykis, išreiškiamas kaip 65 m. ir vyresnių gyventojų skaičius šimtui darbingo amžiaus gyventojų, padidės nuo 31 proc. (2020 m.) iki 57 proc. (2100 m.).

Sunku atsakyti, ar minėtos prognozės pasiteisins ir ar taip smarkiai pasikeis gyventojų struktūra, žinant, kad prognozės, ypač Lietuvos atveju, paremtos tikėtinais galimais emigracijos ir imigracijos srautų pokyčiais. Vis tik galima teigti, kad, pildantis tiek mažesnėms, tiek didesnėms visuomenės senėjimo prognozėms, mažėjant darbingo amžiaus gyventojų skaičiui ir didėjant vyresnio amžiaus žmonių skaičiui, ekonomikos laukia dideli iššūkiai.

1.2. Ekonominis visuomenės senėjimo poveikis

Ekonominį visuomenės senėjimo poveikį galima suskirstyti į tris grupes. Skirtinas poveikis *(1) viešiesiems finansams, (2) darbo rinkai, (3) skurdui ir nelygybei* (Bussolo ir kt., 2015). Pirmiausia, dėl visuomenės senėjimo didėja fiskalinės išlaidos sveikatos priežiūrai, ilgalaikei priežiūrai ir pensijoms (Bussolo ir kt., 2015; Martin, 2018; Corporate authors, 2019; Rouzet ir kt., 2019). Visuomenėje daugėjant išlaikomų vyresnio amžiaus žmonių, gali nepakakti išteklių šios grupės asmenų gyvenimo lygiui išlaikyti, ypač jei didėjančios fiskalinės išlaidos sveikatos ir ilgalaikei priežiūrai bei pensijoms būtų finansuojamos iš įmokų ir mokesčių, kuriuos mokėtų jauni žmonės, o jų skaičius vis mažėtų (Bussolo ir kt., 2015; Martin, 2018; Corporate authors, 2019; Rouzet ir kt., 2019). Antra, gyventojų senėjimas gali paveikti darbo rinką, nes vidutinis darbuotojų amžius didėtų, o vyresnio amžiaus darbuotojai gali būti mažiau produktyvūs negu jaunesni darbuotojai (Eurobarometras, 2012; Bussolo ir kt., 2015; Aiyar ir Ebeke, 2016). Trečia, visuomenėje gali išaugti nelygybė tarp daugiau ir mažiau kvalifikuotų darbuotojų bei nelygybė tarp moterų ir vyrų. Skirtumas tarp kvalifikuotų ir nekvalifikuotų darbuotojų atlyginimų didėja su amžiumi. Vis didesnė vyresnio amžiaus žmonių grupė gali poliarizuotis į vieną kvalifikuotų ir aktyvių žmonių grupę, kuri uždirba dideles pajamas, o kitą grupę gali sudaryti nekvalifikuoti asmenys, gaunantys mažus atlyginimus ir iškrentantys iš darbo rinkos jaunesniame amžiuje (Bussolo ir kt., 2015).

1.3. Politinis atsakas į visuomenės senėjimo procesą

Šiame skyriuje apibendrinamos pagrindinės priemonės, kurių ES-28 šalys ėmėsi neigiamam senėjančios visuomenės poveikiui suvaldyti: visiško užimtumo skatinimas; moterų ir vyresnių žmonių užimtumo didinimas;

pensinio amžiaus didinimas; paskatų rinktis išankstines pensijas mažinimas; pensijų transformavimas pereinant nuo apibrėžtų išmokų prie apibrėžtų įmokų pensijų sistemų ir perėjimas nuo vienos pakopos pensijų sistemos prie daugiapakopių sistemų; automatinių mechanizmų naudojimas, sprendžiant ilgaamžiškumo riziką; aktyvaus senėjimo rėmimas.

Apibendrinant galima teigti, kad pagrindinės tarptautinės organizacijos, tokios kaip Pasaulio bankas, EBPO, Pasaulio sveikatos organizacija ir Europos Sąjunga, sutaria, kad reikia didinti vyresnio amžiaus žmonių užimtumą, skatinti mokymąsi visą gyvenimą ir aktyvų senėjimą (Conclusions, 1993; Presidency Conclusions, 2001; Presidency Conclusions, 2003; Presidency Conclusions, 2005; European Commission, 2009; European Commission, 2012; Pasaulio sveikatos organizacija, 2015; European Commission, 2018; Martin, 2018; Rouzet ir kt., 2019). Nuo pat Stokholmo tarybos (Presidency Conclusions, 2001) iki 2020 m. Europos strategijos (European commission, 2010) ryškiausias diskursas ES kovoje su skurdu ir socialine atskirtimi yra užimtumo didinimas. Užimtumas laikomas pagrindiniu socialinės įtraukties veiksniu, nes jis ne tik sukuria pajamas, bet ir skatina socialinį dalyvavimą ir asmeninį tobulėjimą (Ervik et al., 2009).

2. VYRESNIO AMŽIAUS ŽMONIŲ UŽIMTUMAS: LITERATŪROS APŽVALGA

Siekiant išsiaiškinti vyresnio amžiaus žmonių įsidarbinimo galimybes ir suvaržymus, šioje dalyje analizuojamos problemos, su kuriomis susiduria 55 m. ir vyresni darbuotojai, apžvelgiamas vyresnio amžiaus žmonių, politikos formuotojų ir darbdavių požiūris į užimtumą vyresniame amžiuje, aptariami veiksniai, leidžiantys vyresnio amžiaus darbuotojams ilgiau išlikti darbo rinkoje.

2.1. Užimtumas priešpensiniame amžiuje

Vyresnio amžiaus darbuotojai gali susidurti su neigiamu darbdavių požiūriu į juos ir darbe patirti diskriminaciją dėl amžiaus. Darbdaviai galėtų išskirti tokius vyresnių darbuotojų trūkumus: vyresnio amžiaus darbuotojai mažiau produktyvūs negu jauni darbuotojai, jie mokėsi esant kitokiai švietimo sistemai; vyresni darbuotojai gali būti mažiau judrūs, mažiau verslūs ir mažiau lankstūs; jų žmogiškojo kapitalo kokybė gali būti prastesnė. Be to, net jei vyresnio amžiaus darbuotojai yra įgiję patirties, ji dažnai nėra naudinga dirbant naujuose, besikeičiančiuose sektoriuose (Bussolo ir kt., 2015). Kita

vertus, yra darbdavių, kurie vertina vyresnio amžiaus darbuotojų darbo etiką, didesnę darbo drausmę ir ypač vertina vyresnio amžiaus darbuotojų gebėjimą perduoti savo patirtį jaunesniems darbuotojams (Cummins ir McGrew, 2018).

Nepaisant sunkumų ieškant darbo vyresniame amžiuje ar išlaikant darbo vietą, darbas vyresnių žmonių gyvenimą gali padaryti sveikesnį ir laimingesnį. Argumentuojama, kad ilgesnis darbinis gyvenimas daugumai žmonių padeda išlaikyti gerą savijautą. Ilgiau dirbti daugumai žmonių atrodo naudinga, nes, ilgiau būdamas darbo rinkoje, asmuo jaučiasi reikalingas visuomenei, o tai teigiamai veikia ir jo gerovę, ir sveikatą (Calvo, 2006).

Literatūros apžvalga rodo, kad mažesnį vyresnio amžiaus žmonių užimtumą gali lemti sveikatos problemos ir sunkumai, su kuriais vyresnio amžiaus žmonės susiduria darbo rinkoje (pavyzdžiui, reikia greitai prisitaikyti prie naujų technologijų). Disertacijoje taip pat aptariamos priešpensinio amžiaus žmonių darbo alternatyvos, tokios kaip išankstinė ar neįgalumo pensija, atkreipiamas dėmesys, kad vyresni darbuotojai teikia prioritetą lankstesniam darbo režimui (lankstus darbo grafikas, galimybė dirbti ne visą darbo dieną ar galimybė dirbti iš namų) ir pabrėžia sąžiningo darbuotojų vertinimo svarbą, nediskriminuojant jų dėl amžiaus.

2.2. Užimtumas pensiniame amžiuje

2.2.1. „Pereinamojo darbo“ sąvoka

Užimtumas pensiniame amžiuje (angl. *bridge employment*) disertacijoje apibrėžiamas kaip apmokamas darbas (visą ar ne visą darbo dieną, laikinai ar vykdant savarankišką darbą), sulaukus pensinio amžiaus, kol visiškai pasitraukiama iš darbo rinkos ir gaunama tik senatvės pensija.

2.2.2. Skirtingas politikos formuotojų, darbdavių ir darbuotojų požiūris į užimtumą pensiniame amžiuje

Sarfati (2008) teigia, kad vyresnio amžiaus žmonių išlikimas ilgiau darbo rinkoje gali padėti: *(1) užtikrinti darbo jėgos augimą ir sumažinti neigiamą visuomenės senėjimo poveikį ekonomikos augimui*; *(2) užtikrinti pakankamus valstybės finansus sveikatos ir pensijų sistemoms, nes sumažėtų valstybės išlaidos, susijusios su ankstyvu išėjimu į pensiją, kartu tai leistų padidinti mokesčių pajamas*; *(3) sumažinti darbdaviams aktualią vyresnių darbuotojų keitimo problemą*.

Mokslinėje literatūroje dažniausiai išskiriami du vyresnio amžiaus žmonių užimtumo motyvai. Pirma, geriau finansiškai apsirūpinę pensininkai gali

rinktis dirbti ir išėję į pensiją, kad jaustų pasitenkinimą gyvenimu, neprarastų socialinių santykių (Sandor, 2011; Dingemans ir Henkens, 2019), padidintų savo pajamas senatvėje (Cahill ir kt., 2006). Į pensiją išėję žmonės nesijaučia naudingi visuomenei, nors daugeliu atvejų jie motyvuoti dirbti toliau ir palaikyti socialinius santykius. Kita vertus, darbas pensiniame amžiuje gali atspindėti finansinę būtinybę išvengti skurdo rizikos, ypač tiems, kurie patenka į žemesnę socialinę ir ekonominę skalę. Antrasis motyvas gali būti ir būtinybė išvengti skurdo, ir noras padidinti mažas pajamas.

2.2.3. Veiksniai, lemiantys užimtumą pensiniame amžiuje

Apžvelgiami mokslinėje literatūroje kitų tyrėjų išskirti veiksniai, lemiantys užimtumą vyresniame amžiuje. Šie veiksniai darbo autorės suskirstomi į keturias grupes: asmeninius, finansinius, šeimos ir kitus veiksnius.

2.3. Kitų tyrėjų naudoti modeliai ir duomenys

Atlikdami visuomenės senėjimo mikrolygio tyrimus, kiti tyrėjai dažniausiai naudoja mažiausių kvadratų metodu vertinamas tiesines regresijas (angl. *ordinary least squares regressions*), binarinius tikimybinius (angl. *binary response models*), multinominius logistinius (angl. *multinomial logit models*), tobit (angl. *tobit models*) ar išlikimo modelius (angl. *survival models*).

Daugumoje tyrimų, kuriuose analizuojamas vyresnio amžiaus darbuotojų išėjimas į pensiją, naudojami apklausos duomenys (pavyzdžiui, „Sveikatos, senėjimo ir pensijos tyrimas Europoje“ (angl. *The Survey of Health, Aging and Retirement in Europe*), ES darbo jėgos tyrimas (angl. *EU labour force survey*), „Eurostat“ pajamų ir gyvenimo sąlygų tyrimas (angl. *EU-SILC*), Sveikatos ir pensijų studijos (angl. *Health and Retirement Study*)) arba pačių autorių vykdytų apklausų rezultatai.

3. PRIEŠPENSINIO AMŽIAUS ŽMONIŲ UŽIMTUMAS LIETUVOJE

Trečiąją disertacijos dalį sudaro du skyriai. Pirmame skyriuje tiriamos ikipensinio amžiaus žmonių užimtumo tendencijos Lietuvoje, naudojant aprašomąją analizę. Antrame skyriuje sudaromas išlikimo modelis, siekiant įvertinti priešpensinio amžiaus žmonių buvimo darbo rinkoje Lietuvoje trukmę ir veiksnius, kurie turi poveikį siekiant ilgiau išlikti darbo rinkoje.

3.1. Ikipensinio amžiaus žmonių aprašomoji analizė

Priešpensinio amžiaus žmonių užimtumas Lietuvoje yra didesnis negu Europos Sąjungos šalių vidurkis (2019 m. 55–64 m. užimtumo lygis ES-28 šalyse siekė 60 proc., Lietuvoje – 68,4 proc.).

Vyresnio amžiaus darbuotojų užimtumo lygis didėjant amžiui įprastai mažėja. Užimtumo lygis mažėja asmeniui sulaukus maždaug 55–59 m. Iki 40–44 m. amžiaus vyrų užimtumas yra didesnis negu moterų. Lyčių skirtumai išryškėja sulaukus maždaug 30–34 m., kai moterys pradeda daryti karjeros pertraukas dėl vaikų priežiūros. 40–44 m. amžiaus vyrų ir moterų užimtumo lygis nesiskiria. 55–59 m. amžiaus grupėje moterų užimtumas net viršija vyrų užimtumą, tačiau 60 m. ir vyresnio amžiaus grupėse moterų užimtumas, palyginti su vyrų, yra mažesnis. Užimtumo lygį veikia ne tik pensinio amžiaus nustatymas, bet ir šeiminės priežastys.

Viena iš priežasčių, kodėl žmonėms sunkiau dirbti vyresniame amžiuje, yra sveikatos problemos. Kas penktas 55–64 m. amžiaus žmogus Lietuvoje turi negalią. Žmonių, gaunančių netekto darbingumo pensijas, skaičius nuo 2000 m. išaugo (didžiausias asmenų skaičius fiksuotas 2009–2010 m.). Tarp visų netekto darbingumo pensijų gavėjų beveik 68 proc. yra vyresni negu 55 m. amžiaus. Taigi tikimybė asmeniui, sulaukus 55 m., tapti iš dalies arba visiškai nedarbingu labai išauga.

Nedarbas vyresniame amžiuje gali būti įveikiamas sunkiau ir darbo gali būti ieškoma ilgiau negu esant jauno amžiaus. Vyresnio amžiaus nedarbo išmokų gavėjų dalis tarp visų nedarbo draudimo išmokų gavėjų didėjo nuo 17 proc. (2013 m.) iki 23 proc. (2019 m.). Tai lėmė visuomenės senėjimo procesas, nes pagal gyventojų struktūrą vyresnių (55–64 m.) žmonių dalis išaugo tais pačiais šešiais procentiniais punktais. Minėtina, kad vyresni žmonės darbo ieškojo ilgiau negu jaunesni asmenys. 2019 m. vidutinė nedarbo išmokos mokėjimo trukmė buvo 4 mėn. 55–59 m. amžiaus asmenys nedarbo išmoką gavo beveik 5 mėn., o 60–65 m. asmenys – vidutiniškai beveik 6 mėn.

Ankstyvo išėjimo į pensiją išmokos gavėjų skaičius Lietuvoje nėra didelis, tačiau asmenys, gaunantys išmokas, šią alternatyvą renkasi negalėdami pasilikti darbo rinkoje. Vidutiniškai 56 proc. išankstinės pensijos gavėjų likus metams iki pensijos neturi jokių darbo pajamų, o 44 proc. asmenų likus metams iki išankstinės pensijos uždirba itin mažas darbo pajamas.

Taigi, būdami priešpensinio amžiaus, kai kurie žmonės tampa ankstyvaisiais pensininkais, netekto darbingumo pensijos gavėjais arba susiduria su nedarbu. Šie iššūkiai priešpensiniame amžiuje rodo, kad Lietuvoje, didėjant amžiui, išlikti darbo rinkoje darosi vis sunkiau.

3.2. Išlikimo modelis priešpensinio amžiaus žmonių užimtumui analizuoti

3.2.1. Išlikimo modelis

Ekonometriniai išlikimo modeliai yra tam tikroje būsenoje praleistos trukmės, kol įvyksta tam tikras įvykis, modeliai (Wooldridge, 2001; Cameron ir Trivedi, 2005). Disertacijoje, siekiant ištirti pasitraukimo iš darbo rinkos veiksnius, analizuojami 55 m. amžiaus asmenų perėjimai iš užimtumo būsenos į pensiją 2010–2020 m. laikotarpiu. Naudojami VSDF biudžeto administraciniai duomenys.

Pirmiausia pristatomas išlikimo modelis (Wooldridge, 2001; Cameron ir Trivedi, 2005; Kartsonaki, 2016). Tyrėjai, analizuojantys užimtumo trukmę, domisi, kiek laiko žmonės išlieka darbo rinkoje ir koks yra jų intensyvumo lygis (angl. *hazard rate*). Taigi naujausiais išlikimo analizės metodais dažniausiai dėmesys sutelkiamas į intensyvumo funkciją (angl. *hazard function*). Ši funkcija padeda apytiksliai įvertinti tikimybę išeiti iš pradinės būsenos iki tam tikro momento. Keliama sąlyga, kad yra žinoma, jog iki to laiko stebimasis išliko tos pačios būsenos.

Laikykime, kad $\mathrm{T} \geq 0$ žymi trukmę, kuri turi tam tikrą pasiskirstymą populiacijoje, o t reiškia tam tikrą T vertę. Atliekant užimtumo trukmės, sulaukus 55 m. amžiaus, išlikimo analizę, T bus laiko trukmė, matuojama mėnesiais, kol asmuo gauna darbo pajamas. Tai reiškia, kad asmuo vis dar dalyvauja darbo rinkoje. Kiekvieno atskiro j-ojo asmens užimtumas yra atsitiktinis kintamasis, T_j. Darant prielaidą, kad T_j turi tolydų tikimybinį skirstinį $f(t)$, kur t yra T_j realizacija, T kaupiamoji pasiskirstymo funkcija apibrėžiama taip:

$$\mathrm{F(t)} = \Pr\left(T_j \leq \mathrm{t}\right) = \int_0^t f(s)ds\,,\ \mathrm{t} \geq 0. \qquad (1)$$

Čia $\mathrm{F(t)}$ – pasiskirstymo funkcija, T – išgyventas laikas, t – tam tikras laikas.

Taigi j-ojo asmens išlikimo darbo rinkoje funkcija (angl. *survival function*) yra:

$$\mathrm{S(t)} = 1 - \mathrm{F(t)} = \Pr(T_j > \mathrm{t}) = \int_t^\infty f(s)ds. \qquad (2)$$

Ir atvirkščiai, intensyvumo funkcija j asmeniui t momentu apibrėžiama kaip ribinė tikimybė nedelsiant pasitraukti iš darbo rinkos su sąlyga, kad nebus pasitraukiama iš darbo rinkos anksčiau negu t momentu:

$$\mathrm{h(t)} = \mathrm{P}\left(\mathrm{t} < T_j < \mathrm{t} + \mathrm{dt} \middle| T_j > t\right) = \frac{f(t)}{1-F(t)} = \frac{f(t)}{S(t)}. \quad (3)$$

Tai reiškia, kad kuo didesnis intensyvumo lygis pasitraukti iš darbo rinkos, tuo mažesnė tikimybė joje išlikti. Neparametrinis vertinimas padeda įžvelgti intensyvumo ar išlikimo funkcijų formą prieš taikant parametrinius modelius su kintamaisiais. Šiame tyrime intensyvumo funkcijai vertinti naudoti Kaplano ir Meierio, taip pat Nelsono ir Aaleno įverčiai.

Kaplano ir Meierio metodas yra neparametrinis metodas, naudojamas išlikimo tikimybei įvertinti pagal stebėtą išlikimo trukmę (Kaplan ir Meier, 1958). Šis metodas remiasi išlikimo tikimybės perskaičiavimu įvykus kiekvienam įvykiui.

Kitas galimas išlikimo analizės tikslas gali būti dviejų ar daugiau grupių išlikimo laiko palyginimas (Kartsonaki, 2016). Paprastas statistinio reikšmingumo testas yra logaritminis ranginis testas (angl. *log-rank test*). Šis testas patikrina hipotezę, kad analizuojamų grupių išlikimo funkcijos yra vienodos. Logaritminio ranginio testo statistika tai, kas pastebėta, lygina su „numatomu“ nesėkmių skaičiumi ir turi asimptotinį pasiskirstymą pagal nulinę hipotezę (Kartsonaki, 2016).

Kiekvienam momentui gali būti apibrėžiamas rizikingų stebėjimų skaičius n_j ir įvykių skaičius d_j. Neparametriniuose modeliuose intensyvumo funkcija apskaičiuojama nustatant, kokią dalį įvykių skaičius sudaro tarp visų rizikoje esančių stebėjimų:

$$\lambda\left(t_j\right) = \frac{d_j}{n_j}. \quad (4)$$

Nelsono ir Aaleno kaupiamosios intensyvumo funkcija (angl. *cumulative hazard function*) apskaičiuojama susumavus rizikos funkcijas per tam tikrą laiką:

$$\Lambda\left(t_j\right) = \sum \frac{d_j}{n_j}. \quad (5)$$

Išlikimo funkcijas apskaičiuojant Kaplano ir Meierio metodu, imamas stebėjimų, kai įvykis neįvyko, ir visų stebėjimų santykis, kaupiamas per laiką:

$$\mathrm{S}\left(t_j\right) = \Pi\left(\frac{n_j - d_j}{n_j}\right). \quad (6)$$

Alternatyvus vertinimo ir testavimo pagrindas išlikimo analizėje yra parametrinių modelių naudojimas. Parametrinių modelių vertinimo metu daroma tam tikros prielaidų apie išlikimo modelius (Kartsonaki, 2016).

Rizika, priklausomai nuo laiko, turi tam tikras formas, o tiksli jos forma nustatoma pagal vieną ar kelis parametrus, kurie apskaičiuojami naudojant pastebėtus duomenis. Vieni iš išlikimo analizėje dažniausiai naudojamų skirstinių: eksponentinis, Weibullio ir logistinis paskirstymai (Wooldridge, 2001; Cameron ir Trivedi, 2005; Kartsonaki, 2016). Intensyvumo lygis, priklausomai nuo laiko, turi tam tikrą formą, o tiksli forma nustatoma pagal vieną ar kelis parametrus, kurie apskaičiuojami naudojant stebimus duomenis. Vieni iš išlikimo analizėje dažniausiai naudojamų skirstinių: eksponentinis, Weibullio ir loglogistinis paskirstymai (Wooldridge, 2001; Cameron ir Trivedi, 2005; Kartsonaki, 2016).

Vienas iš galimų išlikimo analizės tikslų – ištirti, ar išlikimo laikas yra susijęs su kitais kintamaisiais. C. Kartsonaki (2016) teigimu, regresijos modeliai gali įvertinti kintamųjų poveikį išlikimo rezultatui. Šiuo tikslu plačiai naudojamas Coxo proporcingo intensyvumo modelis (angl. *Cox proportional hazard model*). Parametriniuose išlikimo modeliuose laikoma, kad išlikimo laikas atitinka žinomą pasiskirstymą (pavyzdžiui, Weibullio, eksponentinis (specialus Weibullio atvejis), loglogistinis, lognormalusis ir kt. skirstiniai). Coxo regresija nereikalauja, kad būtų pasirinktas tam tikras tikimybinis skirstinys, norint pavaizduoti išlikimo laiką. Dėl šios savybės Coxo regresija vadinama pusiau parametrine.

Coxo proporcingo intensyvumo modelis yra apibrėžiamas kaip:

$$h(t;x) = h_0(t)e^{\beta x}, \tag{7}$$

kur h_0 yra pradinė intensyvumo funkcija (angl. *baseline hazard*), x – rizikos veiksnių rinkinys, β – parametras, kurį reikia įvertinti, nurodant veiksnio poveikį įvykiui. Pradinė intensyvumo funkcija yra intensyvumo funkcija, kai visų kintamųjų reikšmės yra 0.

Coxo proporcingo intensyvumo modelis priešpensinio amžiaus žmonių užimtumui Lietuvoje nustatyti apibrėžiamas taip:

$$h(t) = h_0(t) \times \exp(\beta_1 x_{lytis} + \beta_2 x_{DU} + \beta_3 x_{sergamumas} + \beta_4 x_{nedarbas} + \beta_5 x_{netektas\ darbingumas} + \beta_6 x_{profesija}). \tag{8}$$

Čia t reiškia išlikimo darbo rinkoje laiką, $h(t)$ yra intensyvumo funkcija, kurią apibrėžia x kintamųjų rinkinys (x_{lytis}, x_{DU}, $x_{sergamumas}$,

$x_{nedarbas}$, $x_{netektas\ darbingumas}$, $x_{profesija}$), koeficientai ($\beta_1, \beta_2, \beta_3$, β_4, β_5, β_6) matuoja veiksnių poveikį (t. y. efekto dydį) siekiant išlikti darbo rinkoje. Teigiamas koeficientas reiškia, kad, didėjant nepriklausomam kintamajam, laikas iki įvykio mažėja (mažesnė trukmė arba didesnė tikimybė, kad įvykis įvyks). Didesnis intensyvumo lygis reiškia, kad labiau tikėtina, jog įvykis įvyks. Pavyzdžiui, intensyvumo lygis 2 (0,5) reiškia, kad, vienam kintamajam padidėjus x vienetu, intensyvumo lygis (įvykio tikimybė) išauga 100 proc. (sumažėja 50 proc.).

Išlikimo modelių apribojimai. J. Emmersonas ir J. M. Brown (2021) nurodo, kad išlikimo analizė turi daug stipriųjų pusių, tačiau yra atvejų, kai modelių neįmanoma panaudoti arba jie negali pateikti patikimų rezultatų. Norint tinkamai palyginti analizuojamas grupes, gali reikėti didelių imčių. Imties dydį taip pat gali reikėti didinti, kad būtų galima stebėti pakankamus įvykius, jei tiriamųjų tikimybė patirti įvykį yra maža arba jei numatoma, kad bus daug iš imties iškritusių stebėjimų (Emmerson ir Brown, 2021). Lietuvos duomenų analizės atveju tiriama populiacija yra didelė, o nagrinėjamas laikotarpis ilgas, apimantis pensinį amžių, kai didžioji dalis respondentų palieka darbo rinką, todėl, galima manyti, apribojimų gali būti išvengta.

3.2.2. Duomenys

Tyrimui atrinkti 18,5 tūkst. žmonių, gimusių 1955 m., kurie 2010 m. buvo 55 m. amžiaus ir dirbo. Surinkti mėnesiniai duomenys apie tai, ar šie asmenys gavo darbo pajamų nuo 2010 m. sausio mėn. iki 2020 m. lapkričio mėn. Tyrimo subjektai atrinkti pagal tai, ar jie gavo darbo pajamų 2010 m. sausį, ar jiems buvo sukakę 55 m., ar buvo prieinami visi tyrimui reikalingi duomenys. Tirti pasirinkti 2010 m., siekiant išanalizuoti, kaip darbo rinkoje pamečiui keičiasi 55 m. amžiaus žmonių užimtumas, ir apimant kuo ilgesnį laikotarpį, įskaitant ir pensinį amžių. Vyrų, gimusių 1955 m., pensinis amžius buvo 63 m. ir 8–10 mėn., priklausomai nuo gimimo mėnesio. Moterų, gimusių 1955 m., pensinis amžius buvo 61 m. ir 8 mėn. arba 62 m., atsižvelgiant į gimimo mėnesį. Tyrimas apėmė asmenis iki 65-ųjų jų gyvenimo metų. Tai reiškia, kad tyrimo pabaigoje asmenys buvo pensijoje trejus arba dvejus metus.

Šiame modelyje priklausomas kintamasis yra laikas (išreikštas mėnesiais), kurį dirba žmogus, sulaukęs 55 m. Nepriklausomi kintamieji yra lytis, darbo užmokestis (2010 m. sausio mėn.), ligos atvejai (2005–2009 m.), netekto darbingumo veiksnys (2005–2009 m.), nedarbo veiksnys (2013–2020 m.), profesija (devynios pagrindinės profesinės grupės – nuo nekvalifikuotų darbuotojų iki vadovų).

Lytis. Iš literatūros analizės žinoma, kad moterys darbo rinkoje susiduria su didesniais iššūkiais, todėl į taikytiną modelį įtrauktas lyties faktorius, kad būtų galima atskirai išmatuoti vyrų ir moterų, sulaukusių 55 m., išlikimo darbo rinkoje trukmę. Šiam asmens kintamajam buvo priskiriama 1 reikšmė, jei asmuo buvo vyras. 0 reikšmė priskirta, jei asmuo buvo moteris. Tiriamąją imtį sudarė 10,8 tūkst. moterų ir 7,7 tūkst. vyrų.

Darbo užmokestis. Siekiant palyginti tiriamuosius pagal jų uždirbtas pajamas sulaukus 55 m., į modelį įtrauktas 2010 m. sausio mėn. jų gautas darbo užmokestis. Pagal gautą darbo užmokestį tiriamieji suskirstyti į penkias grupes: (1) darbo užmokestis mažesnis arba lygus 232 Eur (minimalus mėnesinis atlyginimas 2010 m.), (2) 233–577 Eur (atrinktų žmonių vidutinis darbo užmokestis), (3) 578–1 154 Eur (du vidutiniai darbo užmokesčiai), (4) 1 155–1 731 Eur (trys vidutiniai darbo užmokesčiai), (5) daugiau negu 1 731 Eur.

Ligos veiksnys. Siekiant įvertinti sveikatos poveikį užimtumui, sulaukus 55 m., surinkti duomenys apie tiriamųjų ligos atvejų skaičių per paskutinius penkerius metus iki asmeniui sukako 55 m. Jei asmuo per penkerius metus turėjo daugiau negu 5 ligos atvejus, jam buvo priskirta 1 reikšmė. 0 reikšmė priskirta, jei asmuo turėjo mažiau arba lygiai 5 ligos atvejus. 5 ligos atvejai pasirinkti eksperimentiniu būdu, nustatant, kada gaunama veiksnio įtaka statistiškai reikšmingiausia.

Netekto darbingumo veiksnys. Siekiant įvertinti neįgalumo poveikį užimtumui, surinkta informacija apie tai, ar asmuo per paskutinius 5 metus iki 55 m. amžiaus gavo netekto darbingumo pensiją. Jei asmuo per tirtą laikotarpį gavo neįgalumo pensiją, šiam asmeniui priskirta 1 reikšmė. 0 reikšmė priskirta, jei asmuo neįgalumo pensijos negavo.

Nedarbo veiksnys. Iš aprašomosios analizės žinoma, kad vyresnio amžiaus žmonės nedarbo išmokas gauna ilgesnį laiką, todėl, siekiant įvertinti šių išmokų gavimo poveikį užimtumui priešpensiniame amžiuje, į tyrimą įtrauktas nedarbo veiksnys. Pasirinktas tirti 2013–2020 m. laikotarpis – VSDF nedarbo išmokas moka nuo 2013 m., tad prieinami tik šio laikotarpio duomenys. Iki 2013 m. nedarbo išmokas mokėjo Lietuvos darbo birža, todėl VSDF nepateikia ankstesnių laikotarpių statistikos.

Profesija. Profesijos veiksnys buvo vertinamas siekiant nustatyti, ar asmens profesija lemia ilgesnę darbo trukmę, jei asmuo dirba aukštesnės kvalifikacijos darbą. Pagal Lietuvos profesijų klasifikatorių buvo įtrauktos devynios pagrindinės profesijų grupės: 1 grupė – vadovai, 2 – specialistai, 3 – technikai ir jaunesnieji specialistai, 4 – tarnautojai, 5 – paslaugų sektoriaus darbuotojai ir pardavėjai, 6 – kvalifikuoti žemės, miškų ir žuvininkystės ūkio darbuotojai, 7 – kvalifikuoti darbininkai ir amatininkai, 8 – įrenginių ir mašinų operatoriai ir surinkėjai, 9 – nekvalifikuoti darbininkai.

Neparametrinė analizė. Naudojant Kaplano ir Meierio metodą bei logaritminį ranginį testą, nustatyta, kad išlikimo funkcijos reikšmingai skiriasi visų kintamųjų atžvilgiu.

Semiparametrinė analizė. Siekiant ištirti pasirinktų veiksnių poveikį išlikimui darbo rinkoje, pateikiamas Coxo proporcingo intensyvumo modelis (1 lentelė), gauti rezultatai aptarti toliau.

1 lentelė. Coxo modelio rezultatai

Kintamieji	coef	exp(coef)	se(coef)	p
x_{lytis}	–0,3095	0,7337	0,0209	<2e-16***
x_{DU_2}	–0,1346	0,8740	0,0230	5,29e-09***
x_{DU_3}	–0,1141	0,8921	0,0274	3,23e-05***
x_{DU_4}	–0,2945	0,7448	0,0455	1,03e-10***
x_{DU_5}	–0,4083	0,6647	0,0674	1,41e-09***
$x_{sergamumas}$	0,2684	1,3079	0,0334	1,01e-15***
$x_{nedarbas}$	0,1576	1,1707	0,0019	<2e-16***
$x_{netektas\ darbingumas}$	0,1622	1,1761	0,0295	4,18e-0,8***
$x_{profesija\_2}$	0,0029	1,0029	0,0311	0,924
$x_{profesija\_3}$	0,1879	1,2067	0,0412	5,11e-06***
$x_{profesija\_4}$	0,2433	1,2754	0,0460	1,27e-07***
$x_{profesija\_5}$	0,2680	1,3074	0,0387	4,71e-12***
$x_{profesija\_6}$	0,6730	1,9601	0,1170	8,82e-09***
$x_{profesija\_7}$	0,4108	1,5081	0,0364	<2e-16***
$x_{profesija\_8}$	0,3640	1,4391	0,0379	<2e-16***
$x_{profesija\_9}$	0,2891	1,3353	0,0367	3,39e-15***

Šaltinis: sudaryta autorės.

Rezultatai rodo, kad visi veiksniai turi statistiškai reikšmingus koeficientus, išskyrus užimtumo koeficientą $x_{profesija\_2}$ (išsamiau aptariamas toliau). Veiksniai ir jų intensyvumo lygio paaiškinimai toliau pristatomi išsamiau. Jei intensyvumo lygis yra >1, tai rodo, kad lyginamos grupės išlikimas yra trumpesnis negu kontrolinės grupės. Jei intensyvumo lygis yra <1, tai reiškia, kad mažai tikėtina, jog dominanti grupė turės trumpesnį laiką iki įvykio negu kontrolinė grupė.

Lytis. Remiantis Coxo modelio rezultatais, galima teigti, kad vyrų darbo trukmė yra ilgesnė. Buvimas vyru (x_{lytis} = 1) sumažina intensyvumo funkciją (0,73–1=27 %). Tai reiškia, kad moterys linkusios anksčiau palikti darbo rinką

negu vyrai. Šią tendenciją, visų pirma, lemia ankstesnis moterų pensinis amžius.

Darbo užmokestis. Į Coxo modelį įtraukus darbo užmokesčio kategorijas, kontroline kategorija tapo pirmoji grupė, kuriai priskirti mažiausią (mažesnį arba lygų 232 Eur) atlyginimą gavę asmenys. Uždirbant nuo 233 iki 577 Eur (2 darbo užmokesčio kategorija), rizika palikti darbo rinką mažėja 13 proc. (0,87–1=13 %), uždirbant nuo 578 iki 1 154 Eur (3 darbo užmokesčio kategorija), rizika mažėja 11 proc. (0,89–1=11 %), uždirbant nuo 1 155 iki 1 731 Eur (4 darbo užmokesčio kategorija), rizika mažėja 26 proc. (0,74–1=26 %), o uždirbant daugiau negu 1 731 Eur (5 darbo užmokesčio kategorija), rizika mažėja 34 proc. (0,66–1=34 %), palyginti su pirmąja kategorija. Tai reiškia, kad žmonės, gavę didesnius atlygius negu minimalus atlyginimas, labiau linkę darbo rinkoje išlikti ilgiau (kuo atlyginimas didesnis, tuo didesnė tikimybė ilgiau išlikti darbo rinkoje). Taigi didesni atlyginimai rodo, kad žmogus jaučiasi saugiau darbo rinkoje ir gali joje išlikti ilgiau. Esant nedarbui, ši stadija gali būti trumpesnė. Galima teigti, kad daugiau mokama už aukštesnės kvalifikacijos darbą, tad didesnį atlyginimą gaunantis asmuo dėl darbdavio investicijų į jį ir įgytos kvalifikacijos rečiau negu žemos kvalifikacijos asmenys keičiamas kitu darbuotoju.

Sergamumo ir netekto darbingumo veiksniai. Asmenys, kurių sergamumas iki 55 m. yra didesnis, darbo rinkoje išlieka trumpiau. Tiriamųjų, kurie sirgo daugiau, intensyvumo rodikliai yra didesni (1,30–1=30 %). Asmenys, netekę nors dalies nedarbingumo, iš darbo rinkos pasitraukia greičiau. Tiriamųjų, netekusių nors dalies darbingumo, intensyvumo lygis yra didesnis (1,17–1=17 %). Taigi, galima teigti, kad sveikatos veiksnys yra būtinas, norint dirbti ilgiau, o sveikatos problemos, patirtos iki 55 m. amžiaus, turi įtakos priešpensinio amžiaus žmonių užimtumui. Dėl prastesnės sveikatos šie žmonės kartais priversti palikti darbo rinką dar nesulaukę pensinio amžiaus.

Nedarbo veiksnys. Laikotarpis, per kurį gaunama nedarbo išmoka, tiesiogiai mažina buvimo darbo rinkoje trukmę. Tiriamųjų, kurie gavo nedarbo išmoką, intensyvumo rodiklis yra didesnis (1,17–1=17 %). Tai rodo, kad vyresniems asmenims Lietuvoje sunkiau grįžti į darbo rinką.

Profesija. Asmenų, kurie dirba žemesnės kvalifikacijos darbus, darbo trukmė yra trumpesnė. Į Coxo modelį įtraukus profesijų kategorijas, kontroline kategorija parinkta vadovų profesija. Minėtina, kad specialistams profesijos veiksnys nebuvo reikšmingas (tarp vadovų ir specialistų buvimo darbo rinkoje trukmės statistiškai reikšmingo skirtumo nenustatyta). Techniko ar jaunesniojo specialisto profesija ($x_{profesija\_3}$) rizikos lygį palikti darbo rinką didina 20 proc. (1,20–1=20 %), tarnautojo profesija ($x_{profesija\_4}$) – 27 proc. (1,27–1=27 %), paslaugų sektoriaus darbuotojo profesija

($x_{profesija\_5}$) – 30 proc. (1,30–1=30 %), kvalifikuoto žemės, miškų ir žuvininkystės ūkio darbuotojo profesija ($x_{profesija\_6}$) – 96 proc. (1,96–1=96 %), kvalifikuoto darbininko ir amatininko profesija ($x_{profesija\_7}$) – 50 proc. (1,50–1=50 %), įrenginių ir mašinų operatoriaus ar surinkėjo profesija ($x_{profesija\_8}$) – 43 proc. (1,43–1=43 %), o nekvalifikuoto darbuotojo profesija ($x_{profesija\_9}$) – 33 proc. (1,33–1=33 %), palyginti su vadovo profesija. Taigi tikėtina, jog nekvalifikuotas darbuotojas greičiau pasitrauks iš darbo rinkos negu vadovas. Galima teigti, kad aukštesnės kvalifikacijos darbuotojai ilgiau išlieka darbo rinkoje, o žemesnę kvalifikaciją turintys asmenys dažniau pasitraukia iš darbo rinkos prieš pensinį amžių ar iškart jo sulaukę. Ši išvada ypač svarbi – ji atskleidžia, kad mažiau kvalifikuoti ir labiau linkę susidurti su skurdo rizika asmenys anksčiau palieka darbo rinką ir praranda pagrindinį pajamų šaltinį. Tai reiškia, kad profesija lemia, ar vyresnio amžiaus asmuo bus paklausus darbo rinkoje. Todėl, sprendžiant užimtumo klausimą, turėtų būti svarbus perkvalifikavimas, kad žmonės vyresniame amžiuje galėtų keisti profesiją, įgyti naujų įgūdžių ir išlikti paklausūs.

Aptarto modelio rezultatai rodo, kad asmenims, sulaukusiems 55 m., siekiant išlikti darbo rinkoje įtakos turi profesija, lytis, sveikatos problemos ir darbo užmokestis. Tarp tyrimo trūkumų galima išskirti sveikatos veiksnį, kuris analizuotas skaičiuojant, kaip dažnai iš VSDF biudžeto buvo gaunama ligos išmoka. Minėtina, kad ne visi ligos atvejai apmokami iš VSDF biudžeto. Į analizę neįtraukti iki dviejų dienų trunkantys ligos atvejai arba atvejai, kai asmuo neturi pakankamo stažo išmokai gauti. Vis dėlto, net ir analizuojant tik ligos atvejus, apmokamus iš VSDF biudžeto, matyti sveikatos veiksnio svarba siekiant išlikti darbo rinkoje.

4. PENSINIO AMŽIAUS ŽMONIŲ UŽIMTUMAS LIETUVOJE

Šioje dalyje apžvelgiama Lietuvos pensininkų padėtis: kaip skiriasi jų užimtumas, priklausomai nuo amžiaus, lyties, darbo užmokesčio ir daugelio kitų veiksnių. Pirmame skyriuje pristatoma aprašomoji analizė, išskiriamos pensininkų užimtumo tendencijos, akcentuojamas jų veiklos ryšys su amžiumi ir lytimi. Kaip galimas užimtumą pensiniame amžiuje skatinantis veiksnys aptariama pensininkų skurdo problema. Antrame skyriuje pateikiamos hipotezės, keliamos analizuojant į tyrimą įtrauktus veiksnius, pristatomi tyrime naudojami duomenys, sudaromi binariniai tikimybiniai modeliai Lietuvai, aptariami šių modelių rezultatai.

4.1. Pensinio amžiaus žmonių aprašomoji analizė

Nustatyta, kad pensininkų užimtumas Lietuvoje auga. Dažniausiai vyresnio amžiaus žmonės linkę mažinti savo darbo krūvį ir dirbti mažiau valandų, tačiau Lietuvoje daugelis dirbančių pensininkų dirba visą darbo dieną. Pensininkų darbo pajamos, palyginti su jaunesnių darbuotojų darbo pajamomis, yra mažesnės. Dėl augančio gyvenimo lygio Lietuvoje mažėja žmonių, gyvenančių žemiau absoliučios ir skurdo rizikos ribos, tačiau santykinis pensininkų skurdo lygis išlieka daug didesnis negu dirbančių gyventojų. Dėl šios priežasties ilgesnį buvimą darbo rinkoje galima traktuoti kaip būdą padidinti senatvėje gaunamas mažas pajamas.

4.2. Binariniai tikimybiniai modeliai

4.2.1. Hipotezės ir duomenys

Disertacijoje iškelta 13 hipotezių, sietinų su asmeniniais, finansiniais ir kitais veiksniais, galinčiais daryti įtaką pensinio amžiaus asmenų užimtumui Lietuvoje (2 lentelė).

2 lentelė. Veiksniai, tirtini kaip darantys poveikį pensininkų užimtumui

Asmeniniai veiksniai	**Finansiniai veiksniai**	**Kiti veiksniai**
Lytis H_1	Darbo užmokestis H_6	Regionas H_8
Sveikata H_2	Pensijos pakeitimo norma H_7	Užimtumo lygis regione H_9
Profesija H_3		Nedarbo išmokos gavėjas H_{10}
Darbo istorija H_4		Netekto darbingumo pensijos gavėjas H_{11}
Sektorius H_5		Našlių pensijos gavėjas H_{12}
		Makroekonominė šalies padėtis H_{13}

Šaltinis: sudaryta autorės.

Hipotezės. Su asmeniniais veiksniais sietinos hipotezės:

1 hipotezė. Būdamos pensijoje, moterys Lietuvoje yra mažiau linkusios dirbti negu vyrai.

2 hipotezė. Asmenys, iki pensijos sirgę daugiau, sulaukę pensijos yra mažiau linkę dirbti negu tie, kurie yra sirgę mažiau.

3 hipotezė. Aukštesnės kvalifikacijos darbuotojai, pavyzdžiui, vadovai ir specialistai, sulaukę pensijos yra labiau linkę dirbti negu nekvalifikuoti darbuotojai.

4 hipotezė. Kuo didesnį pensinį stažą asmenys yra įgiję, tuo didesnė tikimybė, kad jie dirbs sulaukę pensijos.

5 hipotezė. Asmenys, dirbantys biudžetiniame sektoriuje, palyginti su asmenimis, dirbančiais nebiudžetiniame sektoriuje, labiau linkę dirbti sulaukę pensinio amžiaus.

Hipotezės, sietinos su finansiniais veiksniais:

6 hipotezė. Kuo didesnis asmens vidutinis darbo užmokestis prieš pensiją, tuo didesnė tikimybė, kad šis asmuo dirbs ir būdamas pensijoje.

7 hipotezė. Kuo aukštesnė asmens senatvės pensijos pakeitimo norma, tuo mažesnė tikimybė, kad šis asmuo dirbs būdamas pensijoje.

Hipotezės, sietinos su kitais veiksniais:

8 hipotezė. Miestuose gyvenantys asmenys, palyginti su rajonuose gyvenančiais asmenimis, labiau linkę dirbti būdami pensinio amžiaus.

9 hipotezė. Asmenys, gyvenantys regionuose, kuriuose užimtumo lygis žemas, yra mažiau linkę dirbti sulaukę pensinio amžiaus nei gyvenantys regionuose, kuriuose užimtumo lygis aukštas.

10 hipotezė. Asmenys, kurie prieš išeidami į pensiją gavo nedarbo draudimo išmoką, yra mažiau linkę dirbti sulaukę pensijos nei asmenys, kurie nedarbo išmokos negavo.

11 hipotezė. Asmenys, anksčiau gavę netekto darbingumo pensiją, yra mažiau linkę dirbti sulaukę pensijos nei asmenys, negavę tokios pensijos.

12 hipotezė. Asmenys, gaunantys našlio pensiją, yra labiau linkę dirbti nei negaunantys našlio pensijos.

13 hipotezė. Kuo geresnė ekonominė padėtis ir didesnis BVP augimas, asmeniui išėjus į pensiją, tuo didesnė tikimybė, kad šis asmuo dirbs.

Duomenys. Veiksnys x_{lytis} įgyja 1 reikšmę vyrams, 0 reikšmę moterims. Veiksnys $x_{stažas}$ reiškia įgyto pensinio stažo metus. Antruoju laipsniu pakelta stažo reikšmė $x_{stažas^2}$ naudojama vertinant mažėjančią pensijos stažo įtaką užimtumui. Tikėtina, kad, didėjant stažui, didės užimtumo tikimybė ($x_{stažas}$), tačiau, esant gana aukštam įgytam pensiniam stažui, jo įtaka nebus tokia ryški ($x_{stažas^2}$).

Atliekant tyrimą, suformuoti du fiktyvūs pensijų pakeitimo normos kintamieji: $x_{pensijos\ pakeitimo\ norma_{\check{Z}}}$, žyminti, kad asmens pensijos pakeitimo norma mažesnė negu 30 proc., ir $x_{pensijos\ pakeitimo\ norma_A}$, žyminti, kad asmens pensijos pakeitimo norma yra didesnė negu 30 proc.

Tyrime naudoti duomenys apie ligos atvejus, apmokamus iš VSDF biudžeto. Ligos atvejai, fiksuoti paskutinius dešimt metų iki išėjimo į pensiją, susumuoti. Veiksnys $x_{sergamumas_{\check{Z}}}$ reiškia, kad asmens ligos atvejų skaičius per pastaruosius dešimt metų iki pensijos yra mažesnis negu 10 kartų, veiksnys $x_{sergamumas_A}$ reiškia, kad asmens ligos atvejų skaičius per paskutinius dešimt metų iki pensijos yra didesnis arba lygus 10 kartų. 10 ligos atvejų pasirinkta eksperimentiniu būdu pagal veiksnio statistinį reikšmingumą.

Profesijų žymėjimas išlieka analogiškas kaip ir atliekant išlikimo analizę. Disertacijoje, remiantis Lietuvos profesijų klasifikatoriumi, $x_{profesija\,1}$ reiškia vadovus, $x_{profesija\,2}$ – specialistus, $x_{profesija\,3}$ – technikus ir jaunesniuosius specialistus, $x_{profesija\,4}$ – tarnautojus, $x_{profesija\,5}$ – paslaugų sektoriaus darbuotojus ir pardavėjus, $x_{profesija\,6}$ – kvalifikuotus žemės, miškų ir žuvininkystės ūkio darbuotojus, $x_{profesija\,7}$ – kvalifikuotus darbininkus ir amatininkus, $x_{profesija\,8}$ – įrenginių ir mašinų operatorius, $x_{profesija\,9}$ – nekvalifikuotus darbininkus.

Minėtina, kad atsižvelgiant į profesijos ir sektoriaus veiksnius, į sudarytą modelį neįtrauktos kvalifikuotų žemės ūkio, miškininkystės ir žuvininkystės darbuotojų profesijos, nes daugiau šių darbuotojų esama nebiudžetiniame sektoriuje ir kombinuotas sektoriaus ir profesijos veiksnys tampa nereikšmingas. Analogiškai į modelį neįtraukti ir nekvalifikuoti darbuotojai bei tarnautojai, nes jų veiksnys su sektoriumi taip pat nereikšmingas (šioms profesijoms atstovaujančių asmenų tikimybė dirbti sulaukus pensinio amžiaus nepriklauso nuo sektoriaus). Į modelį įtrauktas fiktyvus sektoriaus kintamasis $x_{sektorius}$. Jis lygus 1, jei pensininkas dirba biudžetiniame sektoriuje, ir 0, jei pensininkas dirba nebiudžetiniame sektoriuje.

Regiono veiksnys $x_{regionas}$ yra fiktyvus kintamasis. Didesniame mieste gyvenančiam pensininkui priskiriama 1 vertė, o rajone ar mažesniame mieste gyvenančiam pensininkui priskiriama 0. Užimtumo lygio veiksnys $x_{užimtumo\ lygis}$ rodo užimtumo lygį regione, kuriame pensininkas gyvena.

Kintamieji $x_{nedarbo\ išmoka}$, $x_{netekto\ darbingumo\ pensija}$, $x_{našlio\ pensija}$ yra fiktyvūs: asmeniui priskiriama 1 reikšmė, jei jis gavo atitinkamą išmoką arba pensiją, o 0 reikšmė priskiriama, jei asmuo per tiriamąjį laikotarpį išmokos arba pensijos negavo. Kombinuotas veiksnys $x_{našlio\ pensija} \times x_{lytis}$ yra įtraukiamas į regresijas, siekiant įvertinti našlių moterų padėtį ir nustatyti, ar socialiai labiau pažeidžiamos visuomenės grupės dažniau linkusios dirbti.

Tiesinis tikimybinis modelis (angl. *linear probability model, LPM*) Lietuvos pensininkų užimtumui tirti suformuotas taip:

$$P(y = 1 \mid x) = \beta_0 + \beta_1 x_{lytis} + \beta_2 x_{stažas} + \beta_3 x_{stažas^2} + \beta_4 x_{pensijos\ pakeitimo\ norma_Ž} + \beta_5 x_{pensijos\ pakeitimo\ norma_A} + \beta_6 x_{sergamumas_Ž} + \beta_7 x_{sergamumas_A} + \beta_8 x_{sektorius} \times x_{profesija\ 2} + \beta_9 x_{sektorius} \times x_{profesija\ 3} + \beta_{10} x_{sektorius} \times x_{profesija\ 5} + \beta_{11} x_{sektorius} \times x_{profesija\ 7} + \beta_{12} x_{sektorius} \times x_{profesija\ 8} + \beta_{13} x_{regionas} + \beta_{14} x_{nedarbo\ išmoka} + \beta_{15} x_{netekto\ darbingumo\ pensija} + \beta_{16} x_{našlio\ pensija} \times x_{lytis} + \beta_{17} x_{užimtumo\ lygis} + u_i\ . \quad (9)$$

Jei x diapazonas nėra griežtai apribotas, tiesinis tikimybinis modelis negali būti geras populiacijos atsako tikimybės P (y = 1 | x) apibūdinimas. Tiesinis tikimybinis modelis turi keletą problemų: 1) paklaidos u_i nėra normaliai pasiskirsčiusios, 2) paklaidos heteroskedastiškos, 3) neišpildoma sąlyga $0 \leq E(y \mid x) \leq 1$, 4) abejotina R^2 reikšmė (Gujarati, 2004).

Logit ir probit modeliai. Du standartiniai logit ir probit binominiai modeliai nurodo skirtingas šios tikimybės funkcines formas kaip regresorių funkciją. Sudaromas logit modelis:

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = \Lambda\,[\beta_1 + \beta_2 x_{lytis} + \beta_3 x_{stažas} + \beta_4 x_{stažas^2} + \beta_5 x_{pensijos\ pakeitimo\ norma} + \beta_6 x_{sergamumas_Ž} + \beta_7 x_{sergamumas_A} + \beta_8 x_{sektorius} \times x_{profesija\ 2} + \beta_9 x_{sektorius} \times x_{profesija\ 3} + \beta_{10} x_{sektorius} \times x_{profesija\ 5} + \beta_{11} x_{sektorius} \times x_{profesija\ 7} + \beta_{12} x_{sektorius} \times x_{profesija\ 8} + \beta_{13} x_{regionas} + \beta_{14} x_{nedarbo\ išmoka} + \beta_{15} x_{netekto\ darbingumo\ pensija} + \beta_{16} x_{našlio\ pensija} \times x_{lytis} + \beta_{17} x_{užimtumo\ lygis} + u_i\ ]. \quad (10)$$

Sudaromas probit modelis:

$$I_i = \Lambda\,[\beta_1 + \beta_2 x_{lytis} + \beta_3 x_{stažas} + \beta_4 x_{stažas^2} + \beta_5 x_{pensijos\ pakeitimo\ norma} + \beta_6 x_{sergamumas_Ž} + \beta_7 x_{sergamumas_A} + \beta_8 x_{sektorius} \times x_{profesija\ 2} + \beta_9 x_{sektorius} \times x_{profesija\ 3} + \beta_{10} x_{sektorius} \times x_{profesija\ 5} + \beta_{11} x_{sektorius} \times x_{profesija\ 7} + \beta_{12} x_{sektorius} \times x_{profesija\ 8} + \beta_{13} x_{regionas} + \beta_{14} x_{nedarbo\ išmoka} + \beta_{15} x_{netekto\ darbingumo\ pensija} + \beta_{16} x_{našlio\ pensija} \times x_{lytis} + \beta_{17} x_{užimtumo\ lygis} + u_i]. \quad (11)$$

Vertinant logit ir probit modelius, įprastai nagrinėjami ribiniai efektai. Tiesinių tikimybės modelių ribiniai efektai yra koeficientai, jie nepriklauso nuo x:

$$\frac{dp}{dx_i} = \beta_i. \quad (12)$$

Logit ir probit modelių ribiniai efektai apskaičiuojami taip:

$$\frac{dp}{dx_i} = F'(\boldsymbol{x}'\beta)\beta_i. \quad (13)$$

Ribiniai logit modelio efektai:

$$\frac{dp}{dx_j} = \Lambda(\mathrm{x}'\beta)\,[1 - \Lambda(\mathrm{x}'\beta)]\,\beta_j = \frac{e^{x'\beta}}{(1+e^{x'\beta})^2}\,\beta_j. \quad (14)$$

Ribiniai probit modelio efektai:

$$\frac{dp}{dx_j} = \Phi(\mathbf{x}'\beta)\,\beta_j. \quad (15)$$

Toliau disertacijoje, kaip ir daugumoje kitų autorių atliktų tyrimų, apskaičiuojami ir interpretuojami vidutiniai ribiniai efektai (3 lentelė). Binariniams tikimybiniams modeliams įvertinti naudojamas maksimalaus tikėtinumo metodas.

4.2.3. Rezultatai

Įvertinus binarinius tikimybinius modelius, nustatyta, kad didesnis pensinis stažas, didesnė pensijos pakeitimo norma ir gyvenimas didesniame mieste, kuriame užimtumo lygis aukštesnis, buvo teigiamai susiję su užimtumu pensiniame amžiuje, o didesnis sergamumas, netektas darbingumas ar nedarbas buvo atvirkščiai susiję su darbu pensiniame amžiuje. Be to, specialisto ar vadovo profesija, palyginti su nekvalifikuotais darbuotojais, didina darbo pensiniame amžiuje tikimybę. Ši tikimybė taip pat didėja, jei asmuo dirba biudžetiniame sektoriuje. Galiausiai, galima teigti, kad neįgalūs asmenys ar našliai arba našlės, kurių sveikata blogesnė, greičiausiai nedirbs, sulaukę pensinio amžiaus, jiems gresia didesnė skurdo rizika.

Visi trys tikimybiniai modeliai paaiškina 70 proc. kintamojo kitimo.

3 lentelė. Ribiniai modelio efektai

	LPM	Logit	Probit
laisvasis narys β_1	–0,6422	–1,1475	–0,7751
x_{lytis}	0,0131	0,0120	0,0083
$x_{sergamumas_Ž}$	0,0242	0,0236	0,0161
$x_{sergamumas_A}$	–0,0522	–0,0486	–0,0325
$x_{stažas}$	0,05	0,0474	0,0320
$x_{stažas^2}$	–0,0005	–0,0005	–0,0004
$x_{sektorius} \times x_{profesija\ 2}$	0,0229	0,0216	0,0152
$x_{sektorius} \times x_{profesija\ 3}$	0,0538	0,0536	0,0369
$x_{sektorius} \times x_{profesija\ 5}$	0,0763	0,0761	0,0521
$x_{sektorius} \times x_{profesija\ 7}$	0,0893	0,0899	0,0622
$x_{sektorius} \times x_{profesija\ 8}$	0,1118	0,1143	0,0781
$x_{pensijos\ pakeitimo\ norma_Ž}$	0,1016	0,1077	0,0722
$x_{regionas}$	0,0305	0,0309	0,0210
$x_{nedarbo\ išmoka}$	–0,3489	–0,3135	–0,2167
$x_{netekto\ darbingumo\ pensija}$	–0,0339	–0,0313	–0,0219
$x_{našlio\ pensija} \times x_{lytis}$	–0,015	–0,0148	–0,0102
$x_{užimtumo\ lygis}$	0,0038	0,0037	0,0025

Šaltinis: sudaryta autorės.

Apibendrinant modelių rezultatus, išanalizuoti veiksniai suskirstyti į užimtumą skatinančius ir ribojančius veiksnius (4 lentelė). Gauti rezultatai palyginti su kitų tyrėjų publikuotais rezultatais.

4 lentelė. Užimtumą vyresniame amžiuje ribojantys ir skatinantys veiksniai Lietuvoje

Ribojantys veiksniai	**Skatinantys veiksniai**
Asmeniniai veiksniai	
Vyresnis amžius. Kuo asmeniui daugiau metų, tuo mažiau tikėtina, kad šis asmuo liks darbo rinkoje.	*Jaunesnis amžius.* Kuo asmeniui mažiau metų, tuo labiau tikėtina, kad jis liks darbo rinkoje.
Bloga sveikata. Asmenys, turintys sveikatos problemų, greičiau pasitraukia iš darbo rinkos.	*Gera sveikata ir aktyvus senėjimas.* Sveikesni žmonės ilgiau lieka darbo rinkoje.
Moterys. Moterys iš darbo rinkos pasitraukia anksčiau negu vyrai.	*Vyrai.* Vyrai labiau negu moterys yra linkę dirbti būdami vyresnio amžiaus.
Žemesnė kvalifikacija. Dėl greičiau prastėjančios sveikatos ir didesnio pakeičiamumo žemesnės	*Aukštesnė kvalifikacija.* Dėl įgytos patirties ir specialių įgūdžių

kvalifikacijos darbuotojai linkę greičiau pasitraukti iš darbo rinkos.	aukštesnės kvalifikacijos darbuotojai darbo rinkoje gali išlikti ilgiau.
Rajonas. Asmenys, gyvenantys mažuose miestuose ir rajonuose, dėl mažesnių darbo galimybių iš darbo rinkos pasitraukia greičiau.	*Miestas.* Asmenys, gyvenantys didžiuosiuose miestuose, dėl didesnių darbo galimybių darbo rinkoje linkę likti ilgiau.
Mažesnis stažas. Mažesnį stažą įgiję asmenys trumpiau dirba ir būdami vyresnio amžiaus.	*Didesnis stažas.* Didesnį stažą įgiję asmenys linkę dirbti ilgiau.
Nebiudžetinis sektorius. Nebiudžetiniame sektoriuje asmenys yra linkę dirbti trumpiau.	*Biudžetinis sektorius.* Biudžetiniame sektoriuje asmenys linkę dirbti ilgiau.
Finansiniai veiksniai	
Didesnė pensijos pakeitimo norma. Mažesnį atlyginimą uždirbusių žmonių pensijos pakeitimo norma santykinai yra didesnė, šie žmonės darbo rinkoje būna trumpiau.	*Aukštesnis atlyginimas.* Uždirbę didesnį atlyginimą ir sulaukę vyresnio amžiaus asmenys išlieka darbo rinkoje ilgiau.
Kiti veiksniai	
Nedarbas. Mažiau tikėtina, kad asmenys, netekę darbo būdami priešpensinio amžiaus, grįš į darbo rinką sulaukę pensijos.	*Gera ekonominė padėtis šalyje.* Geresniais ekonominiais laikais vyresni žmonės linkę dirbti ilgiau, o sunkiais ekonominiais laikais linkę eiti į pensiją.
Netektas darbingumas. Netekę darbingumo asmenys susiduria su daugeliu sunkumų darbo rinkoje, todėl, šiems asmenims sulaukus vyresnio amžiaus, tikimybė dirbti mažėja.	
Našlystė. Moterys, gaunančios našlės pensiją, rečiau dirba negu našliai vyrai.	

Šaltinis: sudaryta autorės.

Apibendrinus rezultatus, galima konstatuoti, kad tikimybę, jog asmuo išliks darbo rinkoje būdamas vyresnio amžiaus, mažina: ***vyresnis amžius***; ***bloga sveikata***; ***buvimas moterimi***; ***žemesnė kvalifikacija***; ***gyvenamoji vieta rajone***; ***įgytas mažesnis pensinis stažas***; ***darbas nebiudžetiniame sektoriuje***; ***didesnė pensijos pakeitimo norma***; ***nedarbo išmokos, netekto darbingumo pensijos ir našlio pensijos gavimo laikotarpiai***.

Vyresnis amžius. Modelių rezultatai parodė, kad užimtumas, didėjant amžiui, mažėja (duomenys koreliuoja su kitų tyrėjų rezultatais (Kim ir Feldman, 2000; Gobeski ir Beehr, 2009; Dingemans ir kt., 2016)). Amžius

siejamas su blogėjančia sveikata ir artėjančiu pensiniu amžiumi (sveikatos veiksnys plačiau atskirai aptariamas disertacijos penktoje dalyje).

Bloga sveikata. Blogėjanti sveikata tampa svarbiausiu dalyvavimą darbo rinkoje senatvėje ribojančiu veiksniu. Atliekant tyrimą, analizuoti iš VSDF biudžeto apmokėti ligos atvejai. Minėtina, kad ne visi ligos atvejai apmokami iš VSDF biudžeto (jei asmuo neatitinka stažo ar kitų reikalavimų; kai sergama trumpai ir išmokas moka tik darbdavys; ne visi asmenys turi teisę gauti ligos išmoką), todėl ne visus ligos atvejus į tyrimą buvo galima įtraukti. Vis dėlto visuose sudarytuose modeliuose ligos atvejų skaičius statistiškai buvo reikšmingas ir leido įvertinti sveikatos veiksnio svarbą Lietuvai priimant sprendimus dėl pagyvenusių žmonių išlikimo darbo rinkoje. Gauti rezultatai, kaip ir kitų tyrėjų duomenys, pagrindžia, kad sveikata yra ypač svarbus veiksnys, lemiantis darbo galimybes (Kim ir Feldman, 2000; Zucchelli ir kt., 2007; Kalwij ir Vermeulen, 2008; Wang ir kt., 2008; Komp ir kt., 2010; Van Solinge, 2014; Damman ir Henkens, 2015; Dingemans ir kt., 2016; Reeuwijk ir kt., 2017). Sveikatos veiksnio svarba išauga ir atsižvelgiant į tai, kad Lietuvoje, sulaukus 65 m., sveikų gyvenamų metų skaičius sudaro mažiau negu pusę visų likusių gyventi metų.

Moterys. Dėl mažesnio pensinio amžiaus didesnė moterų dalis iš darbo rinkos pasitraukia anksčiau negu vyrai. Lietuvoje pensininkai vyrai yra aktyvesni darbo rinkoje negu moterys. Šie rezultatai koreliuoja su kitų tyrėjų duomenimis (Kim ir Feldman, 2000; Shacklock ir kt., 2009; Komp ir kt., 2010; Maestas ir Zissimopoulos, 2010; Pleau, 2010; Damman ir Henkens, 2015, 2018). Moterų padėtis darbo rinkoje sudėtinga: kai vyras kopia karjeros laiptais, moteris pertraukia savo karjerą ir augina vaikus. Per šį laikotarpį moters darbo užmokestis įšaldomas. Vėliau moterys tampa netgi aktyvesnės negu vyrai, bet, sulaukusios pensinio amžiaus, jos iš darbo rinkos pasitraukia anksčiau. Tam įtakos Lietuvoje turi skirtingas vyrų ir moterų pensinis amžius ir šeiminės pareigos, sąlygojančios ankstyvesnį moterų pasitraukimą iš darbo rinkos, siekiant padėti kitiems šeimos nariams. Minėtina, kad senatvėje moterys gyvena ilgiau negu vyrai, tačiau, gaudamos mažesnes pensijas, jos dažniau susiduria su skurdo rizika.

Žemesnė kvalifikacija. Kiti tyrėjai išsamiai yra analizavę išsilavinimo veiksnį (Komp ir kt., 2010; Leenaars, 2010; Dingemans ir kt., 2016; Grigoli ir kt., 2021). Lietuvoje išsilavinimo duomenys nėra įtraukti į VSDF duomenų bazę, todėl nagrinėtas kitas veiksnys – profesija. Lietuvos profesijų klasifikatoriuje pagal reikalaujamus įgūdžius darbams atlikti profesijos suskirstytos į devynias pagrindines grupes. Atlikus tyrimą, gauti rezultatai, kad mažiau kvalifikuoti darbuotojai darbo rinkoje išlieka trumpiau. Mažiausia tikimybė ilgiau išlikti darbo rinkoje nustatyta kvalifikuotiems žemės ūkio,

miškininkystės ir žuvininkystės darbuotojams. Ilgiausiai darbo rinkoje išlieka vadovai ir specialistai.

Gyvenamoji vieta rajone. Gyvenantiems mažuose miestuose ir rajonuose taip pat sunkiau išlikti darbo rinkoje ilgiau. Gauti rezultatai koreliuoja su F. Grigoli ir kt. (2021) paskelbtais duomenimis. Sudarant Lietuvos modelius, atskirai analizuoti didžiųjų miestų savivaldybėse gyvenančių žmonių ir likusių savivaldybių gyventojų rodikliai. Tyrimų duomenimis, žmonės, gyvenantys mažuose miestuose ir rajonuose, yra mažiau linkę ilgiau likti darbo rinkoje.

Mažesnis įgytas stažas. Darbo istorija tirta įvairiais aspektais, pradedant darbo formos įtaka (Kim ir Feldman, 2000; Mohring, 2018) ir baigiant karjeros pertraukomis (Bussolo ir kt., 2015; Dingemans ir kt., 2016) (pavyzdžiui, E. Dingemans ir kt. (2016) asmenims, priverstiems pasitraukti iš darbo, nustatė didesnę tikimybę nerasti darbo pensiniame amžiuje). Darbo istorija turi didelę įtaką siekiant išlikti darbo rinkoje.

Atliekant tyrimą Lietuvoje, tirtas stažas, įgytas per visą karjerą senatvės pensijai gauti. Šis stažas išreiškiamas metais, tačiau jeigu per metus asmuo neuždirba 12 minimalių atlyginimų, jam įskaitomi ne visi kalendoriniai stažo metai. Taigi atskirais atvejais gali būti, kad asmens, dirbusio visus metus (tik ne visu etatu), stažas yra mažiau negu metai. Tyrimo duomenimis, asmenys, turintys mažesnį darbo stažą, rečiau dirbo sulaukę pensinio amžiaus. Taigi, galima teigti, kad būdami pensinio amžiaus dažniau dirba asmenys, įgiję didesnį stažą ir gaunantys didesnę pensiją, o ne tie, kurių darbo stažas ir pensija yra maži.

Nebiudžetinis sektorius. Modelių analizė atskleidė, kad Lietuvoje vyresnio amžiaus darbuotojai trumpiau dirba nebiudžetiniame sektoriuje. I. Fontaine ir kt. (2020) apskaičiavo, kad privačiame sektoriuje yra didesnė tikimybė netekti darbo. Gauti rezultatai skatina diskutuoti apie sektorių skirtumus ir leidžia teigti, kad nebiudžetinis sektorius vyresnio amžiaus darbuotojams mažiau palankus. Į šiuos rezultatus atsižvelgiama formuojant disertacijos rekomendacijas.

Didesnė pensijos pakeitimo norma. Analizuojant pensijos poveikį užimtumui pensiniame amžiuje, atliktų tyrimų rezultatai skiriasi. Kai kurių tyrėjų teigimu, kuo didesnė senatvės pensija, tuo išėjimas į pensiją atrodo patrauklesnis (Bussolo ir kt., 2015; Sarfati, 2008). Kiti teigia, kad pensijų išmokos nėra labai susijusios su užimtumu (Kim ir Feldman, 2000). Siekiant išsiaiškinti, ar Lietuvoje pensijos dydis daro poveikį sprendimui ilgiau likti darbo rinkoje, vertinta senatvės pensijos pakeitimo norma. Tyrimo rezultatai parodė, kad asmuo mažiau linkęs likti darbo rinkoje ilgiau, jei pensijos pakeitimo norma yra didesnė (jei pakeitimo norma yra maža, asmuo labiau linkęs dirbti ilgiau). Svarstant teoriškai, maža pensija turėtų skatinti dirbti ir

realizuoti papildomų pajamų poreikį, tačiau modelių rezultatai atskleidė, kad Lietuvoje asmenys, galimai turintys didesnę motyvaciją dirbti, arba nesirenka dirbti ilgiau, arba darbo negauna. Taigi mažų pajamų ar skurdo veiksniai neveikia kaip skatinantys užimtumą. Vis dėlto šie teiginiai pagrįsti tik neatsižvelgiant į šešėlinės ekonomikos galimybes. Atliktas tyrimas neapima šešėlinės ekonomikos – naudoti administraciniai duomenys, todėl tikėtina, kad mažas pensijas gaunantys asmenys labiau negu gaunantieji didesnes pensijas linkę dirbti nelegaliai. Į tai, kad asmenys, gaunantys mažas pensijas, dažniau dirba neoficialiai, būtina atsižvelgti darant galutines išvadas.

Gaunama nedarbo išmoka, netekto darbingumo ar našlio pensija. Lietuvoje atlikto tyrimo rezultatai, kaip matyti iš anksčiau aptartų veiksnių, palyginti atitinka kitų tyrėjų paskelbtus duomenis. Vis dėlto atliktą tyrimą iš kitų tyrimų akivaizdžiai išskiria įvairių socialinio draudimo išmokų ir pensijų gavimo veiksnių analizė. Keltas tikslas – gilinti tyrimų erdvę, naudojant administracinius duomenis, todėl nedarbo, našlių ir netekto darbingumo pensijų gavimo veiksniai pasirinkti kaip perspektyvūs atskleisti, ar asmuo išliks darbo rinkoje ilgesnį laiką. Analizuojant mokslinę literatūrą, nepastebėta, kad gaunamos socialinio draudimo išmokos būtų sietinos su užimtumu. Plačiau nagrinėjamas tik darbo istorijos veiksnys, kurį disertacijos modeliuose iš dalies atskleidžia nedarbo išmokos gavimo laikotarpio analizė. Disertacijos rezultatai atskleidė, kad didžiausias iššūkis vyresnio amžiaus darbuotojams, netekusiems darbo, – rasti naują darbą (žr. Bussolo ir kt., 2015; Dingemans ir kt., 2016). Statistikos duomenimis, vyresnio amžiaus žmonės nedarbo išmokas gauna ilgesnį laiką. Kaip rodo išankstinių senatvės pensijų gavėjų analizė, žmonės, netekę darbo, į pensiją išeina anksčiau. Taigi, galima teigti, kad esama sričių, kuriose užimtumo problemos itin aktualios ir kai kuriems žmonėms sunku sulaukti pensinio amžiaus išlaikant darbo vietą. Netekto darbingumo pensijos gavimo veiksnio analizė dar kartą pagrindė sveikatos veiksnio svarbą, nes asmenys, gavę netekto darbingumo pensiją dar būdami priešpensinio amžiaus, darbo rinkoje išliko trumpiau. Tai minėtina ir kalbant apie dar vieną itin reikšmingą veiksnį – gaunamą našlio pensiją, ypač atsižvelgiant į tai, kad Lietuvoje moterys gyvena ilgiau negu vyrai ir mažiau dirba senatvėje.

Apibendrinus rezultatus, nustatyta, kad ***jaunesnis amžius, gera sveikata ir aktyvus senėjimas, buvimas vyru, aukštesnė kvalifikacija, didesnis įgytas pensinis stažas, gyvenamoji vieta mieste, darbas biudžetiniame sektoriuje, didesnis darbo užmokestis ir geresniais ekonominiais laikais sulauktas pensinis amžius yra užimtumą vyresniame amžiuje skatinantys veiksniai.***

Jaunesnis amžius. Kaip jau minėta, jaunesnis amžius turi įtakos didesniam užimtumui. Jaunesni asmenys susiduria su mažiau sveikatos apribojimų,

lengviau susiranda darbą. Bėgant metams, blogėjant sveikatai, užimtumas mažėja. Minėtina, kad užimtumo lygis pirmus metus, sulaukus pensinio amžiaus, dažnai dar išlieka panašus į prieš pensiją buvusį užimtumą, ypač jei asmuo, būdamas priešpensinio amžiaus, turėjo darbą. Kaip rodo tyrimo rezultatai (juos patvirtina ir kitų tyrėjų duomenys), amžius lemia prastesnę sveikatą ir natūralų pasitraukimą iš darbo rinkos.

Gera sveikata ir aktyvus senėjimas. Gera sveikata nesudaro papildomų sąlygų išeiti iš darbo rinkos. Kaip teigia M. Wangas ir kt. (2008), tai vienas svarbiausių veiksnių, lemiančių, ar asmuo apskritai gali dirbti. Minėtina, kad net būdami prastos sveikatos žmonės geba patekti į darbo rinką ir joje išlikti.

Kaip jau minėta, aktyvus senėjimas apima aktyvų žmonių indėlį į visuomenę per savanorišką darbą, sportavimą, rūpinimąsi sveikata ir galimybę gyventi savarankiškai dėl pritaikyto būsto ir infrastruktūros. Dalyvavimas visuomeniniame gyvenime, įsitraukimas į darbo ir kitas veiklas prisideda prie sveikatos gerinimo, taip pat ir prie galimybių dirbti ilgiau. Naudojant administracinius duomenis, išmatuoti aktyvaus senėjimo veiksnio nebuvo galima, tačiau, kaip rodo sveikatos veiksnio rezultatai, sveikatos problemos, kurių kyla dar prieš pensinį amžių, labai greitai užkerta kelią didesniam užimtumui esant pensinio amžiaus. Aktyvaus senėjimo skatinimas šią padėtį galėtų pagerinti.

Vyrai. Vyrų karjeroje mažiau pertraukų. Moterys iškrenta iš darbo rinkos augindamos vaikus, tačiau vyrai šiuo aspektu mažiau suvaržyti, jiems lengviau kaupti patirtį, įgūdžius ir užsitikrinti darbo užmokesčio augimą. Išanalizavus lyties poveikį užimtumui, nustatyta (Pleau, 2010; Shacklock ir kt., 2009; Beutell ir Schneer, 2020), kad moterų ir vyrų pasirinkimą dirbti vyresniame amžiuje lemia skirtingi veiksniai. Deja, dėl duomenų trūkumo disertacijoje pristatomas tyrimas neapėmė šeimos veiksnių, galinčių daryti poveikį pasirinkimui dirbti vyresniame amžiuje, analizės.

Aukštesnė kvalifikacija. Kaip jau buvo minėta, į tyrimo metu sudarytus modelius buvo įtrauktas profesijos veiksnys. Rezultatai atskleidė, kad Lietuvoje vadovai darbo rinkoje linkę būti ilgiau negu kitų profesijų žmonės. Taigi, galima teigti, kad vadovai išlieka paklausūs ir senatvėje. Gauti rezultatai iš dalies koreliuoja su kitų tyrėjų paskelbtais duomenimis, kad asmenims, siekiantiems aukštojo išsilavinimo, daugiau laiko reikia mokytis, todėl tenka ilgiau dirbti vėlesniame amžiuje (Leenaars, 2010). Kita vertus, galima manyti, kad vyresnio amžiaus vadovams lengviau išsaugoti savo darbo vietą (turima daugiau galių nulemti sprendimus), o asmenys, kurie neužima vadovaujamų pareigų, lengviau pakeičiami jaunesniais darbuotojais. Atkreiptinas dėmesys, kad šioms prielaidoms patvirtinti reikėtų išsamesnių apklausų duomenų – analizuojant administracinius duomenis, negalima

nustatyti, ar vyresnio amžiaus darbuotojai išlaiko darbo vietą ilgiau dėl savo išskirtinių bruožų, ar didesnio kaitumo savaime padeda išvengti vadovo pozicija.

Gyvenamoji vieta mieste. Gyvenimas mieste didina tikimybę ilgiau dalyvauti darbo rinkoje (tai, kaip jau buvo minėta, koreliuoja su F. Grigoli ir kt. (2021) rezultatais). Analizuotuose Lietuvos modeliuose atskirai buvo nagrinėjami didžiųjų miestų savivaldybėse gyvenančių žmonių ir likusių savivaldybių gyventojų duomenys. Tyrimai parodė, kad gyvenantieji didmiesčiuose labiau linkę ilgiau likti darbo rinkoje. Didesniuose miestuose yra daugiau darbo vietų, čia lengviau rasti darbą. Gautus rezultatus patvirtina ir užimtumo lygio analizė – savivaldybėse, kuriose užimtumas didesnis, vyresni žmonės dažniau dirba ilgiau.

Įgytas didesnis pensinis stažas. Kaip jau buvo minėta, pensinio stažo įtraukimas į tyrimo modelius atskleidė, kad asmenys, įgiję didesnį stažą, neretai darbo rinkoje išlieka ilgiau. Tai leidžia atmesti prielaidas, kad turintieji mažesnį darbo stažą ir gaunantys mažesnes pensijas dažniau dirba sulaukę senatvės (Cahill ir kt., 2006). Vis dėlto negalima atmesti E. Dingemans ir K. Henkenso (2019) bei E. Sandor (2011) argumentų, kad pensinio amžiaus sulaukę žmonės gali likti darbo rinkoje, nenorėdami prarasti socialinių ryšių. Nepakanka duomenų svaresnėms išvadoms, ar pensinio amžiaus sulaukę asmenys lieka darbo rinkoje, nes nori išplėsti socialinius ryšius, ar tiesiog pasinaudojama galimybe dirbti dėl finansinių priežasčių. Nors motyvas nėra aiškus, analizuojant Lietuvos duomenis, akivaizdi tendencija, kad asmenų, įgijusių didesnį darbo stažą ir gaunančių didesnę pensiją, geresnės galimybės dirbti ilgiau, o turintieji mažesnį stažą ir gaunantys mažesnę pensiją dažniau palieka darbo rinką anksčiau.

Biudžetinis sektorius. Biudžetiniame sektoriuje vyresnio amžiaus darbuotojai dirba ilgiau. Apskritai, šiame sektoriuje vertinamas ilgesnis darbuotojų išdirbtas laikas (priedai už stažą), todėl, galima manyti, kad net ir sulaukusieji pensinio amžiaus turi galimybę dirbti toliau. Ši prielaida gali būti reikšminga tolesnėse diskusijose apie galimas priemones, taikytinas norint paskatinti žmones dirbti ilgiau. Biudžetinis sektorius gali būti pavyzdys nebiudžetiniam, kaip suteikti vyresnio amžiaus darbuotojams galimybę ilgiau dirbti, įvertinant jų patirtį ir aplinkybes.

Didesnis darbo užmokestis. Darbo užmokesčio poveikis užimtumui pensiniame amžiuje vertinamas gana įvairiai (Kim ir Feldman, 2000; Cahill ir kt., 2006), jis priklauso nuo pensininkų darbo sąlygų šalyje. Tyrėjai skiria U formos ryšį tarp pensijos ir užimtumo lygio, t. y. didelė tikimybė, kad pensininkai, gaunantys mažiausias ir didžiausias pajamas, dirbs ir išėję į pensiją (Cahill ir kt., 2006). Disertacijos modelių rezultatai rodo, kad

gaunantieji didesnį atlyginimą išsiskiria ilgesne įdarbinimo trukme. Taigi daugiau uždirbantis žmogus darbo rinkoje jaučiasi saugiau ir gali joje likti ilgiau. Net ir netekęs darbo toks asmuo trumpiau gali būti bedarbis. Kaip jau buvo minėta, galima manyti, kad už aukštesnės kvalifikacijos darbą daugiau mokama, o tai reiškia, kad didesnį atlyginimą gaunantį asmenį dėl investicijų į jį kaip darbuotoją ir įgytos kvalifikacijos rečiau negu žemos kvalifikacijos darbuotoją gali pakeisti kitas asmuo.

Gera ekonominė padėtis šalyje. Teigiama, kad geresniais ekonominiais laikais vyresnio amžiaus žmonės labiau linkę likti darbo rinkoje ilgiau, o ekonomikai prastėjant į pensiją išeinama anksčiau. Tiek atlikta išlikimo analizė, nagrinėjant vienos kartos situaciją, tiek binariniai tikimybiniai modeliai, naudojant skerspjūvio duomenis, šio teiginio nepagrindžia. Vis dėlto aprašomoji analizė ir kai kurie į modelius įtraukti veiksniai rodo, kad laiko eilučių tyrimai leidžia daryti prielaidą, jog ekonomikai kylant vyresnio amžiaus žmonės dirba ilgiau, o ekonominės krizės metu susiduria su dideliais iššūkiais. Krizinė situacija aptariama kitoje disertacijos dalyje, nagrinėjant vyresnio amžiaus žmonių užimtumo pokyčius per COVID-19 pandemiją.

Taigi ištirti veiksniai, lemiantys vyresnio amžiaus žmonių užimtumą Lietuvoje, atskleidė, kad atotrūkis tarp asmenų, dirbančių aukštesnės kvalifikacijos darbus, gaunančių didesnį atlyginimą ir ilgiau išliekančių darbo rinkoje sulaukus vyresnio amžiaus, ir asmenų, dirbančių žemesnės kvalifikacijos darbus, uždirbančių mažiau ir rečiau išliekančių darbo rinkoje sulaukus senatvės, didėja. Gauti rezultatai, atspindintys esamą Lietuvos situaciją, koreliuoja su M. Bussolo ir kt. (2015) įžvalgomis. Minėtas atotrūkis atspindi tam tikras problemas, pavyzdžiui, tai, kad asmenys nepersikvalifikuoja (dėl įvairių priežasčių: sveikatos, galimo neigiamo požiūrio į vyresnio amžiaus darbuotojus, įgūdžių trūkumo ir kt.). Asmeniniai motyvai nėra nagrinėjami, nes visi modeliai sudaryti naudojant administracinius duomenis, tačiau tiriami kiti veiksniai (tokie kaip sveikata, sektoriaus svarba, regionas) rodo, kad yra daug sąlygų užimtumo vyresniame amžiuje problemoms spręsti, kurias galima gerinti, kad vyresnio amžiaus žmonių užimtumas didėtų.

5. COVID-19 PANDEMIJOS POVEIKIS VYRESNIO AMŽIAUS DARBUOTOJAMS LIETUVOJE

COVID-19 pandemija gali paveikti ne tik visuomenės sveikatą, bet ir ekonominius, politinius, socialinius reiškinius. Taigi svarbu išanalizuoti galimą pandemijos poveikį pagyvenusių žmonių užimtumui, nes sveikatos

krizė ilgainiui gali turėti įtakos darbo rinkai, įvesdama tam tikrų naujų tendencijų ir gyvenimiškų pamokų.

Pirmame šios dalies skyriuje pateikiama literatūros apžvalga, antrame – aprašomoji vyresnio amžiaus žmonių užimtumo Lietuvoje analizė. Trečiame skyriuje pristatomi binariniai tikimybiniai modeliai vyresnio amžiaus žmonių užimtumui per pandemiją tirti. Šių modelių rezultatai aptariami ketvirtame skyriuje.

5.1. Literatūros apžvalga

Šiame skyriuje COVID-19 pandemijos poveikis vyresniems žmonėms nagrinėjamas dviem aspektais: *(1) identifikuojant pasekmes šių žmonių sveikatai* ir *(2) išskiriant jiems aktualias ekonomines pasekmes*. Poveikis vyresnio amžiaus žmonių sveikatai nagrinėjamas trimis aspektais: *(1) didesnis mirtingumas, (2) daugiau liekamųjų ligos reiškinių* ir *(3) poveikis psichinei sveikatai*. Nors pandemija vyresnio amžiaus žmonių nepaveikė proporcingai labiau negu kitų amžiaus grupių, tačiau ji, kaip ir kitos krizės, tapo dideliu iššūkiu asmenims, netekusiems darbo. Kaip jau minėta, vyresnio amžiaus žmonėms sunkiau grįžti į darbo rinką. Darbe aptariamas ekonominis pandemijos poveikis: *(1) kaip pandemija gali paveikti vyresnio amžiaus žmonių dalyvavimą darbo rinkoje* ir *(2) su kokiais iššūkiais susiduria vyresni žmonės, praradę darbą per pandemiją*. Taip pat šiame skyriuje aptariama, kokių galimybių vyresnio amžiaus žmonėms gali suteikti pandemija. Teigiamų pokyčių gali sukelti *(1) padidėjęs technologijų naudojimas*, *(2) labiau vertinami šeimos ryšiai* ir *(3) geresnis laiko valdymas*.

5.2. Aprašomoji analizė

Kaip ir kitų tyrėjų darbuose, šiame skyriuje nagrinėjami užimtumo rodikliai Lietuvoje prieš pandemiją ir jai pasibaigus, lyginama, kaip užimtumo rodikliai keitėsi per 2009 m. ekonominę krizę ir per esamą pandemiją. Nustatyta, kad analogiškai, kaip ir per 2009 m. ekonominę krizę, jaunų žmonių nedarbo lygis išaugo labiau negu pagyvenusių žmonių, tačiau, skirtingai negu 2009 m., didesni neigiami pokyčiai nustatyti nagrinėjant moterų užimtumo rodiklius (palyginti su analizuotais vyrų duomenimis). Galima manyti, kad šiuos pokyčius galėjo lemti mokslinės literatūros apžvalgoje įvardytos priežastys: padidėjęs vaikų priežiūros poreikis, didelis poveikis paslaugų sektoriui, kuriame dominuoja moterys, ir kt. Minėtina ir tai, kad Lietuvoje vyresnio amžiaus darbuotojų, dirbančių karantino labiausiai paveiktose srityse, nėra daug, jų skaičius minėtose srityse mažėjo panašiai arba kiek mažiau negu kitų

amžiaus grupių darbuotojų. Taigi aptarti duomenys nerodo santykinai didesnio neigiamo pandemijos poveikio vyresnio amžiaus darbo rinkos dalyviams.

5.3. Tyrimo modeliai ir duomenys

COVID-19 pandemijos poveikis užimtumui mažai modeliuotas. 2021 m. pirmąjį pusmetį daugiausiai atliktos tik statistinių duomenų analizės. Disertacijoje pasirinkta surinkti duomenis ir sudaryti binarinius tikimybinius modelius, siekiant įvertinti 55–64 m. amžiaus darbuotojų tikimybę likti darbo rinkoje per COVID-19 pandemiją. Tyrimo metu rinkti duomenys apie 55–64 m. amžiaus apdraustuosius, kurie 2020 m. vasario mėn. dirbo nebiudžetiniame sektoriuje. Tiriamąją imtį sudarė apdraustieji, dirbantys apdirbamosios gamybos, didmeninės ir mažmeninės prekybos, variklinių transporto priemonių ir motociklų remonto (toliau – didmeninė ir mažmeninė prekyba), statybos, apgyvendinimo ir maitinimo paslaugų, administracinėje ir aptarnavimo, transporto ir sandėliavimo (toliau – transporto veikla) bei informacijos ir ryšių veikloje. Ekonominės veiklos atrinktos naudojant Ekonominės veiklos rūšių klasifikatorių. Į tiriamąją imtį įtraukti apdraustieji sudarė 77 proc. visų nebiudžetiniame sektoriuje dirbančių šios amžiaus grupės apdraustųjų. Kai kurios ekonominės veiklos į tyrimą įtrauktos dėl didelio apdraustųjų skaičiaus (pavyzdžiui, gamybos, didmeninės ir mažmeninės prekybos veiklos), kitos veiklos įtrauktos dėl galimai didesnio pandemijos poveikio (pavyzdžiui, apgyvendinimo ir maitinimo paslaugų veikla). Duomenims palyginti taip pat įtraukta informacijos ir ryšių veikla, kurioje 55–64 m. amžiaus apdraustųjų skaičius yra nedidelis, o pandemijos poveikis gana mažas (siekta palyginti šiame sektoriuje dirbančių asmenų padėtį kitų veiklų atžvilgiu). Į tyrimą nebuvo įtrauktos šios veiklos: sveikatos priežiūros ir socialinio darbo veikla; švietimas; profesinė, mokslinė ir techninė veikla; viešasis administravimas ir gynyba; finansinė ir draudimo veikla; kasyba ir karjerų eksploatavimas; žemės ūkis, miškininkystė ir žuvininkystė; elektros tiekimas; vandens tiekimas ir kt. Iš viso surinkta 132 tūkst. apdraustųjų duomenų. Minėtina, kad 23,0 tūkst. tiriamųjų, praėjus metams po pandemijos, nedirbo. 1,4 tūkst. neturėjo darbo, nes pradėjo gauti išankstinę senatvės pensiją arba senatvės pensiją. Šių asmenų duomenys į tyrimą nebuvo įtraukti.

Atliekant tyrimą, laikyta, kad priklausomas kintamasis lygus 1, jei asmuo gavo darbo užmokestį 2021 m. vasario mėn., t. y. praėjus metams nuo pandemijos pradžios, ir lygus 0, jei asmuo negavo darbo užmokesčio (tai reiškia, kad šis asmuo nedirbo). Lytis, amžius, darbo užmokestis, nedarbo

išmokos veiksnys, ekonominė veikla pasirinkti kaip nepriklausomi kintamieji (5 lentelė). Toliau pateikiami galimi veiksniai ir suformuluotos hipotezės.

5 lentelė. Veiksniai, lemiantys užimtumą per pandemiją

Asmeniniai veiksniai	Finansiniai veiksniai	Kiti veiksniai
Lytis H_1 Amžius H_2 Ekonominė veikla H_3	Darbo užmokestis H_4	Nedarbo išmokos gavėjas H_5

Šaltinis: sudaryta autorės.

Hipotezės. Su asmeniniais veiksniais sietinos hipotezės:

1 hipotezė. Didesnė tikimybė, kad per pandemiją dažniau darbo neteko moterys nei vyrai.

2 hipotezė. Kuo vyresnis asmuo, tuo didesnė tikimybė, kad šis asmuo pandemijos metu paliks darbo rinką.

3 hipotezė. Vyresnio amžiaus darbuotojai dažniau netenka darbo karantino labiausiai paveiktose ekonominėse srityse, pavyzdžiui, administracinėje ir aptarnavimo, apgyvendinimo ir maitinimo veiklose.

Su finansiniais veiksniais sietina hipotezė:

4 hipotezė. Labiau tikėtina, kad asmenys, kurie uždirbo didesnį atlyginimą, sėkmingiau išlaikė darbo vietas per pandemiją.

Su kitais veiksniais sietina hipotezė:

5 hipotezė. Didesnė tikimybė, kad asmenys, kurie pandemijos pradžioje pradėjo gauti nedarbo išmoką, po metų nebegrįžo į darbo rinką.

Lietuvos duomenims analizuoti sudarytas tiesinis tikimybinis modelis ir bianriniai tikimybiniai modeliai. Tiesinis tikimybinis modelis apibrėžiamas taip:

$$P(y = 1 \mid x) = \beta_0 + \beta_1 x_{lytis} + \beta_2 x_{amžius} + \beta_3 \ln(x_{DU}) + \beta_4 x_{nedarbas} + \beta_5 x_{ekonominė\ veikla} + u_i. \quad (16)$$

Kintamasis x_{lytis} yra fiktyvus kintamasis, turintis 1 reikšmę, jei asmuo yra vyras, ir 0 reikšmę, jei asmuo yra moteris. Kintamasis $x_{amžius}$ yra asmens amžius nuo 55 iki 64 metų. Kintamasis $\ln(x_{DU})$ yra 2020 m. vasario mėn. darbo užmokesčio logaritmas. Šios pertvarkos priežastis sietina su funkcine poveikio forma, nes asmeniui, gaunančiam labai mažą atlyginimą, ir gaunančiajam labai didelį atlyginimą papildomi 100 Eur turi skirtingą

poveikį, todėl logaritmas – vienas iš būdų užfiksuoti mažėjančios grąžos prielaidą.

Kintamasis $x_{nedarbas}$ yra fiktyvus kintamasis, įgyjantis 1 reikšmę, jei asmuo pandemijos metu gavo nedarbo išmoką, ir 0 reikšmę, jei asmuo nedarbo išmokos negavo. Kintamasis $x_{ekonominė\ veikla}$ yra fiktyvus kintamasis, kai analizuojamai ekonominei veiklai priskiriama 1 reikšmė, o visoms likusioms veikloms priskiriama 0 reikšmė. Minėtina, kad kiekviena ekonominė veikla į regresiją įtraukta atskirai (1 reikšme). Rezultatuose šis kintamasis žymimas santrumpomis, kurios reiškia: $x_{ekonominė\ veikla\_C}$ – apdirbamoji gamyba, $x_{ekonominė\ veikla\_F}$ – statyba, $x_{ekonominė\ veikla\_G}$ – didmeninė ir mažmeninė prekyba, $x_{ekonominė\ veikla\_H}$ – transportas, $x_{ekonominė\ veikla\_I}$ – apgyvendinimo ir maitinimo paslaugų veikla, $x_{ekonominė\ veikla\_J}$ – informacija ir ryšiai, $x_{ekonominė\ veikla\_N}$ – administracinė ir aptarnavimo veikla.

Logit modelis apibrėžiamas taip:

$$L_i = \ln(\frac{P_i}{1-P_i}) = \Lambda\,[\beta_0 + \beta_1 x_{lytis} + \beta_2 x_{amžius} + \beta_3 \ln(x_{DU}) + \beta_4 x_{nedarbas} + \beta_5 x_{ekonominė\ veikla} + u_i]. \quad (17)$$

Probit modelis apibrėžiamas taip:

$$I_i = \Lambda\,[\beta_0 + \beta_1 x_{lytis} + \beta_2 x_{amžius} + \beta_3 \ln(x_{DU}) + \beta_4 x_{nedarbas} + \beta_5 x_{ekonominė\ veikla} + u_i]. \quad (18)$$

Gauti rezultatai aptariami tolesniame skyriuje.

5.4. Rezultatai

Asmeniniai veiksniai. Visi asmeniniai veiksniai, įskaitant lytį, amžių ir ekonominę veiklą, modeliuose buvo statistiškai reikšmingi (6 lentelė).

Lytis. Modelių rezultatai rodo, kad pandemijos metu moterys dažniau lieka darbo rinkoje. Mokslinės literatūros analizė ir pradinė statistinė duomenų analizė atskleidė, kad moterys pandemijos pradžioje susidūrė su problemomis: įmonėse, kurias labiausiai paveikė karantinas, santykinai didelė darbuotojų dalis buvo moterys, todėl moterų nedarbas didėjo sparčiau negu vyrų. Vis dėlto vėliau apdraustų moterų skaičius ėmė augti. Tikimybė, jog vyresnio amžiaus moterys po metų išliks darbo rinkoje, yra 4 procentiniais punktais didesnė, palyginti su vyresnio amžiaus vyrų duomenimis.

Amžius. Vyresnis amžius mažina tikimybę išlikti darbo rinkoje praėjus metams nuo pandemijos pradžios. Pandemijos metu vyresnio amžiaus žmonės su kiekvienais papildomais metais 0,45 procentinio punkto labiau linkę palikti darbo rinką. Tikėtina, kad, likus nedaug laiko iki išėjimo į pensiją, asmuo gali priimti sprendimą pasitraukti iš darbo rinkos dėl didesnės susirgimų rizikos.

Minėtina, kad į tiriamąją imtį galėjo pakliūti asmenys, kurie dar negauna senatvės pensijos ar išankstinės senatvės pensijos, bet dėl jos jau kreipėsi. Sudarant imtį, įtrauktas požymis, kad pensija jau gaunama, todėl asmenys, dar nepradėję gauti pensijos, nebuvo pašalinti iš tyrimo.

6 lentelė. Ribiniai modelių efektai

	LPM	Logit	Probit
laisvasis narys β_0	0,8680	0,2339	0,2203
x_{lytis}	–0,0434	–0,0428	–0,0409
$x_{amžius}$	–0,0045	–0,0045	–0,041
$\ln(x_{DU})$	0,1048	0,0900	0,0888
$x_{nedarbas}$	–0,6835	–0,3500	–0,3621
$x_{ekonominė\ veikla\_C}$	0,0197	0,0216	0,0197
$x_{ekonominė\ veikla\_F}$	–0,0358	–0,0311	–0,0290
$x_{ekonominė\ veikla\_G}$	0,0326	0,0354	0,0332
$x_{ekonominė\ veikla\_H}$	–0,0304	–0,0291	–0,0272
$x_{ekonominė\ veikla\_I}$	0,0074	0,0045	0,0034
$x_{ekonominė\ veikla\_J}$	0,0201	0,0311	0,0274
$x_{ekonominė\ veikla\_N}$	–0,0423	–0,0376	–0,0355

Šaltinis: sudaryta autorės.

Ekonominė veikla. Dirbantieji gamyboje ir prekyboje 2–3 procentiniais punktais labiau linkę likti darbo rinkoje negu dirbantys kitose tyrimo metu analizuotose ekonominių veiklų srityse. Informacijos ir ryšių įmonėse dirbančių asmenų tikimybė išlikti darbo rinkoje taip pat 2 procentiniais punktais didesnė negu dirbančiųjų kitose srityse. Palyginti su asmenimis, dirbančiais kitose tyrimo metu analizuotose ekonominių veiklų srityse, dirbančiųjų statybų, transporto ir administracinės veiklos srityse tikimybė išlikti darbo rinkoje 3–4 procentiniais punktais mažesnė. Pastarąją veiklą stipriai paveikė karantinas, todėl, kaip rodo sudarytas tyrimo modelis, vyresnio amžiaus darbuotojams, dirbantiems statybų, transporto ir administracinės veiklos srityse, sunku išlaikyti darbo vietą. Apgyvendinimo ir maitinimo paslaugų veikla per karantiną taip pat buvo smarkiai ribojama,

tačiau šios ekonominės veiklos rodikliai statistiškai nereikšmingi (galima manyti, dėl mažo šiame sektoriuje dirbančių žmonių skaičiaus).

Finansinis veiksnys. Darbo užmokesčio logaritmo rezultatas yra vidutinis tikimybės pokytis, kai atlyginimas padidėja (apie) 10 proc. (logaritmo pokytis 0,1 lygus apie 10 proc. darbo užmokesčio padidėjimo). Ribinis efektas yra 0,09, taigi tikimybė likti darbe per pandemiją padidėja 0,009 arba 0,9 procentinio punkto, darbo užmokesčiui padidėjus 10 proc. Vadinasi, kuo didesnis atlyginimas, tuo didesnė tikimybė, kad asmuo pirmuosius pandemijos metus liks darbo rinkoje.

Kiti veiksniai. Asmenims, per pandemiją gavusiems nedarbo išmoką, tikimybė dirbti pandemijai pasibaigus yra 35 procentiniais punktais mažesnė negu tiems, kurie per pandemiją nedarbo išmokos negavo. Tai rodo, kad į darbo rinką nėra grįžtama greitai. Pavyzdžiui, jei asmuo buvo atleistas iš darbo 2020 m. antroje pusėje, jis 2021 m. viduryje vis dar gauna nedarbo išmoką (ji mokama 9 mėn.), todėl kol kas nepakanka duomenų analizuoti, kaip žmonėms, atleistiems iš darbo pandemijos metu, seksis grįžti į darbo rinką. Be to, karantino laikotarpiu buvo mokamos subsidijos už prastovas, o tai taip pat mažino atleidimų skaičių. Vis dėlto neaišku, ar, pasibaigus karantinui, kai kurie iš šių žmonių nebus atleisti. Taigi šiuo aspektu tyrimo rezultatai yra ganėtinai nauji ir negalutiniai.

Sukurto modelio privalumas, kad tai vienas pirmųjų tokio tipo tyrimų (kiti tyrėjai nagrinėja tik bendruosius statistinius užimtumo rodiklius). Trūkumas – tyrimo atlikimo laikas. Pandemija vis dar tęsiasi, todėl, atliekant tyrimą, naudojami tarpiniai duomenys. Ateityje būtų galima ištirti ilgesnį laikotarpį, palyginti pandemijos padarinius jaunesniems ir vyresniems žmonėms.

Taigi, kaip rodo statistinė duomenų analizė, vyresnio amžiaus darbuotojai pandemijos metu nebuvo labiau išstumti iš darbo rinkos negu kitų amžiaus grupių darbuotojai. Kaip ir ankstesnės ekonominės krizės atveju, matyti, kad neigiamai labiau paveikti jaunesni asmenys. Sudaryti binariniai tikimybiniai modeliai atskleidė, kad 55–64 m. darbuotojai, dirbę nebiudžetiniame sektoriuje, dažniau iškrito iš darbo rinkos, jei dirbo administracinėje ir aptarnavimo veikloje, transporto veikloje ir statybose.

COVID-19 pandemija pirmiausia yra iššūkis vyresnio amžiaus žmonių sveikatai. Būtent tai gali kelti papildomų nepatogumų vyresnio amžiaus darbo rinkos dalyviams – atsiranda baimė darbe užsikrėsti virusu. Antra vertus, svarbu suvokti, kad vyresnio amžiaus žmonės yra nevienalytė, labai įvairi grupė, todėl kai kuriems iš šiai grupei priklausančių asmenų COVID-19 pandemija taps iššūkiu, o kitiems ši pandemija turės tokią pat reikšmę kaip ir jaunesniems darbuotojams. Daug kas priklausys nuo darbo rinkos lankstumo pasibaigus pandemijai (pavyzdžiui, ar bus skatinamas lankstus darbo grafikas,

nuotolinis darbas). Galima teigti, kad lankstesnė darbo rinka vyresnio amžiaus žmonėms padėtų apsisaugoti nuo viruso ir nepatirti socialinės izoliacijos.

IŠVADOS IR REKOMENDACIJOS

Tyrimų išvados

1. ***Visuomenei senėjant, sveikatos, ilgalaikės priežiūros, socialinės apsaugos sistemos ir darbo rinka turi užtikrinti pakankamas ir tvarias vyresnio amžiaus žmonių pajamas, gerą jų sveikatą ir priežiūrą, todėl priešpensiniame ir pensiniame amžiuje tampa vis svarbesnis užimtumas, prisidedantis prie minėtų sistemų stabilumo.*** Kaip rodo mokslinės literatūros analizė, šiandien taikomos priemonės (pensijų reformos, plečiant privatų pensijų kaupimą, pensinio amžiaus didinimas) nėra pakankamos tinkamai pagyvenusių žmonių gerovei užtikrinti, todėl vis daugiau dėmesio skiriama asmenų, sulaukusių vyresnio amžiaus, užimtumui, leidžiančiam *(1) darbdaviams išvengti darbuotojų trūkumo, (2) darbuotojams užsitikrinti didesnes pajamas senatvėje* ir *(3) šalims užtikrinti finansinį pensijų ir sveikatos sistemų stabilumą.*

2. ***Remiantis Lietuvos vyresnio amžiaus žmonių duomenimis, sudaryti išlikimo ir binariniai tikimybiniai modeliai bei nustatyti veiksniai, skatinantys (traukos veiksniai) ir mažinantys (atstūmimo veiksniai) paskatas ilgiau dirbti sulaukus senatvės.*** Vyresnis amžius, bloga sveikata, buvimas moterimi, žemesnės kvalifikacijos darbas, gyvenimas kaime ar rajone, įgytas mažesnis pensinis stažas, darbas nebiudžetiniame sektoriuje, didesnė pensijos pakeitimo norma, nedarbo, netekto darbingumo ir našlio pensijos gavimo laikotarpiai – veiksniai, mažinantys vyresnio amžiaus žmonių paskatas dirbti. Jaunesnis amžius, gera sveikata, buvimas vyru, aukštesnės kvalifikacijos darbas, įgytas didesnis pensinis stažas, gyvenimas didmiestyje, darbas biudžetiniame sektoriuje, didesnis darbo užmokestis ir geresniais ekonominiais laikais sulauktas pensinis amžius traktuotini kaip veiksniai, skatinantys užimtumą Lietuvoje, sulaukus senatvės.

3. ***Sveikata – vienas svarbiausių veiksnių, priimant sprendimą ilgiau likti darbo rinkoje, nes ilgainiui, didėjant amžiui, sveikata pradeda riboti darbo galimybes.*** Asmenų, kurie daugiau serga, rizika pasitraukti iš darbo rinkos yra 30 proc. (1,30–1=30 %) didesnė negu sergančiųjų mažiau. Turinčiųjų negalią rizika pasitraukti iš darbo rinkos yra 17 proc. (1,17–1=17 %) didesnė negu asmenų, kurie nėra neįgalūs. Asmenys, dažniau sirgę dar iki pensijos, sulaukę pensinio amžiaus 3,2–5,2 procentinio punkto dirba rečiau negu sirgusieji

mažiau. Taigi sveikata yra esminis veiksnys, be kurio pagyvenęs žmogus, kad ir kokių socialinių ar finansinių motyvų turėtų, dirbti negali. Ilgėjant sveiko gyvenimo metams, tikėtina, kad žmonės galės dirbti ilgiau, tačiau ilgesnei ir sėkmingesnei karjerai bus svarbus prisitaikymas prie darbo rinkos ir greičiau įgyjami nauji įgūdžiai.

4. ***Įgyta aukštesnė kvalifikacija suteikia didesnes galimybes tęsti darbą ir užsitikrinti didesnes pajamas vyresniame amžiuje.*** Ilgiausiai darbo rinkoje išlieka vadovai. Toliau minėtini technikai ir jaunesnieji specialistai, mašinų operatoriai, baigiant kvalifikuotais žemės ūkio, miškininkystės ir žuvininkystės darbuotojais bei nekvalifikuotais darbuotojais, kurių užimtumas vyresniame amžiuje yra mažiausias. Asmenų, dirbančių nekvalifikuotą darbą arba kvalifikuotą žemės ūkio darbą, tikimybė dirbti sulaukus pensinio amžiaus yra maždaug 20 procentinių punktų mažesnė negu vadovų, o technikų, tarnautojų ir gamyklų bei mašinų operatorių – 14 procentinių punktų mažesnė negu vadovų. Mažesnės kvalifikacijos ir dažniau su skurdo rizika susiduriantys asmenys anksčiau išeina iš darbo rinkos ir praranda pagrindinį pajamų šaltinį, o aukštesnės kvalifikacijos darbuotojai ilgiau lieka darbo rinkoje galimai dėl darbo pobūdžio (daugiau protinio, o ne fizinio darbo), geresnės sveikatos ir kt. priežasčių.

5. ***Asmenys, dirbantys biudžetiniame sektoriuje, yra labiau tikri dėl darbo galimybių vyresniame amžiuje ir gali sėkmingiau tęsti darbą sulaukę pensinio amžiaus.*** Specialistų tikimybė dirbti sulaukus pensijos yra 1,5–2,2 procentinių punktų, technikų ir jaunesniųjų specialistų – 3,7–5,3 procentinių punktų, paslaugų sektoriaus darbuotojų ir pardavėjų – 5,2–7,6 procentinių punktų, kvalifikuotų darbininkų ir amatininkų – 6,2–8,9 procentinių punktų, įrenginių ir mašinų operatorių – 7,8–11,1 procentinių punktų didesnė, jiems dirbant biudžetiniame sektoriuje (palyginti su nebiudžetiniu sektoriumi). Didesnis biudžetinio sektoriaus atvirumas vyresnio amžiaus darbuotojams gali būti geras pavyzdys nebiudžetiniam sektoriui, kuriame jaunesni darbuotojai dažnai yra paklausūs, o vyresni – mažiau patrauklūs darbdaviams.

6. ***Asmenys, uždirbantys didesnį atlyginimą, darbo rinkoje išlieka ilgiau.*** Didesnis vidutinis darbo užmokestis, gautas per paskutinius kelerius metus iki pensijos, padidina tiriamųjų tikimybę dalyvauti darbo rinkoje išėjus į pensiją. Asmenų, uždirbančių didesnį atlyginimą, pensijos pakeitimo norma yra mažesnė. Tikimybė, kad šie žmonės dirbs sulaukę pensinio amžiaus, yra 7,2–10 procentinių punktų didesnė negu asmenų, gaunančių mažesnį atlyginimą, kuriems pensijos pakeitimo norma yra didesnė. Svarstant teoriškai, maža pensija turėtų skatinti dirbti, siekiant gauti papildomų pajamų, tačiau modelių rezultatai rodo, kad asmenys, kurie teoriškai lyg ir turėtų didesnę motyvaciją

dirbti, sulaukę pensijos arba nesirenka dirbti, arba darbo negauna. Taigi reikėtų daryti išvadą, kad mažų pajamų ar skurdo veiksnys Lietuvoje neveikia. Vis dėlto ši išvada taikytina tik neatsižvelgiant į šešėlinę ekonomiką. Minėtina, kad atliktas tyrimas neapėmė šešėlinės ekonomikos, nes buvo analizuoti administraciniai duomenys. Tikėtina, kad mažas pensijas gaunantys asmenys labiau linkę dirbti nelegaliai negu gaunantieji didesnes pensijas, todėl nereikėtų skubėti daryti galutinių išvadų. Gali būti, kad gaunantieji mažas pensijas dirba, tik jų darbas dažniau yra neoficialus.

7. ***Galimybė dirbti vyresniame amžiuje yra labiau privilegija tiems, kurie per savo karjerą buvo paskirti į aukštesnes pareigas; taip didėja atotrūkis tarp vyresnio amžiaus žmonių dviejų grupių: gaunančiųjų aukštesnį atlyginimą ir užsitikrinančių didesnes karjeros galimybes ir asmenų, kurie visą savo karjerą dirba žemesnės kvalifikacijos darbus ir yra nelinkę dirbti senatvėje bei pasididinti ir taip mažas pensijas.*** Vienareikšmiškai sunku atsakyti, ar asmenys, būdami pensinio amžiaus, dirba dėl asmeninių paskatų, norėdami jaustis socialiai svarbūs ir išlaikyti socialinius ryšius, ar dėl būtinybės išvengti skurdo ir siekdami pagerinti savo finansinę padėtį. Tyrimai akivaizdžiai rodo, kad aukštesnės kvalifikacijos darbuotojai ilgiau išlieka darbo rinkoje, galimai dėl darbo pobūdžio ir geresnės sveikatos. Kad ir koks būtų aukštesnės kvalifikacijos darbuotojų motyvas, atotrūkis tarp kvalifikuotų ir mažesnę kvalifikaciją turinčių darbuotojų didėja.

8. ***Nedarbas vyresniame amžiuje tampa dideliu iššūkiu vyresnio amžiaus darbo rinkos dalyviams grįžti į darbo rinką; tai skatina ieškoti alternatyvų, pavyzdžiui, pasirenkamas išankstinis išėjimas į pensiją.*** Laikotarpis, per kurį gaunama nedarbo išmoka, tiesiogiai sumažina buvimo darbo rinkoje trukmę. Asmenims, kurie gauna nedarbo išmoką, rizika vyresniame amžiuje pasitraukti iš darbo rinkos yra 17 proc. (1,17–1=17 %) didesnė negu asmenų, kurie nedarbo išmokos ankstesniais laikotarpiais negauna. Tikimybė dirbti sulaukus pensinio amžiaus, jei asmuo yra gavęs nedarbo išmoką ankstesniais karjeros metais, sumažėja 21,6–34,8 procentiniais punktais, palyginti su asmenimis, negavusiais nedarbo išmokos.

9. ***Moterys darbo rinką dažniausiai palieka greičiau negu vyrai dėl įsipareigojimų savo šeimai, mažesnio pensinio amžiaus ir trumpesnės karjeros.*** Vyrų tikimybė dirbti sulaukus pensinio amžiaus yra 1,0–1,3 procentinio punkto didesnė negu moterų. Tam įtakos turi moters šeiminės pareigos, tokios kaip rūpinimasis sergančiais, jauniausiais ir vyriausiais šeimos nariais. Moterys dažniau pertraukia savo karjerą, o tai lemia ilgesnius darbo užmokesčio įšaldymo periodus, vėliau – mažesnes pensijas ir didesnę skurdo riziką senatvėje.

10. ***Ilgėjant gyvenimo trukmei, svarbi tampa ilgesnio gyvenimo kokybė, kuri šiandien Lietuvoje nėra pakankamai stiprinama, esant menkoms aktyvaus senėjimo apraiškoms.*** Sveiko gyvenimo metų trukmė Lietuvoje yra trumpesnė negu kitose šalyse: 65 m. moterų tikėtini sveiko gyvenimo metai sudaro 32 proc. likusios gyvenimo trukmės, o 65 m. vyrų sveiko gyvenimo metai sudaro 41 proc. likusių gyvenimo metų. Vyresnio amžiaus žmonės Lietuvoje retai dirba ne visą darbo dieną, jų sveikata, palyginti su kitų šalių duomenimis, yra prastesnė. Lietuvoje įprasta skirti tris svarbiausius gyvenimo etapus: mokymąsi, darbą ir pensiją. Vis dėlto mokslinės literatūros analizė rodo, kad ateityje žmonės turės tobulinti savo kompetencijas per visą savo karjerą, o mokymasis visą gyvenimą taps labai svarbiu veiksniu, užsitikrinant finansinę padėtį vyresniame amžiuje. Taigi apibendrintai galima teigti, kad Lietuvai reikia dar daug įdirbio siekiant gerinti žmonių sveikatą ir skatinti aktyvų senėjimą.

11. ***COVID-19 pandemija vyresnio amžiaus asmenims nepakenkė labiau negu kitų amžiaus grupių darbuotojams.*** Aprašomoji analizė parodė, kad pandemijos metu jaunų žmonių nedarbo lygis padidėjo labiau negu vyresnio amžiaus žmonių (minėtina, kad sektoriuose, kuriuos labiausiai paveikė karantinas ir pandemija, dirbančių vyresnio amžiaus asmenų dalis buvo palyginti maža). Binarinių tikimybinių modelių rezultatai atskleidė, kad 55–64 m. žmonės, dirbę administracinėje ir aptarnavimo veikloje, transporto veikloje ir statybose, susidūrė su didesniais sunkumais, nes, praėjus metams po pandemijos, tikimybė, kad šie asmenys grįš į darbo rinką, buvo atitinkamai 4,2, 3,0 ir 3,6 procentinio punkto mažesnė negu asmenų, dirbusių kitose ekonominės veiklos srityse. Vyresnis amžius, buvimas vyru ir atleidimas iš darbo taip pat didino tikimybę iškristi iš darbo rinkos (2020 m. nedarbo išmokas gaunančių asmenų tikimybė išlikti darbo rinkoje buvo 35 procentiniais punktais mažesnė negu asmenų, 2020 m. negavusių nedarbo išmokos). Išlikimas darbo rinkoje tiesiogiai koreliuoja su gautu prieš pandemiją didesniu atlyginimu: esant 10 proc. didesniam darbo užmokesčiui, tikimybė, kad asmuo dirbs praėjus metams nuo pandemijos pradžios, yra 0,9 procentinio punkto didesnė negu asmenų, kurių vidutinės darbo pajamos mažesnės.

12. ***COVID-19 pandemija pirmiausia yra iššūkis pagyvenusių žmonių sveikatai; tai gali kelti papildomų nepatogumų vyresnio amžiaus darbo rinkos dalyviams, nes atsiranda baimė užsikrėsti virusu darbe.*** Vis dėlto pagyvenę žmonės, kaip ir kitų amžiaus grupių atstovai, labai skirtingi: vieni linkę daugiau mokytis ir prisitaikyti prie naujovių, kiti mažiau; vieni turi daugiau sveikatos problemų ir neturi kito pasirinkimo, kaip pasitraukti iš darbo rinkos, iškilus dideliam pavojui sveikatai, kiti turi mažiau sveikatos

problemų. Taigi, pandemijai pasibaigus, vyresnio amžiaus žmonės ateityje turės susidoroti su naujais darbo rinkos iššūkiais. Galima manyti, kad daugės nuotolinio darbo ir bendravimo įvairiomis technologijų platformomis. Tikėtina, kad vyresni žmonės tai vertins ne kaip tam tikrus suvaržymus, bet kaip galimybes, nes didesnis darbo rinkos lankstumas gali pagerinti vyresnio amžiaus žmonių užimtumą, leisti jiems laisviau derinti darbą ir laisvalaikį, padėti apsisaugoti nuo virusų, išvengti izoliacijos ir diskriminacijos dėl amžiaus.

Viešosios politikos rekomendacijos

Išanalizuotos vyresnio amžiaus žmonių užimtumo tendencijos ir veiksniai, ribojantys ir skatinantys užimtumą, leidžia formuoti pasiūlymus, kaip būtų galima pagerinti vyresnio amžiaus žmonių užimtumo politiką. Siūlytinos šios rekomendacijos:

1. ***Investuoti į sveikatos stiprinimą*****.** Modelių rezultatai parodė, kad prastesnė sveikata priešpensiniame amžiuje ir su amžiumi didėjanti rizika netekti dalies darbingumo lemia mažesnį įsitraukimą į darbo rinką. Reikia pripažinti, kad šis veiksnys apsprendžia realias galimybes dirbti ilgiau. Vienas svarbiausių užimtumą palaikančių veiksnių – sveikata ir jos stiprinimas – svarbus jau nuo mažų dienų: sveika gyvensena, sportas, rūpinimasis psichologine būkle gerina žmonių gyvenimo kokybę, be kurios neįmanoma įsivaizduoti didėjančio užimtumo. Ilgėjant gyvenimo trukmei, svarbu, kad didėtų ir sveiko gyvenimo metų skaičius. Kartais senėjimo problemos sprendimas suprantamas tik kaip ilgalaikės priežiūros paslaugų kūrimas ar šių paslaugų gerinimas. Suprantama, kad, visuomenei senstant, reikia parengti daugiau slaugos specialistų, organizuoti globos namus, atsižvelgiant į didėjančią pagyvenusių žmonių paklausą, tačiau užimtumo politikos formuotojai turėtų parengti strategijas ne tik kovoti su senėjimo padariniais, bet ir įgyvendinti priemones, užtikrinančias sveiką senėjimą, kuris galėtų sumažinti neigiamas senėjimo pasekmes. Atsižvelgiant į tyrimo rezultatus, rodančius, kad vyresniame amžiuje įvairiomis ligomis sergama sudėtingiau ir ilgiau, kad išauga neįgalumo rizika, rekomenduojama remti prevencines priemones nesveikai gyvensenai mažinti. Siūloma sutelkti dėmesį į dvi sritis: *1) palaikyti sveikesnį gyvenimo būdą* (apima visas amžiaus grupes) ir *2) stiprinti sveikatos ir ilgalaikės priežiūros sistemas* (pagyvenusiems žmonėms užtikrinti kokybiškas paslaugas).

2. ***Gerinti aktyvaus senėjimo politiką.*** Aktyvus senėjimas apima ne tik sveikatos priežiūrą ir apsaugą, bet ir vyresnio amžiaus darbuotojų dalyvavimą darbo rinkoje ir socialinėje veikloje. Turėtų būti rengiamos specialios

programos, suteikiančios žmonėms švietimo ir mokymosi galimybes visą gyvenimą. Mokymasis ir darbas visą gyvenimą, šeimos įsipareigojimų ir laisvalaikio suderinamumas leistų gyventi produktyviau ir sėkmingiau. Apžvelgus mokslinę literatūrą ir išnagrinėjus vyresnio amžiaus žmonių užimtumą Lietuvoje, atsižvelgiant į jų įgytą kvalifikaciją, bei įvertinus tai, kad mažai vyresnio amžiaus žmonių dirba ne visą darbo dieną, formuojama rekomendacija plėsti aktyvaus senėjimo politiką, aktualizuojant tris sritis: *1) labiau skatinti mokymosi visą gyvenimą programas, 2) sudaryti sąlygas daugiau žmonių dirbti ne visą darbo dieną* (taip vyresniems žmonėms padėti įsitraukti į darbo rinką pagal jų pajėgumus), *3) skatinti savanorystę*, kuri leidžia vyresniems žmonėms neprarasti ryšio su visuomene, būti reikalingiems ir taip gerinti savo emocinę savijautą.

3. ***Remti ir skatinti mokymąsi visą gyvenimą.*** Sudarytų Lietuvos modelių rezultatai panašūs į kitų tyrėjų paskelbtus rezultatus, rodančius, kad aukštąjį išsilavinimą turintys asmenys įprastai dirba ilgiau ir turi geresnes karjeros perspektyvas negu įgijusieji žemą išsilavinimą. Viena vertus, asmenys, turintys aukštesnį išsilavinimą, gali dirbti geriau apmokamą darbą ir būti patrauklesni darbdaviams – tai padidina jų galimybes įsidarbinti senatvėje; kita vertus, asmenims, įgyti aukštą išsilavinimą užtrunka ilgiau, todėl vėliau jiems tenka ilgiau dirbti. Atlikto tyrimo duomenys patvirtino, kad Lietuvoje žemesnės kvalifikacijos darbuotojai dažniausiai išeina į pensiją anksčiau negu aukštos kvalifikacijos darbuotojai. Duomenys rodo, kad žemos kvalifikacijos asmenys patenka į uždarą ratą: mažas darbo užmokestis, esant darbingo amžiaus, lemia mažą pensiją ir mažas galimybes padidinti savo pajamas senatvėje. Aukštos kvalifikacijos darbuotojai yra labiau motyvuoti dirbti ilgiau. Galima manyti, kad jiems dirbti yra geresnės sąlygos. Tikėtina, kad mokymasis visą gyvenimą taps svarbi priemonė, siekiant išvengti pasenusių įgūdžių ir užkirsti kelią priešlaikiniam pasitraukimui iš darbo rinkos. Rekomenduojama švietimo sistemoje kurti modelį, skatinantį žmones lengviau persikvalifikuoti ir būti universalesniems. Mokymasis visą gyvenimą turėtų tapti darbo rinkos pagrindu, leidžiančiu drąsiau keisti darbą ir priimti naujus iššūkius.

4. ***Didinti galimybes dirbti ne visą darbo dieną*****.** Kaip rodo atliktas tyrimas, Lietuvoje, palyginti su kitomis šalimis, mažiau vyresnio amžiaus žmonių dirba ne visą darbo dieną. Galimybė dirbti ne visą darbo dieną dažnu atveju yra puikus sprendimas vyresnio amžiaus žmonėms, kurie, tikėtina, rinktųsi dirbti trumpiau dėl mažesnių fizinių galimybių, lėtesnio gyvenimo tempo, derindami darbą ir laisvalaikį. Lietuvos darbo rinkoje trūksta lankstumo, o reikalavimas dirbti visu etatu arba eiti į pensiją tampa sunkiu pasirinkimu

žmonėms, kurie yra pakankamai motyvuoti dirbti, bet nebegali ar nebenori praleisti daug laiko dirbdami.

5. ***Išnaudoti bedarbių, moterų ir neįgaliųjų, kurie galėtų dirbti, bet šiandien to nedaro, rezervą.*** Disertacija atskleidė, kad dalis moterų, neįgaliųjų ir bedarbių galėtų dirbti, tačiau šiandien jie susiduria su nedarbo problemomis ir patiria tam tikrų sunkumų ieškodami darbo, kuris atitiktų jų įgūdžius ir gebėjimus. Užimtumo politikos formuotojai pirmenybę turėtų teikti šioms problemoms spręsti, nes minėti asmenys šiandien atsiduria už darbo rinkos ribų. Reikėtų tikslingiau investuoti į perkvalifikavimo programas, kurios padėtų bedarbiams greičiau grįžti į darbo rinką. Moterų užimtumo klausimas turėtų būti sprendžiamas panaikinant diskriminaciją dėl darbo užmokesčio pagal lytį ir teikiant daugiau paramos šeimai (geresnė infrastruktūra, tolygesnis šeimos įsipareigojimų pasiskirstymas). Žmonės, turintys negalią, šiandien daugiausia dirba nekvalifikuotą darbą, todėl reikėtų stiprinti jų galimybes dirbti aukštesnės kvalifikacijos darbus (pavyzdžiui, susijusius su informacinėmis technologijomis). Apskritai, neįgalaus žmogaus samprata yra diskutuotina, nes jeigu asmuo turi fizinę negalią, tai nereiškia, kad jis negalėtų dirbti darbo, kuriam nereikia trūkstamo fizinio pajėgumo. Šie asmenys turėtų dirbti pagal savo galimybes, tačiau jokiu būdu jų negalima stumti iš darbo rinkos. Neįgaliųjų įtraukimas į darbo rinką turėtų būti didinamas per užimtumo programas ir įgūdžių ugdymo kursus. Tai rekomenduojama ne tik dėl finansinių, bet ypač dėl socialinių integravimo į visuomenę aspektų.

6. ***Pagerinti vaikų priežiūros infrastruktūrą.*** Vaikus auginančios šeimos šiandien susiduria su dideliais iššūkiais, nes stengiasi derinti karjerą ir šeimines pareigas. Siekiant pagerinti šių asmenų karjeros perspektyvas ir taip sustiprinti jų galimybes ilgiau išlikti darbo rinkoje, tikslinga užtikrinti, kad vaikams auginti būtų sukurtos kuo palankesnės sąlygos. Viena iš galimų rekomendacijų – investuoti į infrastruktūrą, darželius ir mokyklas, kad visos šeimos šiomis paslaugomis galėtų naudotis. Sukūrus sąlygas dirbti ir derinti vaikų priežiūrą, tėvai jaustųsi saugesni darbo rinkoje, ypač moterys, kurių grįžimas į darbo rinką taptų lengvesnis.

7. ***Darbdaviai turi būti motyvuojami sudaryti lankstesnes darbo sąlygas darbuotojams (darbas ne visą darbo dieną, lankstus darbo grafikas, nuotolinis darbas).*** Senėjant visuomenei, ne tik darbuotojai, bet ir darbdaviai turi dalyvauti didinant vyresnio amžiaus žmonių užimtumą darbo rinkoje. Darbo jėgos aktyvinimas, vyresnio amžiaus darbuotojų galimybė perduoti savo žinias ateities kartoms, jaunesnių darbuotojų mokymasis iš vyresnio amžiaus darbuotojų ir įvairaus amžiaus darbuotojų grupės kolektyve turi būti vienos iš socialinių įmonių atsakomybių.

8. ***Biudžetiniame sektoriuje vykdyti pilotines programas, skirtas pagyvenusių žmonių užimtumui remti.*** Sukurtų modelių rezultatai parodė, kad vyresnio amžiaus darbuotojams palankesnis biudžetinis sektorius, todėl šį sektorių galima pasitelkti pavyzdžiu, kaip vyresni darbuotojai sėkmingai integruojami į darbo rinką. Biudžetinio sektoriaus įmonės galėtų sudaryti specialią programą, remiančią vyresnio amžiaus žmonių užimtumą. Visuomenė būtų informuota apie programos tikslus, jų įgyvendinimą ir rezultatus. Tikėtina, kad tai skatintų nebiudžetinį sektorių organizuoti panašias programas.

9. ***Įgyvendinus minėtas rekomendacijas, reikėtų įvertinti galimybę Lietuvoje įvesti lankstų pensinį amžių.*** Duomenys rodo, kad kai kurie žmonės, sulaukę pensinio amžiaus, apsisprendžia dirbti toliau (pagrindiniai veiksniai: gera sveikata, protinis darbas), o kiti renkasi ankstyvą išėjimą į pensiją (pagrindiniai veiksniai: prasta sveikata, sunku susirasti darbą vyresniame amžiuje, negebama toliau dirbti fizinio darbo). Šiuo metu Lietuvoje galima išeiti į pensiją anksčiau, galima dirbti ir gauti pensiją arba atidėti pensijos mokėjimą. Vis dėlto esamos priemonės nėra veiksmingos. Labai maža dalis žmonių naudojasi pensijos atidėjimu. Vieni dirba ir uždirba kelis kartus didesnį darbo užmokestį negu jų senatvės pensija, kiti dėl prastesnės sveikatos ar sudėtingesnės pozicijos darbo rinkoje išeina į pensiją anksčiau laiko. Šalis galėtų įvesti lankstų pensinį amžių, kuris leistų asmeniui nuspręsti, kada jam išeiti į pensiją. Kuo vėliau asmuo išeitų į pensiją, tuo jo pensija būtų didesnė. Svarbu aiškiai informuoti, kiek papildomi darbo metai padidintų asmens pensiją. Atsižvelgiant į šios rekomendacijos taikymo sritį, kaip šios priemonės dalį rekomenduotina atlikti išsamų galimo pagyvenusių žmonių elgesio ir finansinių išteklių, skirtų rekomendacijai įgyvendinti, tyrimą.

Disertacijoje pabrėžiama, kad priešpensinio ir pensinio amžiaus žmonių užimtumas mokslinėje literatūroje aprašytas gana plačiai. Literatūros apžvalga ir Lietuvos administracinių mikroduomenų analizė parodė, kad šiandien ir ateityje daug dėmesio turi būti skiriama priemonėms, kurios vyresnio amžiaus žmonėms leistų dirbti ilgiau. Ilgėjant gyvenimo trukmei ir sveiko gyvenimo metams, žmonės turėtų būti pasirengę dirbti ilgiau. Šūkis „gyvenk ilgiau, dirbk ilgiau“ turėtų būti priimtas šiandien kaip raginimas galvoti apie kiekvieno žmogaus sveikatą, kvalifikaciją ir galimybes būti paklausiems ne tik šiandienos, bet ir ateities darbo rinkoje.

PUBLIKACIJŲ SĄRAŠAS IR JŲ KOPIJOS

Akademinių publikacijų sąrašas:

1. Zitikytė, K. (2019). To work or not to work: factors affecting bridge employment beyond retirement, case of Lithuania. *Ekonomika (Economics)*, 98(2), 33–54.
2. Zitikytė, K. (2020). Employment at 55+: do we want to work longer in Lithuania? *Ekonomika (Economics)*, 99(1), 50–68.
3. Zitikytė, K. (2021). The impact of the first wave of Covid-19 pandemic on gender equality in Lithuania [online]. *64th International Scientific Conference on Economic and Social Development. ISSN 1849-7535* (Online). https://www.esd-conference.com/past-conferences.

Pranešimai tarptautinėse konferencijose:

1. Zitikytė, K. (2019, December 5–6). *To work or not to work: factors affecting bridge employment beyond the retirement, Case of Lithuania*. Technical seminar "Anticipating the evolving needs of an ageing population". ISSA European network. Poland.
2. Zitikytė, K. (2020, September 10). *To work or not to work: factors affecting bridge employment beyond the retirement, Case of Lithuania*. 59th International Scientific Conference on Economic and Social Development. Varazdin, Croatia.
3. Zitikytė, K. (2020, September 28–29). *Staying at the labor market after retirement: who and why?* 14th Economics and Finance conference. International Institute of Social and economic sciences. Lisbon, Portugal.
4. Zitikytė, K. (2020, October 14). *The impact of COVID-19 on gender equility in Lithuania*. SOCIN 2020 conference "Sustainability in the face of the global crisis". MRU, Lithuania.
5. Zitikytė, K. (2021, January 22). *The impact of the first wave of COVID-19 pandemic on gender equility in Lithuania*. 64th International Scientific Conference on Economic and Social Development. Varazdin, Croatia.

Dalyvavimas konkursuose ir tarptautiniuose kursuose:

1. Zitikytė, K. (2021, March 24). Participation in competition „Three Minute Thesis" at Vilnius university. Vilnius, Lithuania.
2. Zitikytė, K. (2021, April 26–30). Successfully completed the virtual course on Social insurance, taxation and employment. Joint Vienna institute and IMF institute. Vienna, Austria.

TRUMPOS ŽINIOS APIE DISERTANTĘ

Kristina Zitikytė gimė 1991 m. rugpjūčio 9 d. Utenoje. 2010 m. baigė Utenos „Saulės“ gimnaziją, 2014 m. – ekonomikos studijas (studijų kryptis – ekonominė analizė) Vilniaus universiteto Ekonomikos fakultete. 2016 m. Vilniaus universiteto Ekonomikos fakultete baigė ekonominės analizės ir planavimo magistro studijas Cum Laude diplomu. 2017 m. įstojo į doktorantūros studijas Vilniaus universiteto Ekonomikos ir verslo administravimo fakultete.

Nuo 2016 m. dirba Valstybinio socialinio draudimo fondo valdyboje prie Socialinės apsaugos ir darbo ministerijos Statistikos, analizės ir prognozės skyriuje (iki 2019 m. - vyriausiąja specialiste, nuo 2019 m. - skyriaus patarėja).

Nuo 2016 m. dirba dėstytoja Vilniaus universiteto Ekonomikos ir verslo administravimo fakulteto Kiekybinių metodų ir modeliavimo katedroje. Moksliniai interesai: socialinė apsauga, socialinė politika.

1 paper

To work or not to work: factors affecting bridge employment beyond retirement, case of Lithuania

Zitikytė, K. (2019). *Ekonomika (Economics)*, 98(2), 33–54
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2 paper

Employment at 55+: do we want to work longer in Lithuania?

Zitikytė, K. (2020). *Ekonomika (Economics)*, 99(1), 50–68

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3 paper

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Kristina Zitikyte

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