

# The Initial Impact of the Covid-19 Pandemic on Older Workers in Lithuania

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**Abstract.** The Covid-19 pandemic that began in 2020 presented a new challenge for the labor market participants. This paper 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. Binary response models are used to identify the push-and-pull factors determining the impact of the Covid-19 pandemic on the employment of people aged 55–64 during the pandemic in Lithuania. As the Covid-19 pandemic still continues, most of researchers prefer statistical analysis, comparing employment rates with those of the 2009 economic crisis, to determine the potential impact of the pandemic on employment or by only theoretically discussing the potential impact of the pandemic on the elderly. This paper models the impact of the pandemic on the employment of older people in Lithuania using unique administrative micro-data of State social insurance fund (SSIF). This allows to draw deeper conclusions about how the pandemic affects workers aged 55–64 in Lithuania. The results show that 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.

**Keywords:** Covid-19 pandemic, older people, employment, ageing

## 1. Introduction

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. An analogous 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.

**Received:** 08/03/2022. **Revised:** 24/04/2022. **Accepted:** 14/05/2022

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This paper discusses the impact of the Covid-19 pandemic on older workers' employment in Lithuania. 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 eventually, leaving new trends and new lessons learned.

The paper is proceeded as follows: the next Section 2 provides literature review, Section 3 provides statistical analysis, Section 4 describes the models and results for Lithuania, and Section 5 concludes.

## 2. Literature review

Because of the higher mortality rate among older people infected with the Covid-19 virus, particularly among people over sixty, including the baby boomer age cohort (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 were coming back from retirement to help their former colleagues cope with the high demand of their services.

Thus, the Covid-19 pandemic will have a wide range of effects on older people; two areas of exposure are most explored in this paper: 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 of 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 the 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 em-

ployment, 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 function 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 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) argues 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.** Even though 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; Papadi-

mitriou & Blasko, 2020). Firstly, women account for a sizable 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 disproportionately 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 (Papadimitriou & Blasko, 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 (Papadimitriou & Blasko, 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 substantial 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 con-

tainment 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.

### 3. Statistical analysis

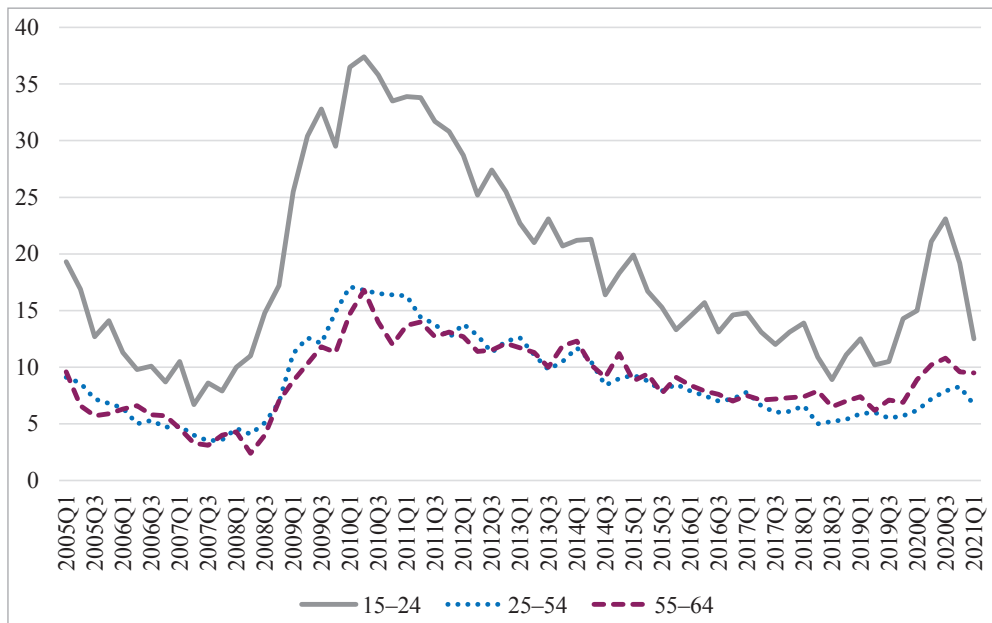
Due to the pandemic, with the introduction of quarantine and restrictions on economic sectors, the unemployment rate started to grow in Lithuania. In the second quarter of 2020, compared to the second quarter of 2019, the unemployment rate increased by 2.4



percentage points from 6.1 to 8.5%. 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 (Figure 1). 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%) (Figure 1). 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 1 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 1.** 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 1). 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 1).

**Table 1.** Activity rate, employment rate and unemployment rate (%) in 2008-Q3, 2009-Q3, 2019-Q3, 2020-Q3 by age groups and gender

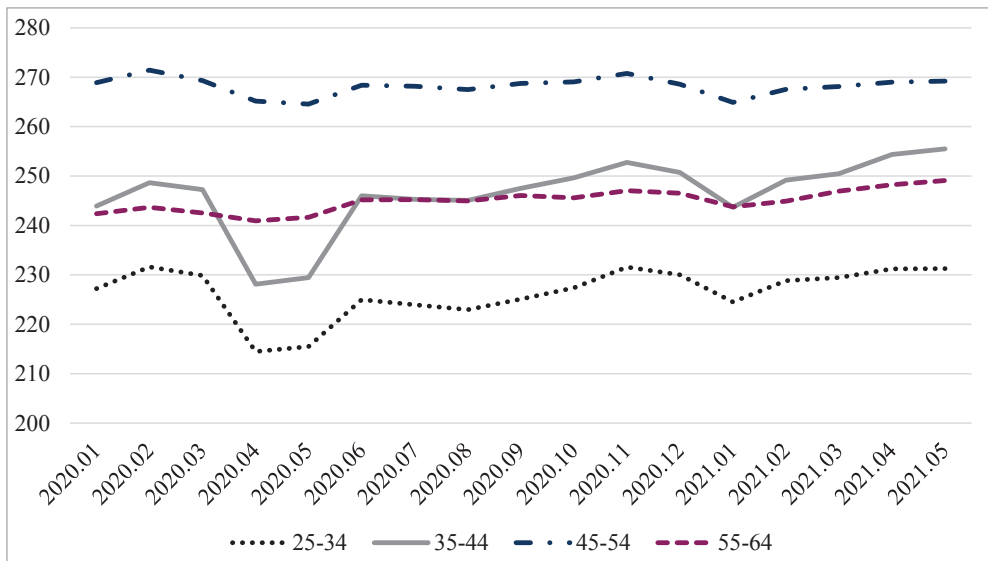
	Ages 15–24			Ages 25–54			Ages 55–64		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
<b>Activity rate</b>									
2019 Q3	38.8	40.3	39.5	91.7	88.6	90.2	72.6	72.3	72.4
2020 Q3	36.8	36.4	36.6	90.3	88.7	89.5	76.6	75.3	75.9
p. p. change	-2.0	-3.9	-2.9	-1.4	0.1	-0.7	4.0	3.0	3.5
2008 Q3	36.5	27.9	32.3	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
<b>Employment rate</b>									
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
<b>Unemployment rate</b>									
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 2).



**Figure 2.** 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 2).

**Table 2.** Change in the number of insured persons in economic activities (%), from February of 2020 to February of 2021

<b>Economic activity</b>	<b>Annual change (%) in the total number of insured persons (2021.02 comparing to 2020.02)</b>	<b>Annual change (%) in the number of insured persons aged 55–64 (2021.02 comparing to 2020.02)</b>	<b>Share of insured persons aged 55–64 of total insured persons in that activity (%) in 2020.02</b>
<b>Activities where the number of insured persons decreased the most</b>			
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
<b>Activities where the total number of insured persons is the highest</b>			
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

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 (Table 2). In these activities, the share of older insured persons amounts 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% (Table 2). 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 extremely 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.

#### **4. The models and results**

The impact of the Covid-19 pandemic on employment is poorly modeled, and statistical analysis of data is performed in the first half of 2021. In this paper, 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 nonbudgetary 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 activities 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 nonbudgetary 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 defense, 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 was selected as independent variables (Table 3). A hypothesis is formulated, and each factor is presented below.

**Table 3.** 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. Considering 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:

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

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:

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

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

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

The results of these models will be discussed below.

Table 4 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.

**Table 4.** Marginal effects of the models

	<b>LPM</b>	<b>Logit</b>	<b>Probit</b>
$intercept \beta_0$	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 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.

## 5. Conclusions

The advantage of the developed models 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 nonbudgetary 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.

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