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Women's employment before and during the Covid-19 pandemic: The case of Armenia

Master's Thesis

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Year: 2023

Declaration

1. I hereby declare that I have compiled this thesis using the listed literature and resources only.
2. I hereby declare that my thesis has not been used to gain any other academic title.
3. I fully agree to my work being used for study and scientific purposes.

In Prague on August 1st, 2023 Lusine Sargsyan

References

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Disclaimer: Parts of this paper have previously been submitted as part of my MAER study at CERGE-EI.

Length of the thesis: 90,429 characters with spaces without abstract, references and appendix

Abstract

The Covid-19 pandemic had a significant impact on female labor market outcomes in Armenia. This study uses Armenian Labor Force Surveys data from 2019, 2020, and 2021 to examine women's probability of working in the labor market during the Covid-19 pandemic that started in March 2020. Employing the linear probability model (LPM) approach, I find that 30-39 years old women with vocational education had a lower probability of working during specific quarters in 2020 and 2021 compared to tertiary education graduates. Additionally, the presence of a child under four years in the household gradually reduced the probability of working during 2020, and married women had the lowest probability of working during the first quarter of 2020. This research sheds light on the gender-specific impacts of the pandemic on the labor market in Armenia and provides insights for future policy considerations.

Abstrakt

Pandemie Covid-19 měla významný dopad na trh práce žen v Arménii. Tato studie využívá data z průzkumů pracovní síly z let 2019, 2020 a 2021 ke zkoumání pravděpodobnosti žen pracovat během pandemie Covid-19, která začala v březnu 2020. Pomoci lineárního pravděpodobnostního modelu (LPM) zjišťuji, že ženy ve věku 30–39 let s odborným vzděláním měly v letech 2020 a 2021 nižší pravděpodobnost, že budou pracovat ve vybraných čtvrtletích ve srovnání s absolventkami terciárního vzdělání. Kromě toho, přítomnost dítěte do čtyř let v roce 2020 postupně snižovala pravděpodobnost pracovat, a vdané ženy měly nejnižší pravděpodobnost, že budou pracovat během prvního čtvrtletí roku 2020. Tento výzkum vnáší světlo na genderově specifické dopady pandemie na trh práce v Arménii a popisuje mechanismus, který může být užitečný pro budoucí politická rozhodnutí.

Keywords

Covid-19, Labor Market, Female Employment, Probability of Working

Klíčová slova

Covid-19, Trh práce, zaměstnanost žen, pravděpodobnost zaměstnání

Název práce

Zaměstnanost žen před a během pandemie Covid-19: Případ Arménie

Dedication

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Introduction

The Covid-19 pandemic has dramatically affected the world economy. Labor markets in particular were among the worst hit, experiencing a decrease in labor demand, supply and labor market participation. According to the Ministry of Labor and Social Affairs of Armenia, around 241,442 people, constituting 18% of the working-age population, who were employed before the pandemic lost their jobs due to Covid-19[1]. Of these, unregistered workers and female employees accounted for the highest share.

The main aim of this thesis is to explain how the individual characteristics influence women's probability of working before and during the Covid-19 outbreak in Armenia. The analysis employs the linear probability model (LPM) approach to estimate the probability of participating in the labor market. As a source of data, I use the Armenian Labor Force Surveys from 2019, 2020 and 2021. I divided each survey into four quarters, and overall, I have twelve regression results– one for each quarter. Before jumping into the results, let's explore how the Covid-19 started in Armenia and how it affected the economy in general.

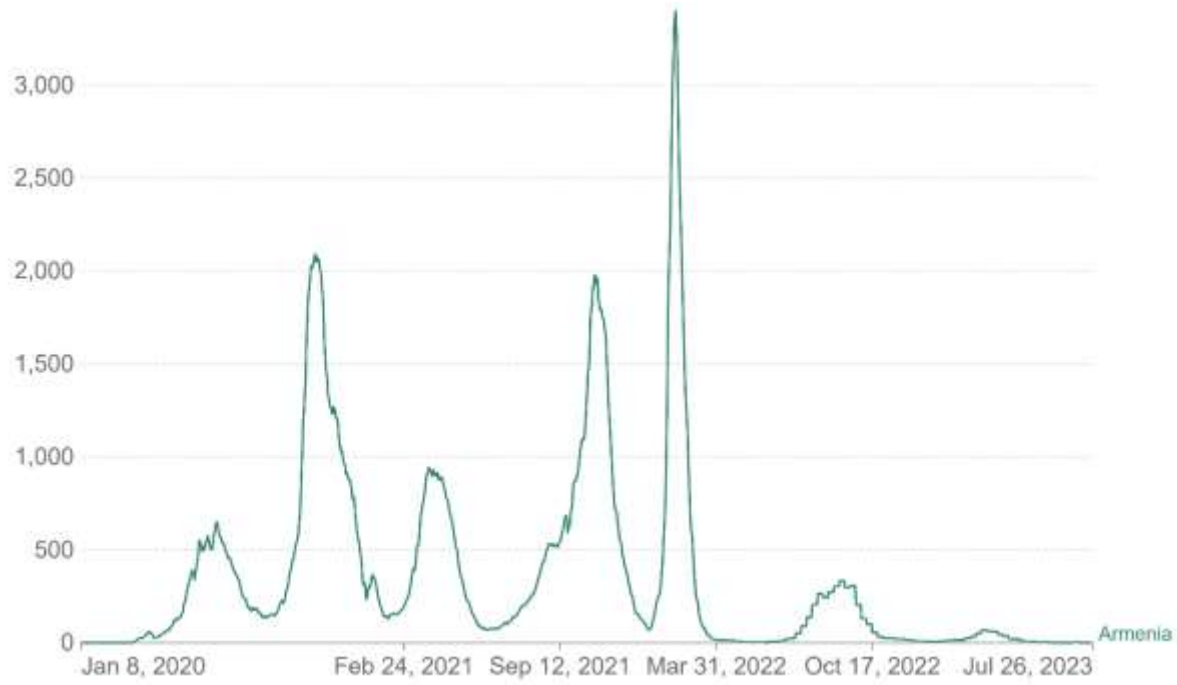
According to the Ministry of Health of the Republic of Armenia, the first case of Covid-19 in the country was reported on March 1st, 2020. The patient was an Armenian citizen who arrived in Yerevan from Tehran by plane on February 28. It then spread to all Armenian regions, reaching the 100th case on March 18. The figure below shows the new number of confirmed cases since the beginning of the pandemic and the five waves of the pandemic can be clearly noticed. To date, there have been more than 440,000 confirmed Covid-19 cases in Armenia, of which more than 8,750 cases ended in death.

To prevent the spread of the Covid-19 virus and to protect the health and safety of the population of Armenia, Prime Minister Nikol Pashinyan declared a state of emergency in the country on March 16th, 2020[2], initially envisaged to last until April 14 but then prolonged until July 13[3]. The declaration emphasized the threat posed to public health and the normal living conditions of the population. The government recognized the need to prioritize the life and health of individuals and implement special sanitary, preventive, and quarantine measures. The declaration allowed for the

[1] https://www.unicef.org/armenia/en/press-releases/ministry-labor-and-social-affairs-unicef-world-bank-and-eu-present-core-diagnostic
[2] https://www.arlis.am/DocumentView.aspx?docid=140212
[3] https://www.arlis.am/DocumentView.aspx?docid=145244

introduction of special conditions and a regime to prevent the spread of the infection and effectively protect the population. The decision authorized the establishment of a Commandant's Office responsible for managing the state of emergency, with the Deputy Prime Minister appointed as the Commandant.

Figure 1. New confirmed Covid-19 cases in Armenia



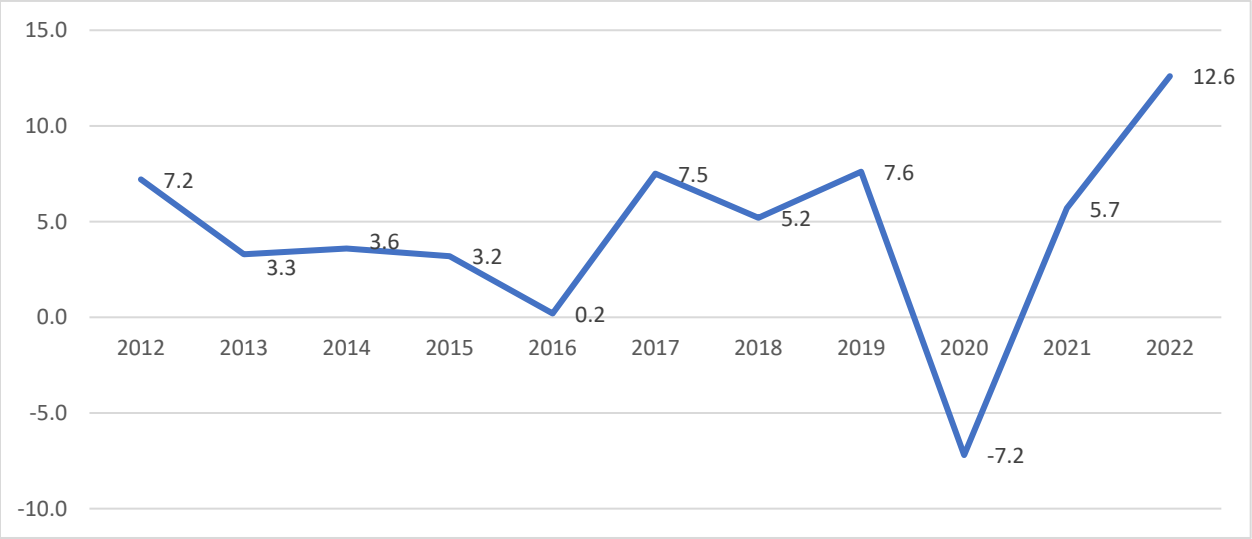
Source: WHO COVID-19 Dashboard

According to the decision, various restrictions and prohibitions were imposed on the population during the state of emergency. The restrictions included special procedures for the entry and exit of individuals, vehicles, and cargo at border checkpoints, limitations on the movement of citizens and non-citizens, mandatory medical examinations for individuals entering the country, and the establishment of quarantine and isolation measures. It also covered restrictions on property rights, visitations in institutions such as penitentiaries and psychiatric facilities, prohibitions on assemblies and public events, and limitations on certain economic activities and educational institutions. The educational process in state, community, and non-state institutions of general education, primary vocational education, secondary vocational, and higher educational institutions, as well as organizations involved in extracurricular upbringing were suspended. As a

result, regular in-person classes and activities were terminated. The restriction on educational institutions did not apply to military educational institutions; they continued their operations as usual. While in-person education was halted, educational institutions were encouraged to adopt distance learning methods. This allowed students to continue their studies remotely using online platforms, digital materials, and other remote learning tools.

According to the World Bank, Armenia is classified as an upper-middle-income country and is characterized by a mix of industries including agriculture, manufacturing, mining and services. It has a population of less than three million people and its owns currency – Armenian dram/AMD (1 USD ≈ 500 AMD). Before the pandemic, the country's GDP per capita was increasing gradually, driven by the growth in various sectors including IT, services and manufacturing. However, in 2020, due to the pandemic, there was a contraction in GDP per capita (4,500 USD) caused by the distruptions in economic activities. However, the economy started to recover during the first half of 2021 since the restrictions eased and economic activity resumed. In 2021, the GDP per capita reached nearly 5,000 USD.

Figure 2. Real annual GDP growth



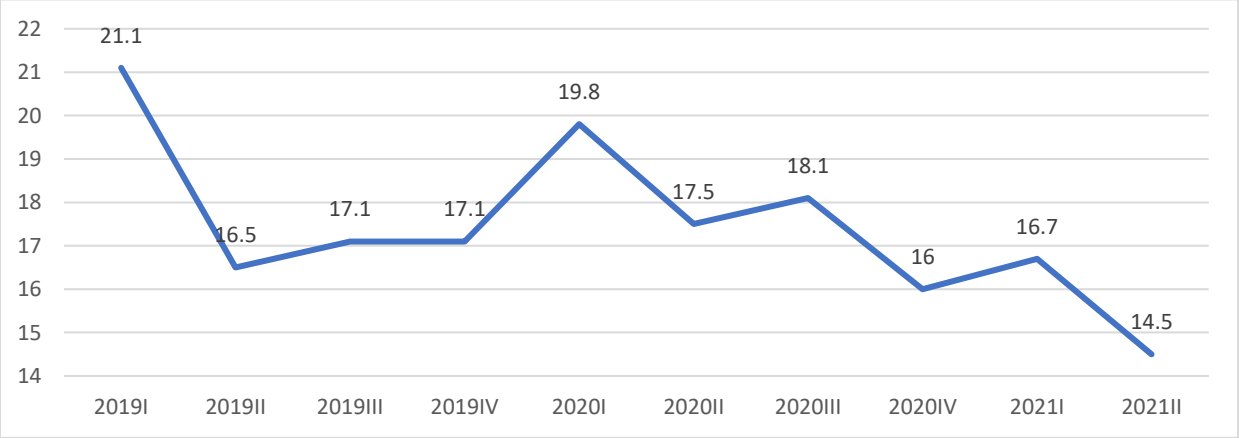
Source: World Bank national accounts data, and OECD National Accounts data files

As indicated in Figure 2 above, in 2019 the economy experienced a robust growth, with GDP growing at a rate of around 7.6%. In 2020, however, there was a sharp decline in GDP, reaching -7.2%. As the global economy started to recover from the initial shock of the pandemic, Armenia's economy also showed signs of rebounding, illustrated by the GDP growth rate of 5.7% already in 2021.

In 2020, the monetary policy carried out by the Central Bank of Armenia was targeting a 4% inflation rate[4]. However, the inflation rate remained low during this period (1.2% compared to 1.4% in 2019) due to the weak demand that was a consequence of the pandemic outbreak and the martial law declared in the country on September 27th. At the end of the year, the central bank increased the interest rate and, as a result, inflation increased gradually at a faster pace at the end of the year, reaching 3.7% in December. In 2021, inflation accelerated in the country and the inflation rate remained high (7.2%). The growth was mainly conditioned by the acceleration of core inflation[5].

Before the pandemic, the unemployment rate in Armenia was already the highest in the region[6] (18.3% in 2019) despite the strong economic growth. According to the Statistical Committee of

Figure 3. Unemployment rate in Armenia



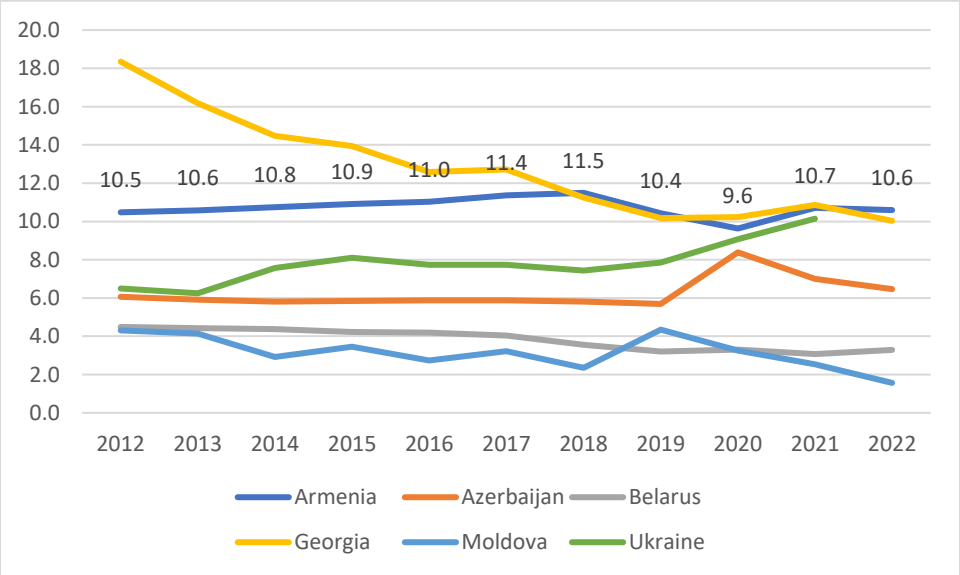
Source: Statistical Committee of Armenia, https://armstat.am/file/article/sv_02_21a_141.pdf https://armstat.am/file/article/sv_09_22a_141.pdf

[4] https://www.cba.am/EN/pperiodicals/MP%20report%202020Q4.pdf
[5] https://www.cba.am/EN/pperiodicals/MP%20report%202021Q4.pdf
[6] By region I mean the Eastern Partnership countries: Armenia, Azerbaijan, Belarus, Georgia, Moldova, Ukraine

Armenia[7], during the pandemic period, the unemployment rate remained relatively stable and even slightly lower at 18.2%. In 2021, it decreased to 15.5%. The quarterly data shows that during the pre-pandemic period the unemployment rate was the highest during the first quarter of 2019. Over the next quarters, the unemployment rate declined gradually reaching 16.5% in the second quarter. In the first quarter of 2020, it increased to 19.8%, which most likely reflects the early economic disruptions caused by the pandemic. In the second quarter of 2020, the unemployment rate decreased to 17.5% since the country attempted to control the spread of the pandemic through appropriate measures. By the third quarter of 2020, the unemployment rate increased again, indicating the ongoing challenges in the labor market caused by the pandemic. Starting from the last quarter of 2020, signs of recovery and stabilization are evident.

Moreover, among the post-Soviet countries in the region, Armenia also has the second highest female unemployment rate after Georgia. Figure 4 shows that, in 2020, the female unemployment rate was almost 10% in Armenia, which is surprisingly slightly lower than the previous year.

Figure 4. Female unemployment rate (percentage of female labor force)



Source: International Labor Organization

There are many studies in economic literature that analyze the impact of the pandemic on labor markets in different countries. One of the most prominent research questions in the literature

[7] https://www.armstat.am/en/?nid=12&id=08010&submit=Search

relates to changes in labor market participation and wage structure during the Covid-19 pandemic. The pandemic's effect on the labor market could vary depending on the country, industry, and gender. In this paper I would mainly concentrate on the Armenian female population, which, as mentioned before, has the highest share of the unemployed population. The reason why I decided to concentrate on the female population only is that I expect women to be more sensitive to the consequences of the pandemic. Women are more likely to be overrepresented in the sectors where social contact with customers is the highest, e.g., hospitality, trade, and services. Furthermore, due to the closure of schools and caregiving centers in Armenia, it is likely that women had to bear the extra responsibilities of taking care of their children. This might force some women to leave their jobs or somehow reduce the number of hours worked.

The main findings of the research are the following. Women with tertiary education had higher probability of participating in the labor market than those with secondary school education during. What is more interesting is that the effect of higher education on employment probability is even higher in 2021. Moreover, the presence of a child under four years in the household gradually decreased the probability of labor market participation in 2020. In addition, I find that married women had 14% less probability of labor market participation during the first quarter of 2020 (the lowest in the year).

The remainder of this thesis is structured as follows. In the next section, I provide an extensive review of the current literature on the topic. Then I describe the applied data based on the employment status providing cross tabulations and visualizations. In the following sections, I present the applied methodology in more detail and the discussion of the estimation results. The last section concludes the paper and suggests avenues for future research.

1 Literature Review

1.1 The impact of Covid-19 on the labor supply, labor demand, and labor market outcomes

In this section I present some studies which aim to evaluate the impact of the Covid-19 pandemic on labor supply, labor demand, and labor market outcomes. We will see that these studies provide clear evidence of gender differences in the mentioned areas. According to Albanesi and Kim (2021), Titan et al. (2020a), Titan et al. (2020b), Croda and Grossbard (2021), and Pitts (2021), in the past, women were typically considered less affected by recessions than men. However, the Covid-19 pandemic hit women more severely than men in terms of employment losses. According to the same source, which uses real-time data from the US, the way that employment behaves during the time of recession has both demand-side and supply-side related factors. Women are primarily employed in the service sector, while men are more concentrated in production (Albanesi & Sahin, 2018). During the pandemic, there was a significant drop in the demand for the services because of the imposed lockdowns and social distancing measures to mitigate the risks of spreading the virus (Chetty et al., 2020). The lack of demand in the service sector led to employment drops for women. Moreover, Albanesi and Kim (2021) show that women have the largest share in occupations that do not provide flexibility for conducting the job remotely. Women also have high contact regarding their physical distance from customers or colleagues. This is another factor that makes women vulnerable to employment losses during the pandemic.

The impact of pandemic shocks on the labor supply is highlighted by Guerrieri et al. (2020). Covid-19 has caused an increase in the unemployment rate which leads to a decrease in consumption. Their model takes into account the theoretical impact of an economic shock. The intuition behind these results is that, because of the Covid-19 shock, workers are losing their income and agents reduce spending causing a decrease in demand. Therefore, the unemployed should save for further periods and use only a portion of their savings in this period if they do not receive any remuneration. On the other hand, Robalino (2020) presents a theoretical model to show how pandemic shocks will have an effect on consumption and productivity by introducing them into

utility functions. There's a tradeoff between the flattening of the pandemic curve and the recession in this case. All governments seem to be facing this problem in the course of the pandemic.

Robalino (2020) suggests that developing countries are ill-prepared to handle such a crisis. While extended periods of social distancing can help prevent virus transmission, its success relies on society's strong aversion to short-term mortality rates and indifference towards aggregate consumption. However, if social distancing measures persist for a prolonged duration, it may lead to both demand and supply shocks. The aftermath could be more severe than a mere recession, resulting in a significant economic depression.

Empirically, the Coibion et al. (2020) study shows that Covid-19 leads to a 7% reduction in labor force participation in the US. Because a majority of those who've lost their job don't look for work after they lose it. Lozano Rojas et al. (2020) analyze the government policies that were meant todeal with the pandemic. They show that the spread of a virus may be slowed if there is social distancing. Economic activity is also negatively affected by mitigation policies which aim at controlling the virus's spread.

The authors demonstrate that the primary cause of the economic upheaval has been the direct impact of the health crisis. McKibbin and Fernando (2020), in close alignment with the aforementioned papers, argue that the decision to close borders was delayed and came into effect when it might have been more effective earlier.

Albanesi and Kim (2021) also provide supply-side explanations for the employment drop of women. The primary explanation is that many working mothers were forced to leave their jobs to take care of their children and start homeschooling because of the immediate shutdowns of schools and child-caring facilities. As per the question of why strictly women had to give up their job and not their male counterparts, Albanesi and Kim (2021) highlight the existing gender norms and provide economic insight: the gender pay gap, which is highly likely to be wider for women who have kids due to the “child penalty” makes the decision of the mother’s reduced labor supply optimal for the household. This is because the opportunity cost of the termination of women’s labor supply is more negligible in earnings than that of their spouses, who could earn more if they remain in the labor force.

Titan et al. (2020a) provide another interesting insight about the impact of Covid-19 from the perspective of gender inequality in the US. They again highlight that, due to the social distancing measures, the pandemic severely affected employment in the service sector, where women have a higher participation rate. In addition, the closure of schools forced many working mothers to quit, and single mothers, who are too many in the US, suffer the most.

Another point that Titan et al. (2020a) add to the literature is the possibility of positive changes in social norms and gender inequality. First, employers are becoming more open to flexible work schedules and remote work opportunities, especially female employees who need to fulfill childcare duties. This, in the long run, may result in more equal opportunities for both genders for accompanying career with the childcare responsibilities. Second, there are occupations, including medical doctors, nurses, grocery shops, and pharmacy workers, which females mostly occupy. These professions are critical during the pandemic and may continue operating. Meanwhile, some fraction of such workers' spouses would either lose jobs or switch to remote work. Hence, many fathers may become the main childcare providers in the family. This tendency could change the perception of gender roles in a family and the division of household labor.

Even though Titan et al. (2020a) predict some positive shifts toward gender equality due to the pandemic outbreak, in the long run, they conclude that the short-term effects of the pandemic are harsh. This is especially so for working single mothers and families who cannot afford the benefits of childcare services during the school closures. Whatever Titan et al. (2020a) provide in the form of qualitative analysis, Titan et al. (2020b) confirm with a quantitative approach. Titan et al. (2020b) employ an advanced quantitative macroeconomic model, which controls for different features of usual and pandemic recessions. They found that in the short and medium term, the pandemic deteriorated females' position in the labor market, first by employment losses and then by lost experience opportunities during the recession. These two forces contribute to the widening of the gender pay gap during the pandemic and also after it. However, Titan et al. (2020b) also point out that the pandemic, in the long term, could contribute to reducing gender inequality. They highlight the rising work flexibility in the job market and the triggered social norm changes towards an equal child-caring approach among families. Ultimately, the recession caused by the pandemic could decrease the gender wage gap, although it could take many years for females to fully recover from the initial skill losses.

Hoehn-Velasco et al. (2022) provide a study about the impact of the Covid-19 recession on Mexican households analyzing the changes in labor supply, earnings, and household time allocation. Exploiting event study design, Hoehn-Velasco et al. (2022) examined the same individuals over time. They found a noticeable decrease in employment, hours worked, and income for both genders. However, the negative effect of unemployment on men lasted shorter, especially in the informal sector. The study also found that men contributed more to household chores during the pandemic. However, women with school-aged children only showed a slight temporary increase in time spent caring for others. The authors explain this small change in women's time allocation by the fact that Mexican women have been spending most of their time caring for others and doing household chores before the pandemic already. Finally, Kugler et al. (2021) examine 40 developing countries in 5 regions using data from a set of high-frequency phone surveys conducted by the World Bank and National Statistics Offices. Kugler et al. (2021) found that in these countries, the most significant employment losses occurred with younger workers, female workers, and those with lower levels of education.

Aina et al. (2023) study the effect of a first wave of Covid-19 influenza in Italy on employee salary distribution. They use quantile regression approach and correct sample-selection bias via Heckman's two-stage estimation strategy. They found that the pandemic appears to have a positive effect on all workers' wages. However, since teleworking entails a minimum wage premium for all employees, this short-term advantage can be temporary and is probably due to possible changes in the composition of employment.

Barth et al. (2021) provide another comprehensive study that explains the labor demand shock due to Covid-19 pandemic in Norway. The authors use the job postings data from the Norwegian Welfare Administration (NAV) (2018-2020) as a proxy of labor demand for new jobs and for replacement hires. They apply both a descriptive and regression analysis. To be more precise, the authors use difference-in-difference (DiD) techniques to examine the pandemic's impact on occupations that are relevant to distinct worker groups. The primary variable of interest is the number of job postings per occupation and week. The average difference-in-differences (DiD) findings, when compared to 2019 and 2018, and accounting for moving holidays and weekly occupational job-posting trends, indicate a sharp 40% decline in job postings during the initial lockdown period in April 2020. However, there was a gradual recovery over time, with job postings

reaching approximately 10 to 8 percent below pre-pandemic levels by the end of the year. During the first phase of reopening, remote working jobs were hit more severely and recovered less fully. The affected jobs were those which required fewer qualifications and skills, as opposed to those who require higher education. The key findings of the study are that positions for young people have become harder to find than other jobs, and entry into employment among workers with no college degrees has been hardest hit. It is particularly unfortunate, given that the well-established phenomenon of the scarring effect" implies that young people entering the labor market under less fortunate conditions may face negative consequences in the labor market in the long run, too.

Forsythe et al. (2020) use US job vacancy as well as unemployment insurance (UI) initial claims and Bureau of Labor Statistics (BLS) employment data to estimate the impact of Covid-19 on the labor demand in the United States. They find that, by the end of March 2020, there was a huge drop in job vacancies. They had fallen by more than 40% by the end of April. The cuts have been broad, affecting all U.S. states. There have been reductions in job posts and increase in UI claims in almost all sectors and occupations irrespective of the fact that they were considered essential and able to perform from home. Campello et al. (2020) utilize a different dataset of job-vacancy postings to investigate the effects of Covid-19 on the U.S. job market. Their findings reveal that high-skill jobs experienced more significant impacts compared to low-skill jobs, with deeper reductions observed in unionized industries and the non-tradable sector.

On the other hand, Hensvik et al. (2021) focus on studying the job-search behaviors in response to the Covid-19 pandemic using real-time data on vacancy postings and ad views from Sweden's largest online job board. Employing a Difference-in-differences (DiD) methodology, the researchers compare changes in job postings between a pre-Covid period (weeks 1-10) and a post-Covid period (weeks 11 to the end of July) in 2020, relative to a control year, 2019. The DiD analysis reveals a substantial reduction of approximately 36% in the influx of job vacancies from January to July. This indicates that the negative labor demand shock in Sweden was nearly as significant as in the US. Additionally, the study finds that Covid-19's impact on industries and occupations was heterogeneous. Similarly, Holgersen et al. (2020), in their Norwegian study using vacancy posting data, observe a decline of around 27% in job postings from late February to the end of June 2020, compared to the same period in 2019. The reduction in labor demand was

widespread, affecting almost all industries and occupations, regardless of their feasibility for remote work.

Paresashvili et al (2020) provides an exploratory statistical analysis based on an official data about the Georgian labor market during the Coronavirus pandemic. According to the source, the labor market in the country has been negatively affected by the pandemic. Quantitative indicators of business activity have decreased and consequently the number of employees has been reduced. The activities of self-employed people have also been set out in the regulations introduced, limiting their economic activities. As a result, there has been a marked reduction in employment and the level of real unemployment has increased in this country. Unfortunately, it had a direct impact on the deterioration of people's quality of life by limiting working rights, health care use, reduced wages to minimum levels and so forth. According to the official statistics, Georgia's unemployment rate rose by 0.9 percentage points in comparison with the same period of last year and reached 12% in the second quarter of 2020. The employment rate decreased by 0.5 percentage point to 55.9% in the second quarter of 2020. The proportion of employees in overall employment declined 1.6 percentage points to 48.6% during the second quarter of 2020 relative to the same period of the previous year.

Giguashvili and Tamar (2022) bring another piece of evidence from Georgia highlighting the problems emerged in the labor market due to the pandemic. The research is founded on prominent scientific literature, statistical data, analysis of Georgian labor legislation, and an evaluation of the key aspects of the government's anti-crisis policy. There has been a significant slowdown in economic activity as a result of restrictions placed for preventing the spread of Covid-19 in Georgia. The reasons for a lot of lost jobs and reduced income are the closure of hotels, restaurants, retail shops, disruption in air and rail transport, abandoned museums, casinos or sports fields. The difficulties of the labor market in Georgia have been further exacerbated by the pandemic. The problem of unemployment in developing economies is particularly acute, according to statistics and real data. In Georgia, unemployment is the highest social-economic problem and a major challenge at present. It appears to have a significant influence on poverty in the country. The authors emphasize that in the context of the Covid-19 pandemic, it is evident that promoting employment in each country's economy and addressing existing societal challenges by improving

business environment and introducing measures necessary to ensure an effective functioning of the labor market are key priorities.

Timbi & Tagne (2021) assess the social consequences of the Covid-19 pandemic on the labor market in Moldova using the World Bank (Enterprise Survey) company level data for the year 2020 containing information for only the first wave of the virus. The study focuses on two dependent variables: labor demand and labor supply. It uses the censored Tobit model for the estimation of both dependent variables. The selection of this model corrects the endogeneity bias caused by the ordinary least squares. The statistical analysis shows that certain companies have not reduced their workforce, while others have terminated or made redundant approximately 748 employees. On average, the number of employees laid off or made redundant per company was 15 employees. Similarly, in some companies, no employees resigned or took extended leave (over five days) since the start of the pandemic, while in other companies, 70 employees did so, averaging around 8 employees per company. Through the implementation of the censored Tobit model, Timbi & Tagne (2021) discovered that the majority of the variables under investigation have a significant impact on both labor demand and labor supply in Moldova. Specifically, authors observed that companies that embrace e-commerce practices are less likely to lay off or terminate their employees during the Covid-19 pandemic, and their employees are less likely to resign or quit. Additionally, companies that adapt or modify their production or services in response to the pandemic have a significant influence on the labor demand and supply dynamics in Moldova.

When it comes to Armenia, very few studies have attempted to analyze changes in labor market due to the virus. Khachatryan, Grigoryan, & Mukhopadhaya (2021, henceforth KGM) apply a modern empirical approach for estimating the impact of the pandemic on labor market outcomes. The approach is based on the estimation of the multidimensional deprivation from labor market opportunities using Alkire-Foster dual cut-off methodology (Alkire and Foster, 2008). Researchers construct multidimensional deprivation indexes and develop comparative analysis which aims to identify changes in labor market outcomes resulted from Covid-19. They also conduct contribution analysis to find out what indicators affect the deprivation score the most. Moreover, authors run regression analysis to show how the industry type, regional area, and gender impact the deprivation. The study uses two major cross-sectional datasets: first one was collected via an online survey and the second one was the Labor Force Survey 2018 data collected by the Statistical

Committee of Armenia. The sample size of the first survey is 3,202 while that of the second data source is 19,467. KGM confirms the fact that labor market conditions have been deteriorated during the time of the pandemic in Armenia. The results show that educational achievement followed by unemployment and professional mismatches are the main contributors to the deprivation from labor market outcomes. Regarding sectors of the economy, the study found that agriculture and construction are the ones that were hit by the pandemic the most, while information and communication, and service sectors have bigger potential to overcome the difficulties caused by the shock. Deprivation in rural areas was significantly high before the pandemic, while during the time of the pandemic it became more widespread and uniform including the urban areas. In terms of provinces, Aragatsotn and Gegharquniq suffered from deprivation the most. In addition, Shirak, being the region with the highest unemployment rate, experienced even worse conditions due to the pandemic. Barseghyan (2021) uses a simpler approach. To show the impact of the coronavirus shock on the labor market in Armenia the author represents the online survey results by graphical illustrations, figures and tables using relevant statistical methods. For this particular study two major representative online surveys were conducted which covered all of the provinces of Armenia. The respondents of the surveys were selected using proportionate stratified random sampling method. In total the sample sizes of the two surveys were 2,516 and 3,232 observations. Similar to KGM, Barseghyan (2021) reports that sectors that have been impacted by the pandemic the most are agriculture, manufacturing, construction, trade, and services, while information and financial sectors experienced lower declines in terms of job cuts. Also, females are worried about their potential job losses but are more optimistic about the future wage rise. In addition, women also show higher potential and willingness to work from home (henceforth WfH). Thus, WfH is a great tool for mitigating the financial difficulties caused by the crisis. The author shows that educational attainment, income, and urban residency all are linearly correlated with the potential to WfH. Not surprisingly, employees from the ICT sector have the highest potential to work from home. Regarding the regional analysis, Barseghyan (2021) found that Aragatsotn, Lori and Gegharkunik have the highest share of job losses due to the pandemic. Additionally, the study found that the capital city Yerevan has the highest population with a WfH potential.

1.2 The impact of Covid-19 on employment probabilities

Bussink, Vervliet, & Weel (2022) provide a study about the short-term effects of the Covid-19 crisis on the employment probabilities of fresh graduates in Netherlands just before and during the

pandemic. The study also compares these employment probabilities to cohorts of graduates before the Covid-19 crisis. The research specifically examines the employment prospects of all graduates who started working after obtaining their diplomas, within one year of graduation. The paper uses administrative data from the Social Statistical Database (SSD) of Statistics Netherlands, which includes detailed individual-level information about the education, employment status, job characteristics, income and other demographic characteristics of the citizens of Netherlands. The authors used logit and OLS techniques to estimate the employment probabilities, and both of these methods lead to similar results. The estimation results indicate that employment probabilities declined during the lockdowns in the Netherlands, especially for graduates with relatively lower education levels. However, when conducting counterfactual analyses, the magnitude of employment loss appears to be relatively low. As the lockdown measures eased, employment quickly rebounded, revealing the tight labor market conditions in the Netherlands.

Fiaschi and Tealdi (2022) analyze the short-term impact of the Covid-19 on the Italian labor market, specifically studying the transition probabilities across labor market states after the country entered a full lockdown on March 10, 2020. The authors used Italian quarterly longitudinal Labor Force Surveys data that follows a rotating sample design provided by the Italian Institute of Statistics. Fiaschi and Tealdi (2022) used a logit regression for calculating the probability of being active in the labor market in the next quarter. The study found that an increased number of unemployed people changed their state to "Not in the Labor Force, Education, or Training" (NLFET) state, especially in the Southern regions of Italy. Also, it provides evidence that significant number of women in their 30s with young children changed their state from employment to inactivity, mainly in the Northern and Central regions of the country. These outflows led to higher transition probabilities from employment to inactivity, significantly surpassing the forecasted probabilities, indicating a significant shock to the labor market. For instance, in quarter III of 2020, the quarterly transition probability from temporary employment to inactivity for women aged 30-39 (40-49) was around 25% (19%) compared to the forecasted 10% (12%) in the absence of the pandemic.

The potential limitations of the study written by Fiaschi and Tealdi (2022) are the following: the applied data does not provide information about the change of labor market state within the period under analysis (quarter). For example, if an employed person loses his job and finds a new one

during the same quarter, those changes are not captured in the data. Furthermore, the short longitudinal period is another important limitation of the analysis, as the data only provides information about the same individuals for two consecutive quarters. Thus, the analysis is based on the Markovian process of order one, which is a further limitation in the study of persistence.

Catea et al. (2022) provides evidence about the impact of the Covid-19 on the labor force participation in Brazil using Pnad-Covid-19 database of the Brazilian Institute of Geography and Statistics (IBGE), round November 2020. In particular, this study is based on a series of robust statistical data regarding the most recent trends in household living standards and gender labor force participation prior to and after the Covid-19 pandemic in Brazil. It aims to analyze the significance of Covid-19 in the gender gap predicted labor force participation probability with the help of a probit model. The authors have shown that females participate less in the labor market than males because they are disadvantaged in many dimensions. There is also a lower literacy rate between women and men. These results suggest that, in order for women to be able to cope with economic crises as men, there is a need for an agenda for women's employment with training programmes.

The work of Davis and von Wachter (2011), who studied the effects of the business cycle on women's LFP in the US, has increased interest in LFP during the economic crisis. By demonstrating that women are less active than men due to the shock of the product, their paper has made a significant contribution. According to them, women and men are affected differently by the differences in sectoral products. Alon et al. (2020) have replicated these results in their analysis of the impact of Covid-19 on females in the United States.

A number of empirical studies have assessed LFP since the research of Davis and von Wachter (2011), in order to quantify the impact of income shocks on different gender outcomes. Studies have been made on the economic impact of Covid-19, particularly in developed countries. For example, in Spain, Farre et al. (2020) examined the impact of the lockdown on gender inequality in paid and unpaid work. The authors found evidence indicating that women were somewhat more prone to job losses than men during the lockdown, and among those who retained their jobs, women were more inclined to work remotely from home.

Additionally, Sevilla and Smith (2020) found proof of a gender-based childcare gap within UK families, with women dedicating a significant portion of their working hours to childcare

responsibilities. Based on real time data from surveys conducted in Italy, the United States and the United Kingdom, Biroli et al. (2020) come to similar conclusions also noting loss of employment as an important factor for household change away from existing status quo. Del Boca et al. (2020) conducted a study using survey data from Italian couples and similarly observed gender-based patterns in housework and childcare. The research revealed that men's responses were more influenced by their spouse's work situation compared to women's responses. The authors also acknowledge that mothers who were employed and had very young children (aged 0-5) faced the greatest challenges in juggling their work responsibilities with family demands.

Carlson et al. (2020) report comparable gender effects on household responsibilities in the United States. They also discovered that both men and women perceived an increase in mothers' childcare duties during the lockdown. However, fathers reported taking on more childcare tasks than their spouses acknowledged them doing during this period. Although not directly centered on gender, Ma et al. (2020) emphasize the significant impact of school closures on parental decisions regarding their labor market participation. Their study, based on survey data from junior high school students and their parents in China, reveals a decreased likelihood of parents returning to work when workplaces were open while schools remained closed.

Evidence of the Covid-19 impact on gender imbalance can also be found in other parts of the world. For example, Adams-Prassl et al. (2020), in their study for Germany, the UK, and the US., analyzed the reduction in job earnings of different workers due to decreased work hours and job losses. They demonstrate that women and workers with lower education are having an increased impact on the Covid-19 crisis as it has shown to have large and uneven effects in different countries.

Similarly, Andrew et al. (2020) conducted a study using time-use diary data from a representative sample in the UK during the pandemic. They observed differing responses based on gender when one partner was no longer employed, with mothers taking on more responsibilities than fathers in response to their partners' employment status. The researchers concluded that changes in employment status alone could not entirely account for the gender disparities in time use. Despite doing less than mothers, fathers still increased their involvement in childcare during this period.

Tas et al. (2020) examined the gender impacts of the Covid-19 pandemic on the labor market and household wellbeing, using an online survey of the users of Pakistan’s largest online job platform.

The analysis reveals that the pandemic has created an unprecedented level of economic uncertainty for staff and employers, resulting in a widespread loss of employment, closure of businesses, slowed down business activity and reduced working time. The pandemic had notable repercussions on women in Pakistan, particularly in sectors with high female workforce representation, such as education, which were severely affected. Additionally, women experienced a disproportionate rise in unpaid care responsibilities, leading to elevated rates of reported stress and anxiety. These findings indicate significant wellbeing challenges for women in Pakistan, including a decline in the already low female labor force participation rate, which was among the lowest globally.

Risse (2023) considers longer term economic effects on Australia's labor market through a gender lens three years into the Covid-19 pandemic. It analyses trends in employment, earnings and educational participation compared to the anticipated pre-pandemic trend that would otherwise have occurred using data from the Australian Bureau of Statistics. Even though women's employment rebounded more quickly than men's, the pandemic resulted in a widening gender gap in earnings and a more significant decline in women's educational participation. In order to create a more flexible policy design, this paper emphasizes the need for continuous monitoring of labor market indicators through women's perspective.

Cabanillas-Jiménez & Galanakis (2022) analyze the impact of the Covid-19 national lockdown on the employment situation in Spain. The authors apply Active Population Survey data available at the Spanish National Institute of Statistics and use Conditional Logit model with fixed effects. The main dependent variables that the authors consider are the number of weekly hours worked, the extra hours worked and the probabilities of having a temporary contract, having a full-time job and being unemployed. In order to correct the sample selection bias due to labor supply decisions, Cabanillas-Jiménez & Galanakis (2022) use the two-step Heckman bias correction model. The results suggest that employment and labor supply have fallen, in addition to a decline in the labor force participation. Analysis of the impact of Covid-19 across sectors showed mixed results. The most affected by the pandemic are the agricultural and commercial sectors. There has been an increase in the demand for labor in the transport sector due to the necessity of transferring key workers due to the pandemic. However, in the healthcare sector there was an excess demand for health services, hence more employees were needed in this sector.

Brik & Obrizan (2023) study inequality in labor market outcomes Covid-19 epidemic in 2020-2021 in Ukraine. The authors specific focus is to investigate whether women faced greater adverse impacts from Covid-19, similar to the "she-cession" observed in high-income countries. Additionally, they are examining whether women are more inclined to telecommute (as a crucial adjustment to the post-Covid scenario) or experience feelings of job insecurity or financial instability (which may act as motivation for seeking additional training or second jobs). This paper uses two surveys conducted in 2020 and 2021. Both surveys focused on participants who were employed before quarantine, ensuring they reacted to the most recent governmental regulations. The exclusion of rural areas, which clearly limits our understanding of the gender gap in the labor market in rural areas and smaller cities with a population of less than 50 000 people, is a major limitation of the data.

Brik & Obrizan (2023) constructed four dependent variables to assess the job market's impact on household well-being: not working, working from home, fears of losing a job and savings for less than one month. For each of these variables they estimate the linear probability model with robust standard error clustered at the city level. Based on the results of both pooled and random effects models, the authors found that urban women and urban men in all regions of Ukraine had similar probabilities of retaining their jobs after two lockdowns. Additionally, they exhibited comparable levels of fear concerning job loss, which were moderate overall. This indicates that, at least in urban areas of Ukraine, there was no evidence of a "she-cession" phenomenon, as the gender gap in job loss was not observed. This finding is intriguing as it contrasts with results from developed countries where women were disproportionately affected by the pandemic. The models also offer a potential explanation for this observation, as it was observed that urban women in Ukraine had a higher likelihood of working from home. In contrast to developed countries where women might have faced job losses, Ukrainian urban females were able to transition telecommuting. These findings align with the existing expectation that telecommuting plays a pivotal role in mitigating gender inequalities during the pandemic, as suggested by Alon et al. (2021).

Aygun & Uysal (2022) investigate how the pandemic affected the labor market in Turkey. Using the unique, national representative working age population sample collected in September and October 2020 via face-to-face interviews the authors apply the linear probability model. In view of the impact on employment and income loss as well as reduction in working hours, they identify

groups that were hardest hit by the pandemic. The findings suggest that women with lower levels of education (less than high school and high school) were more prone to dropping out of the labor market. This effect was further intensified when they had children. Among all groups, women without a high school degree and with children were found to be the most vulnerable in terms of dropping out of the labor market. Also, women with university degrees, even when there was a baby in the home, did much better because of their education than men who had similar characteristics.

2 Data and Statistics

The study will use the Labor Force Surveys data, available at the website of the Statistical Committee of the Republic of Armenia. Labor Force Surveys are anonymized micro databases. Each year a *new* representative sample of households and their members are surveyed. Hence, I am going to work with cross sectional data. The surveys contain information about individual employment status, hours worked, earnings, personal characteristics such as age, gender and education, marital status, etc. The survey collects data from the population, typically individuals residing in private households. The units being observed are individuals who typically live in a specific household, even if they are currently absent from their usual place of residence (either within or outside the country) or temporarily residing in the reference household for a duration of at least 3 months (continuously), but less than 12 months. Additionally, household members serving compulsory military service are also included in the survey. The surveys are conducted in the capital city of Yerevan as well as all regions (marzes) of the Republic of Armenia, ensuring proportional coverage of both urban and rural areas.

I will use survey data gathered during 3 consecutive years (2019, 2020 and 2021). This will ensure to have data both from the pre-Covid (2019) and Covid periods (2020-2021). Each annual data set has a sample size of more than 20,000 total respondents out of which the half are women. Furthermore, the LFS 2021 data has been published only recently on the website of the statistical committee of Armenia, hence this paper might be the first one to use the dataset for estimating the impact of the Covid-19. As mentioned, surveys cover both the capital city and all the regions of

Table 1: Share of observations from each interviewed months and region out of total (2019)

	Interview Month												
Region	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Yerevan	1.4%	1.6%	1.4%	1.4%	1.4%	1.6%	1.5%	1.3%	1.4%	1.3%	1.4%	1.4%	17.0%
Aragatsotn	0.5%	0.5%	0.4%	0.4%	0.5%	0.4%	0.5%	0.4%	0.4%	0.5%	0.4%	0.5%	5.5%
Ararat	1.2%	1.1%	1.0%	1.0%	1.2%	1.2%	1.2%	1.1%	1.0%	1.0%	1.1%	1.2%	13.3%
Armavir	0.7%	0.6%	0.5%	0.5%	0.5%	0.6%	0.5%	0.5%	0.5%	0.5%	0.5%	0.6%	6.6%
Gegharkunik	0.6%	0.5%	0.7%	0.5%	0.8%	0.6%	0.6%	0.6%	0.6%	0.6%	0.5%	0.6%	7.3%
Lori	0.8%	0.8%	1.1%	0.9%	0.9%	1.0%	0.8%	0.9%	1.0%	0.9%	1.1%	0.8%	11.1%
Kotayq	0.9%	1.1%	1.0%	1.2%	1.0%	1.2%	1.1%	1.1%	1.1%	1.1%	1.3%	1.1%	13.3%
Shirak	0.7%	0.6%	0.6%	0.6%	0.7%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	7.4%
Syuniq	0.5%	0.5%	0.5%	0.5%	0.6%	0.6%	0.5%	0.5%	0.4%	0.6%	0.6%	0.5%	6.4%
Vayoc Dzor	0.4%	0.5%	0.5%	0.4%	0.4%	0.5%	0.5%	0.5%	0.4%	0.5%	0.5%	0.5%	5.6%
Tavush	0.7%	0.5%	0.6%	0.6%	0.5%	0.5%	0.6%	0.5%	0.5%	0.6%	0.5%	0.5%	6.6%
Total	8.4%	8.4%	8.3%	8.2%	8.6%	8.7%	8.4%	8.1%	8.0%	8.2%	8.5%	8.3%	100.0%

the country. Also, the statistical committee collected the data during the whole year. The tables above and below show the number of observations from each interviewed month and region. As we can see, we have a balanced dataset in terms of interviewed months and regions.

Table 2: Share of observations from each interviewed months and region out of total (2020)

	Interview Month												
Region	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Yerevan	1.4%	1.4%	1.3%	1.4%	1.3%	1.3%	1.4%	1.4%	1.3%	1.2%	1.2%	1.3%	16.0%
Aragatsotn	0.5%	0.5%	0.6%	0.6%	0.5%	0.5%	0.5%	0.5%	0.6%	0.5%	0.5%	0.4%	6.1%
Ararat	1.1%	1.2%	1.0%	1.1%	1.0%	1.2%	1.1%	1.0%	1.2%	1.2%	1.1%	1.1%	13.1%
Armavir	0.4%	0.5%	0.6%	0.6%	0.6%	0.6%	0.5%	0.5%	0.5%	0.5%	0.5%	0.6%	6.5%
Gegharkunik	0.5%	0.6%	0.6%	0.6%	0.6%	0.6%	0.5%	0.6%	0.6%	0.6%	0.5%	0.6%	6.9%
Lori	0.9%	0.9%	0.8%	1.0%	1.1%	1.0%	1.1%	1.0%	0.9%	1.0%	1.0%	1.0%	11.8%
Kotayq	1.2%	1.1%	1.0%	1.0%	1.1%	1.1%	1.1%	0.9%	1.0%	1.0%	1.3%	1.1%	12.9%
Shirak	0.6%	0.7%	0.6%	0.5%	0.6%	0.7%	0.5%	0.6%	0.6%	0.6%	0.5%	0.5%	7.2%
Syuniq	0.5%	0.5%	0.5%	0.6%	0.5%	0.6%	0.4%	0.5%	0.6%	0.5%	0.5%	0.5%	6.2%
Vayoc Dzor	0.5%	0.5%	0.6%	0.6%	0.6%	0.5%	0.6%	0.5%	0.5%	0.5%	0.6%	0.6%	6.4%
Tavush	0.6%	0.5%	0.5%	0.7%	0.5%	0.5%	0.6%	0.6%	0.5%	0.7%	0.6%	0.6%	7.0%
Total	8.4%	8.3%	8.1%	8.7%	8.4%	8.6%	8.4%	8.2%	8.3%	8.1%	8.2%	8.5%	100.0%

It is important to note that the process of field work, which includes the collection of survey data, has changed from March 2020 to February 2021 because of serious difficulties in reaching and interviewing respondents due to the Covid-19 pandemic. Data collection normally was carried out by the survey interviewer by direct visit to the selected households, by Face-to-Face interview with the respondent, using the method of Pen-and-Paper Personal Interviews (PAPI). During the pandemic, this was done by means of telephone calls in which responses from respondents were not always fully completed or accurate.

There has also been a significant number of refusals for participation in the survey. The survey sample, which was drawn up in accordance with a specific statistical method, has been partially

Table 3: Share of observations from each interviewed months and region out of total (2020)

	Interview Month												
Region	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Yerevan	1.3%	1.1%	1.4%	1.2%	1.3%	1.4%	1.2%	1.3%	1.3%	1.4%	1.3%	1.3%	15.6%
Aragatsotn	0.5%	0.6%	0.6%	0.6%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.6%	0.5%	6.4%
Ararat	1.1%	1.1%	1.1%	1.2%	1.2%	1.2%	1.1%	1.1%	1.2%	1.1%	1.1%	1.2%	13.7%
Armavir	0.5%	0.6%	0.5%	0.6%	0.5%	0.6%	0.5%	0.5%	0.5%	0.4%	0.5%	0.5%	6.3%
Gegharkunik	0.6%	0.6%	0.6%	0.6%	0.6%	0.5%	0.6%	0.5%	0.5%	0.6%	0.6%	0.6%	6.9%
Lori	1.0%	0.9%	1.0%	1.1%	0.9%	0.9%	0.9%	1.0%	0.9%	1.1%	1.0%	1.1%	11.9%
Kotayq	1.1%	1.0%	1.0%	1.0%	1.0%	0.9%	1.0%	1.0%	1.0%	1.1%	1.0%	1.1%	12.3%
Shirak	0.6%	0.6%	0.7%	0.6%	0.5%	0.5%	0.6%	0.6%	0.5%	0.5%	0.7%	0.7%	7.0%
Syuniq	0.6%	0.5%	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.6%	0.7%	6.3%
Vayoc Dzor	0.5%	0.6%	0.5%	0.5%	0.5%	0.6%	0.5%	0.5%	0.6%	0.6%	0.7%	0.5%	6.7%
Tavush	0.5%	0.6%	0.6%	0.6%	0.6%	0.5%	0.5%	0.6%	0.6%	0.6%	0.6%	0.6%	7.0%
Total	8.3%	8.3%	8.4%	8.5%	8.3%	8.2%	7.8%	8.2%	8.1%	8.4%	8.6%	8.8%	100.0%

changed. As the Statistical Committee reports, sometimes it was not feasible to visit the households or there were difficulties in establishing contact due to the lack of complete updated telephone databases related to addresses. These cases have been common in urban areas and especially in the capital city Yerevan. For this purpose, data from randomly selected households have also been taken into account. A factor of selection bias had an impact on the latter. For this purpose, a number of indicators were subject to expert adjustments based on internationally accepted assessment tools, analysis of time series dynamics, alternative sources such as the State Revenue Committee

or other information. Therefore, a number of historical statistics on labor markets have been affected due to these reasons. In view of the fact that survey data would have to be collected in order to gain an insight into the effect of the pandemic on the labor market, LFS data collection was not interrupted during the outbreak.

For the regression analysis part of this study, I will be working with a sample that includes individuals who are in the following working age (20-59). However, according to the Labor Code[8] of the Republic of Armenia, the minimum legal age to start working is 16. Whereas the retirement age is 63 years old according to the Law of the Republic of Armenia on Funded Pensions[9].

To define the working age population (WAP), the surveys are considering the ILO methodological principles and recommendations. Prior to 2020, the age limits in the Labor Force Surveys were defined as 15-75 years old, which differed from the legally established working age range of 16-63 years old. However, starting from 2020, no upper age limit has been imposed. This change was made to ensure a comprehensive coverage of work activities among the adult and elderly population, as well as to monitor the potential impact of population aging on the labor market. Thus, survey from 2019 is the only one that includes 15-75 years old people in working age population/labor resources. Surveys from 2020 and 2021 only define a lower age limit – 15, and the maximum age is 105 in both surveys. However, for the purposes of this study I will be considering 15-75 years old people as the working age population for all the years in order to be consistent in my results.

2.1 Labor resources/Working age population.

The surveys define labor resources/working age population as the sum of labor force (both employed and unemployed persons) and population outside the labor force (neither in employment nor in unemployment (not having job and not searching for a job)).

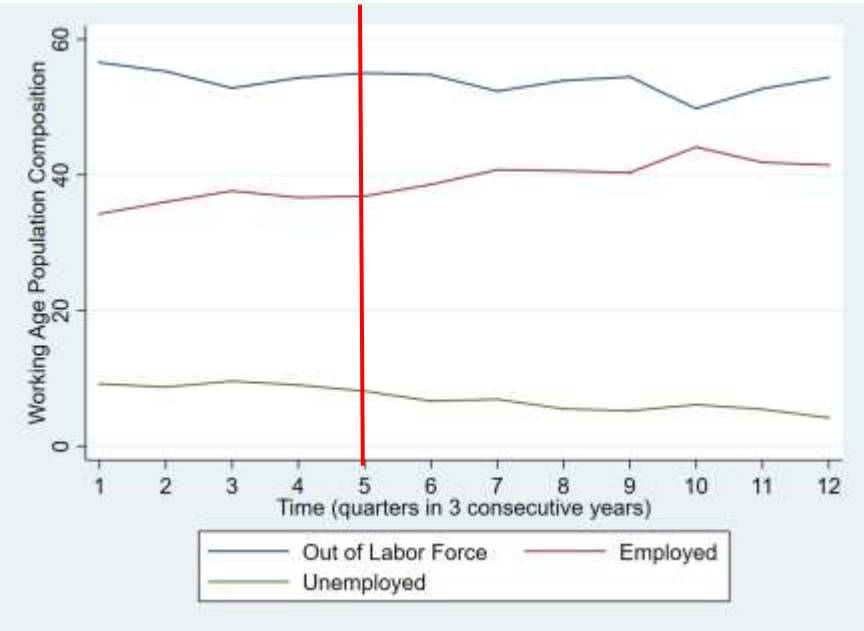
$$Labor\ Resources/WAP = labore\ force + population\ outside\ the\ labor\ force$$

$$Labore\ Force = employed + unemployed$$

[8] https://www.arlis.am/documentview.aspx?docid=89360
[9] https://www.arlis.am/DocumentView.aspx?DocID=173501

The chart below shows the composition of female working population in the three consecutive labor force surveys that I am using for this study. As we see, for all the three years population out of the labore force outweighs in the surveys.

Figure 5: Female Working Population Composition by Quarters: 1,2,3,4 for 2019; 5,6,7,8 for 2020; 9,10,11,12 for 2021. The red line shows the start of the pandemic.



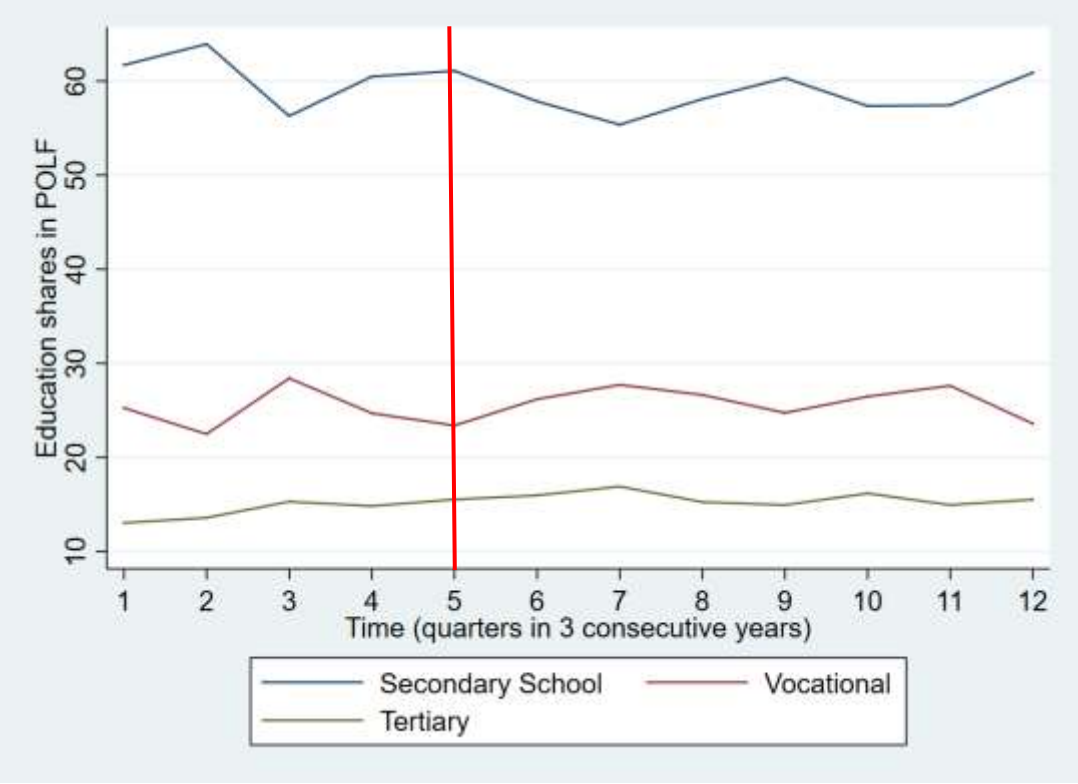
In terms of number of observations, in the original appended datasets there are around 30, 0000 *female* respondents from the 2019, 2020 and 2021 surveys in total.

According to the Ministry of Education, Science, Culture and Sports of the Republic of Armenia the education system consists of 12-year general secondary education (primary, lower- and upper-secondary), vocational education, tertiary and postgraduate education[10]. Considering the number of observations in each of the level, I grouped education levels into three categories: secondary school education (includes primary school – grades 1-4 for 6-9 year olds; lower secondary school – grades 5-9 for 10-14 year olds; and upper secondary school – grades 10-12 for 15-17 year olds), vocational (includes primary vocational (handicraft) education – max 3 years and secondary specialized education – 2-5 years) and tertiary education (includes bachelors – 4 years; masters –

[10] https://escs.am/en/static/second-education?s=edu

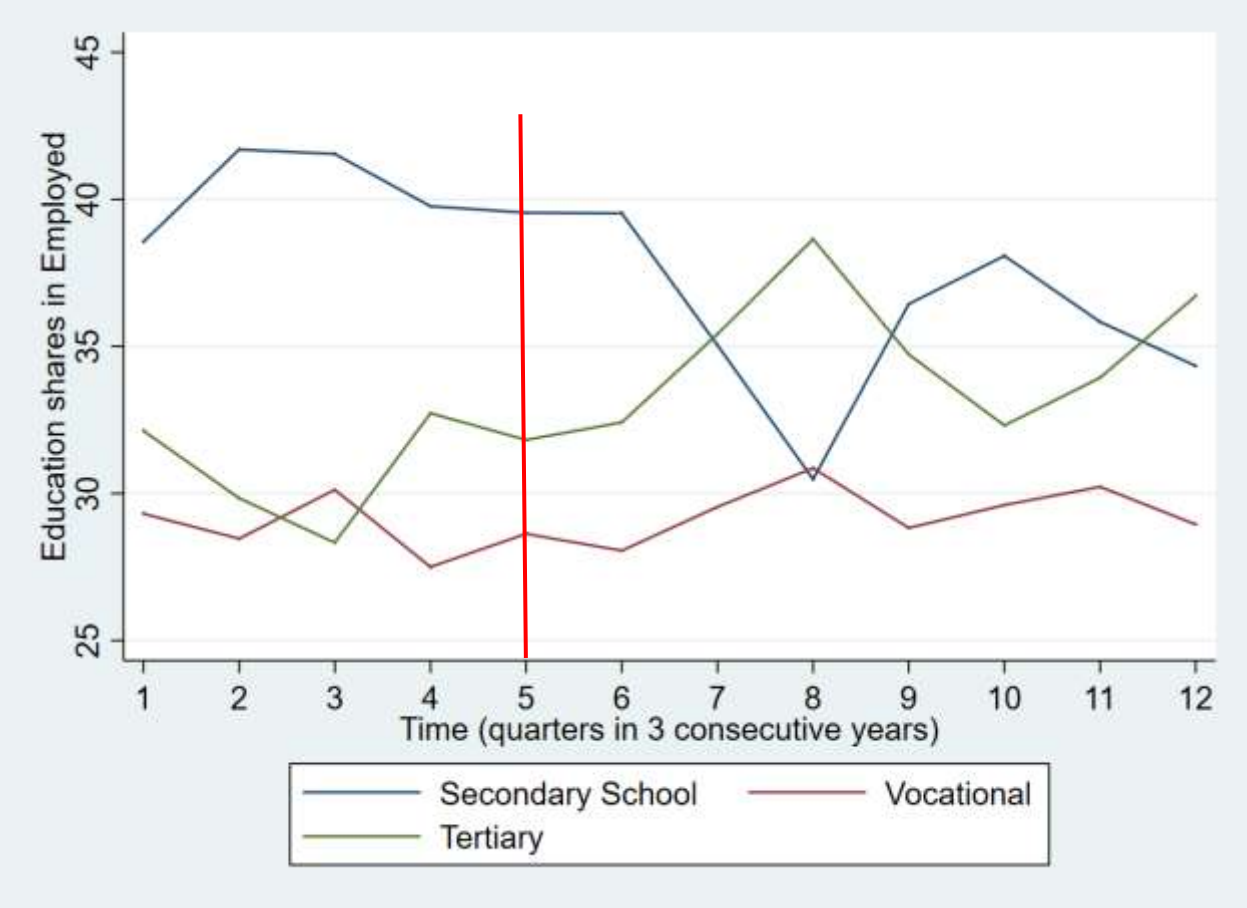
2 years; and PhD – 3 years). In the following figures I represent the composition of working female population in the labor market based on their highest achieved education.

Figure 6a: Female out of labor force population by education over quarters: 1,2,3,4 for 2019; 5,6,7,8 for 2020; 9,10,11,12 for 2021. The red line shows the start of the pandemic.



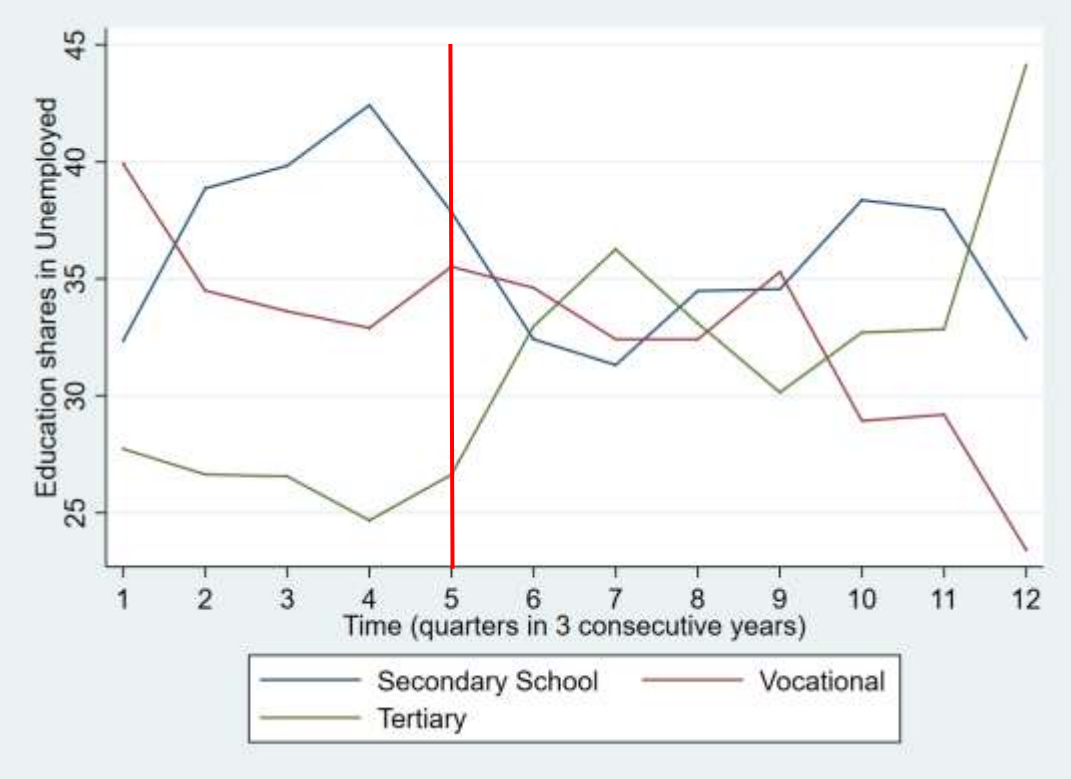
Most of the females in the out of labor force population are secondary school graduates, then vocational education degree holders. The smallest share in the out of labor force population had tertiary education graduates.

Figure 6b: Female Employed population by education over quarters: 1,2,3,4 for 2019; 5,6,7,8 for 2020; 9,10,11,12 for 2021. The red line shows the start of the pandemic.



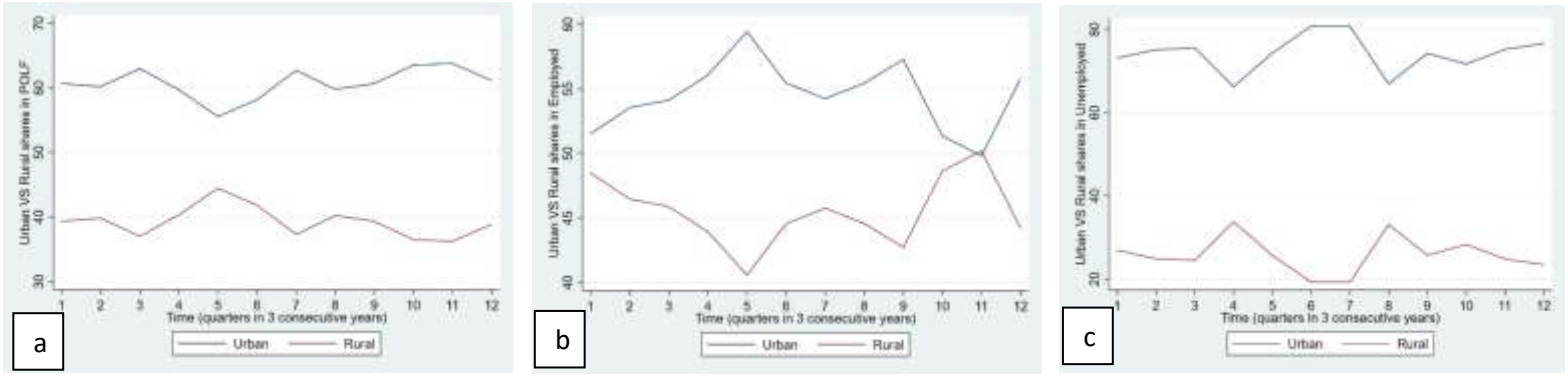
As we can see, until the second quarter of 2020 most of the employed female population has secondary school education as their highest education level, whereas starting from the third quarter of 2020 until the second quarter of 2021 more employed women have higher education.

Figure 6c: Female Unemployed population by education. The red line shows the start of the pandemic.



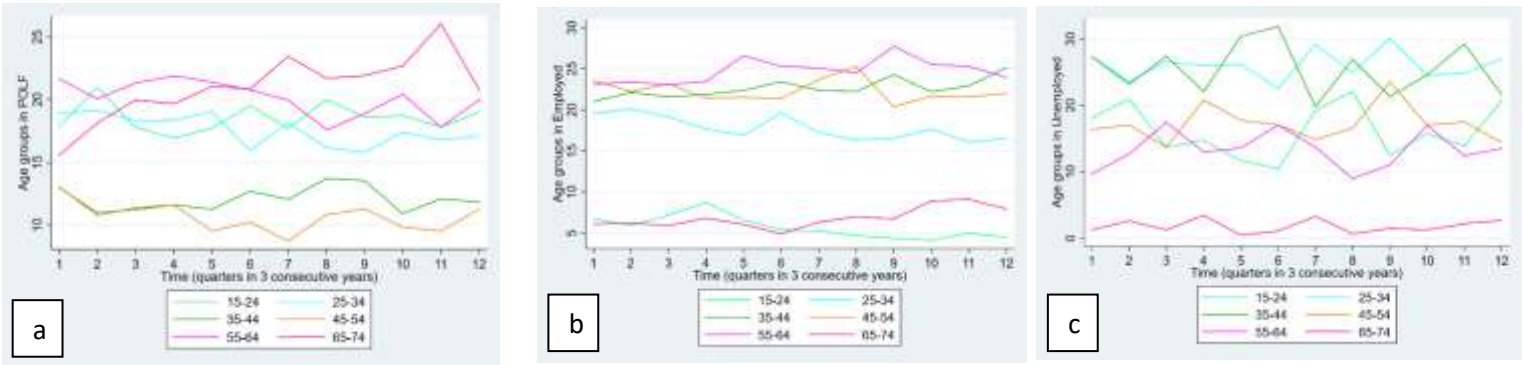
For the unemployed population an increase in the share of tertiary education graduates could be noticed starting from the first quarter of 2020 until the third quarter of 2020. Overall, the share of vocational education graduates in the unemployed population shows a declining trend.

Figure 7: Composition of female working age population by type of residency.



In Figure 7 I have summarized the scope of the female working age population based on the type of residence that the respondent lives. According to the data, I have more women residing in urban areas regardless of the status in the working age population and in all three consecutive years. One exception is the third quarter of 2020, when I have somewhat equal shares of urban and rural employed residents.

Figure 8. Female working age population in the labor market by age groups.



As Figure 8a shows, in the out of labor force population group older people from 55-64 and 65-74 age groups followed by younger people in 15-24 age group dominate. The smallest share in the out of labor force population belongs to the middle-aged women. In employed population, however I can notice that women in the 55-64 and 35-44 age groups have the highest share. The lowest share in the employed population has the youngest and oldest female respondents. When it comes to unemployed women, from panel c it is visible that young and middle-aged have the highest

share. However, for middle-aged people there is a noticeable drop in shares during the second and third quarters of 2020, whereas for younger people the shares are relatively constant.

Figure 9. Female working age population by marital status.

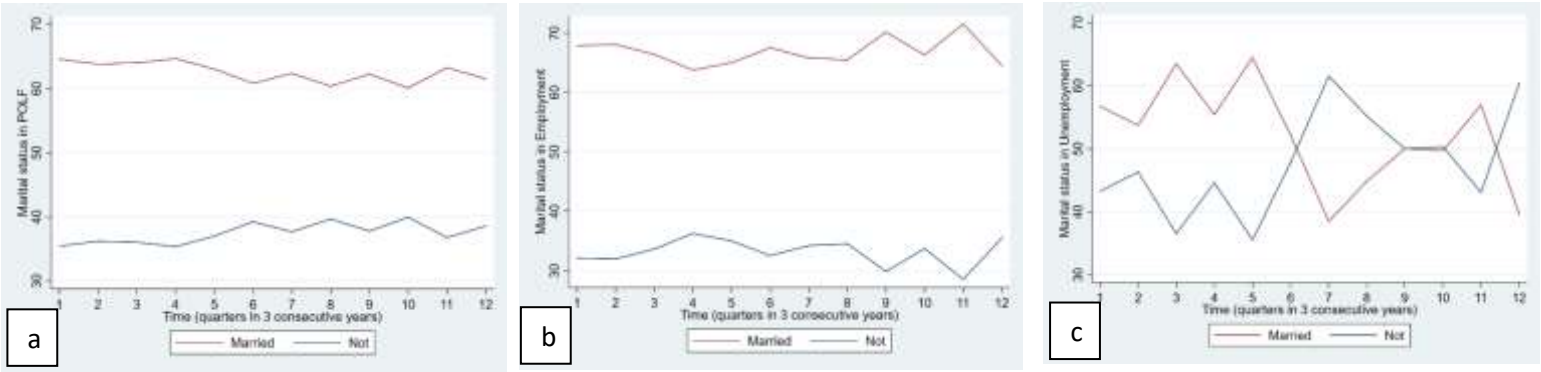
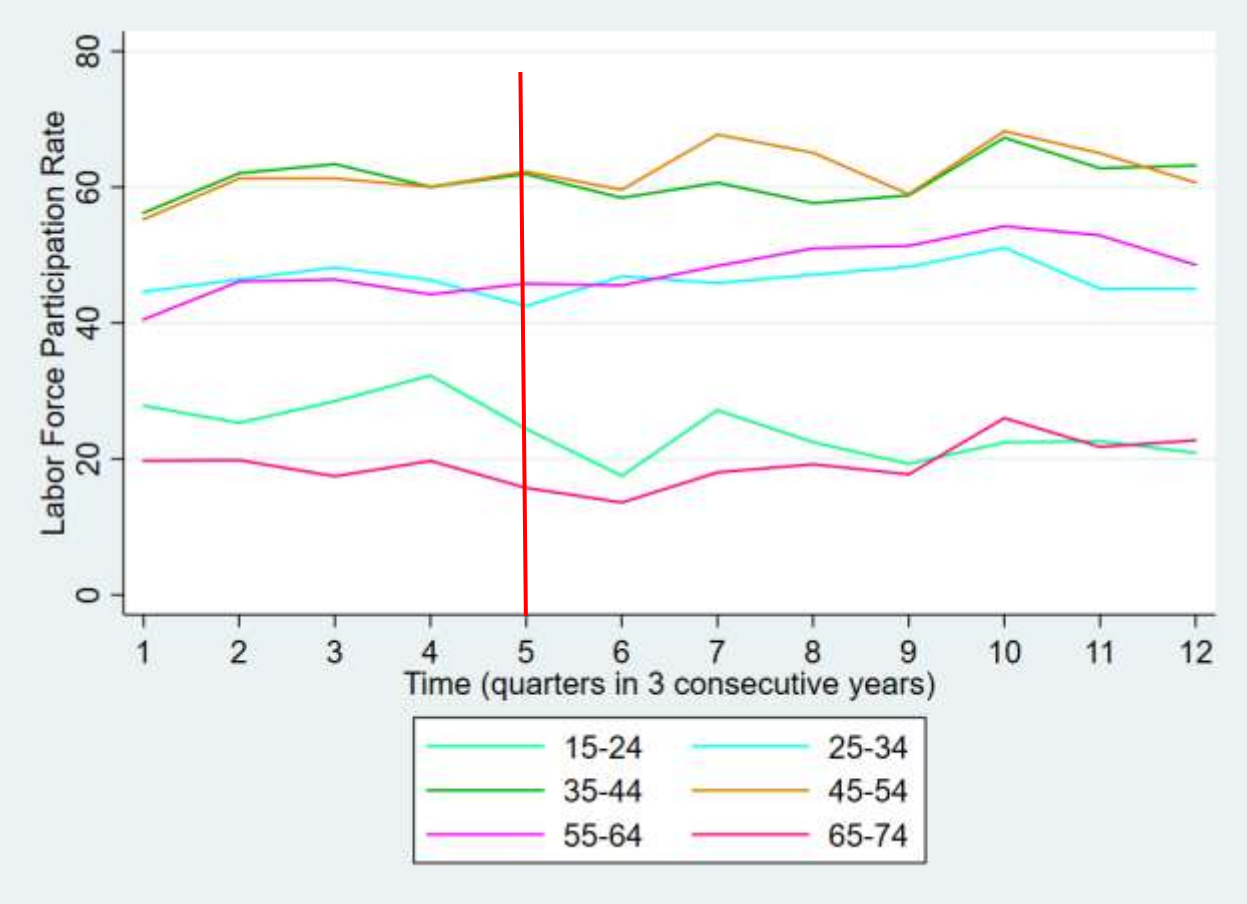


Figure 9 shows the proportions of married and not married women in the out of labor force, employed and unemployed populations. Non-married group includes respondents who reported to be single, widow or divorced. I classified them into one group since I am not interested in those smaller groups. According to the charts above, there are more married women in the working age population than not married in almost all three survey years. However, in the unemployed group of population during the second quarter of 2020 until the second quarter of 2021 and during the last quarter of 2021 not married women dominate married respondents.

2.2 Labor Force

Now, let's explore the Armenian female labor force (employed and unemployed population) in more details. Figure 10 presents the female labor force participation for the specific age groups. I calculated the labor force participation rate (LFPR) by dividing the number of labor force participants to the number of working age population.

Figure 10. Female activity rates by specific age groups. The red line shows the start of the pandemic.



rate is calculated by dividing the number of unemployed respondents to the number of labor force participants within each age group. The chart shows that the labor force participation rates are the highest for middle aged women – for 35-44 and 45-54 ears old groups, as noticed before.

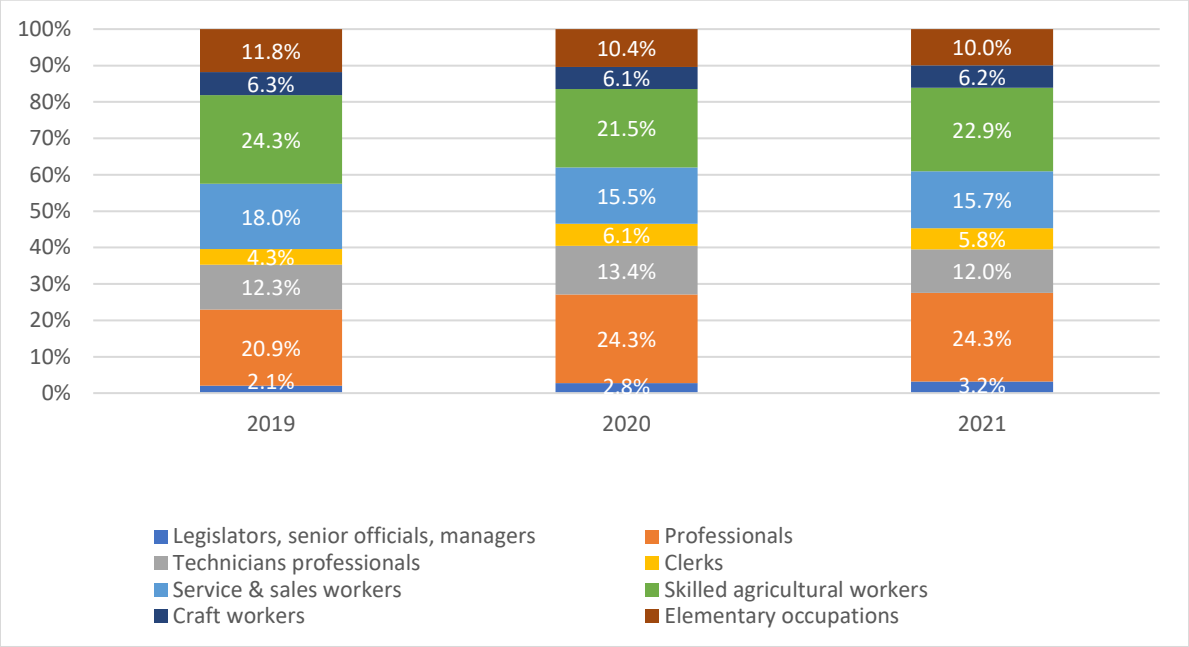
I also calculated the female labor force participation rate across the 10 regions of Armenia and the capital city Yerevan. The results showed that in Armavir there are the highest rates of labor force

participation and in this region the lowest rate was in year 2020. Next is Syuniq, where we see a slight increase in the participation rate from year 2019 to 2020, and in 2021 it is again similar to the first period. Overall, the regions that experienced a decrease in the labor force participation rate after 2019 in both consecutive periods or at least one are Yerevan, Ararat, Shirak and Tavush. The lowest female labor force participation overall is in Gegharkunik in all three years (32-33%) and in Lori in 2019 (32%).

When it comes to the type of ownership of the workplace of those who are employed, most of the respondents are employed in the private sector. Here workplaces having private ownership type include NGOs, religious organizations, representative offices of international organizations, private enterprises (also farms) and private employers (who employ paid domestic workers: babysitters, housemaids, drivers etc.).

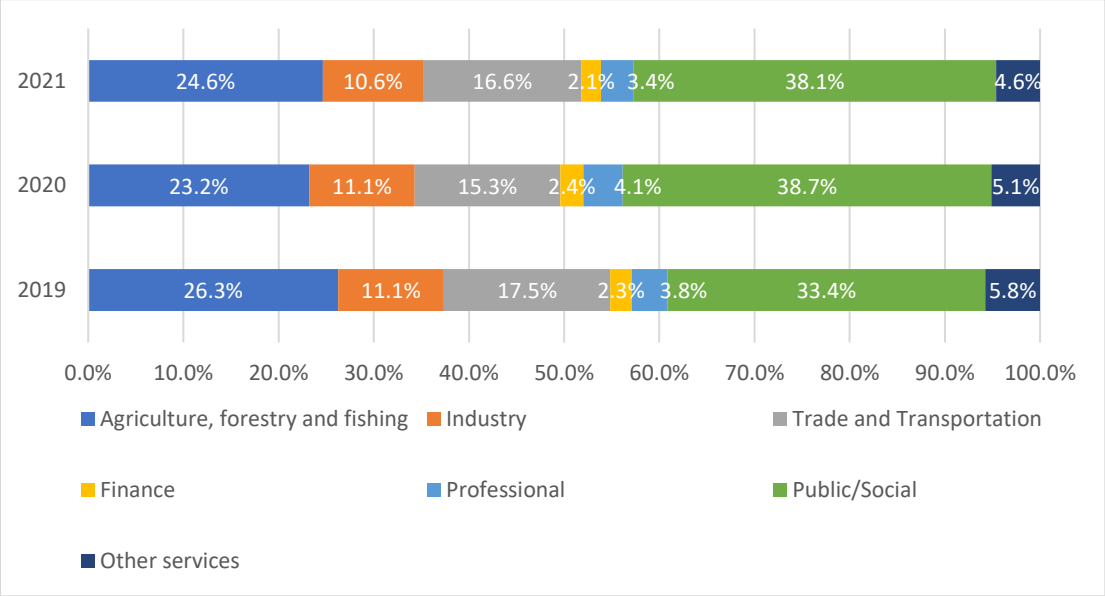
We can also have a look at the composition of the female labor force based on the positions they occupy. As we can see from the Figure 11, before the pandemic most of the employed females were the skilled agricultural workers, whereas in 2020 and 2021 I see more professional employees in the labor force.

Figure 11: Employed female population by occupations



Now let's have a look at the sectors that the female respondents are working in. In the survey I have 21 classifications of economic activities, but for ease of the analysis I classified them

Figure 12: Employed female population by sector.



into smaller groups. As Figure 12 shows, more than 23% of the respondents work in Agriculture, forestry and fishing sector for all the three periods. More than 10% of the respondents works in Industry, which consists of the following sectors: "Mining and Quarrying," "Manufacturing," "Electricity, Gas, Steam and Air Conditioning," "Water Supply, Sewerage, Waste Management, and Remediation Activities" and "Construction." More than 15% work in Trade and Transportation activities, which are mostly "Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles", "Accommodation and Food Service Activities," and "Transportation and Storage" sectors. A small portion of the respondents - 2% - work in Finance, which are "Financial and Insurance Activities" and "Real Estate Activities."

A group called Professional consists of "Information and Communication," "Professional, Scientific, and Technical Activities," and "Administrative and Support Service Activities," which are more than 3% of the sample. Public and Social workers (more than 33% of the sample in each year) are from "Public Administration and Defence; Compulsory Social Security," "Education," and "Human Health and Social Work Activities." The rest are grouped in Other services – around 5-6% of the sample and they work in the following sectors: "Arts, Entertainment and Recreation,"

"Other Service Activities," "Activities of Households as Employers; Undifferentiated Goods- and Services- Producing 15 Activities of Households for Own Use" and "Activities of Extraterritorial Organizations and Bodies." Groups have been created based on the statistical classification of economic activities[11].

2.3 Population outside the labor force

Now let's explore how the population outside the labor force is distributed in the surveys. First, let's understand who these people are. Generally, I define the population outside the labor force to be people who neither work nor look for a job, in other words who are neither in employment nor in unemployment. These economically inactive people usually are full-time students and pupils, housekeepers, people with disabilities, caregivers to children or sick people, and pensioners. In all three years, most of the people who are outside the labor force are from 65-74 age groups. As the data showed, most of the economically inactive population has secondary school education, which was true for all three periods. The second most frequent education level was vocational education – 26% for almost all periods. Moreover, in urban areas, people attaining vocational education still dominate. In rural areas, we still have a similar picture and here vocational and secondary specialized education holders have even a bigger share than the population in urban areas.

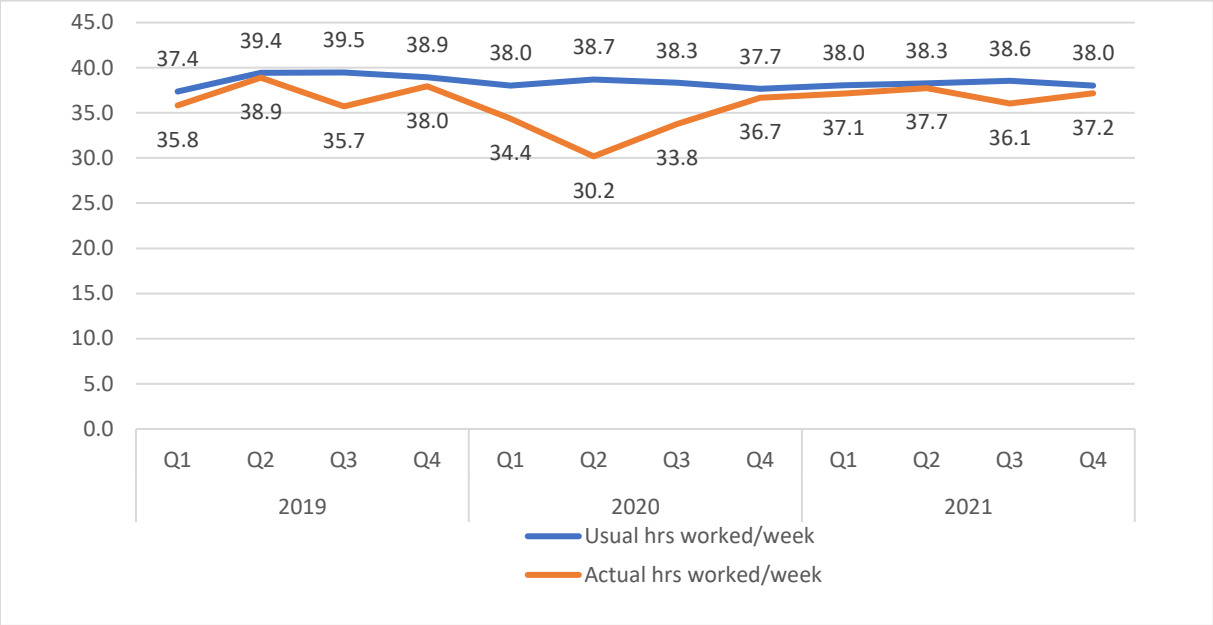
When it comes to the reason behind being outside the labor force and not having a job, most of the respondents mentioned to be engaged in household chores / family responsibilities (including pregnancy and childcare).

2.4 Employment

In the surveys, there are dedicated sections to the respondent's main job and the secondary job if any. According to the survey methodology, if the respondent has more than one job, the main job is the one in which she is engaged most of the time – spends the maximum number of working hours per week (even if she was temporarily absent or not engaged in it during the surveyed week).

[11] https://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF p.43

Figure 13. Mean usual and actual weekly hours worked in the main job.



Let's see how the working hours in the main and the secondary jobs evolved over time. Analyzing the line charts based on the usual hours worked per week and actual hours worked per week over the three-year period (2019-2021), I observe some trends and patterns in how the numbers behave and evolve over time. The first thing I notice is that the usual mean weekly hours worked in the main job are more stable compared to the actual hours. In the first two quarters of 2020 there is a small increase in the usual hours worked per week compared to the corresponding quarters of 2019. However, during the third and fourth quarters of 2020 the usual hours worked per week gradually declined. From 2020 to 2021, there is relative stability in usual hours worked per week across the quarters of 2021, with minor fluctuations but no clear upward or downward trend. The lowest mean weekly usual hours I observe in the first quarter of 2019, whereas the highest (with around 6% increase) I see in the third quarter of 2019.

When it comes to the mean actual hours worked per week in the main job there is a notable decrease across all quarters of 2020 compared to the corresponding quarters in 2019. This decline appears to be most significant in the second quarter of 2020. Compared to the corresponding quarters in 2020, there is a partial recovery of the mean actual hours worked per week in the first, second and fourth quarters of 2021. However, the mean number of actual working hours decreased slightly in the 3rd quarter of 2021.

Overall, it appears that the usual number of working hours per week during the three-year period remained fairly stable, with some variations but no apparent trend. On the other hand, it is likely that the impact of external factors, such as the Covid-19 pandemic, has led to a significant decrease in actual working hours per week in 2020. The subsequent recovery in actual hours worked per week in 2021 indicates some stabilization but not a complete return to pre-pandemic levels. These observations highlight the importance of considering both usual and actual hours worked per week to gain insights into the dynamics of workforce activity and potential disruptions affecting labor patterns over time.

In order to learn more about the distribution of the actual hours worked in the main job variable I also created a box plot chart where the median value, minimum, maximum and the basic percentiles are also visible. In total 6% of the employed population reported working zero hours during the previous week. The proportion of these employees over the quarters is presented in the table below the box plot. Most of these employees are from the public administration, education, and healthcare sectors.

Figure 14: Actual hours worked during the last week in the main job

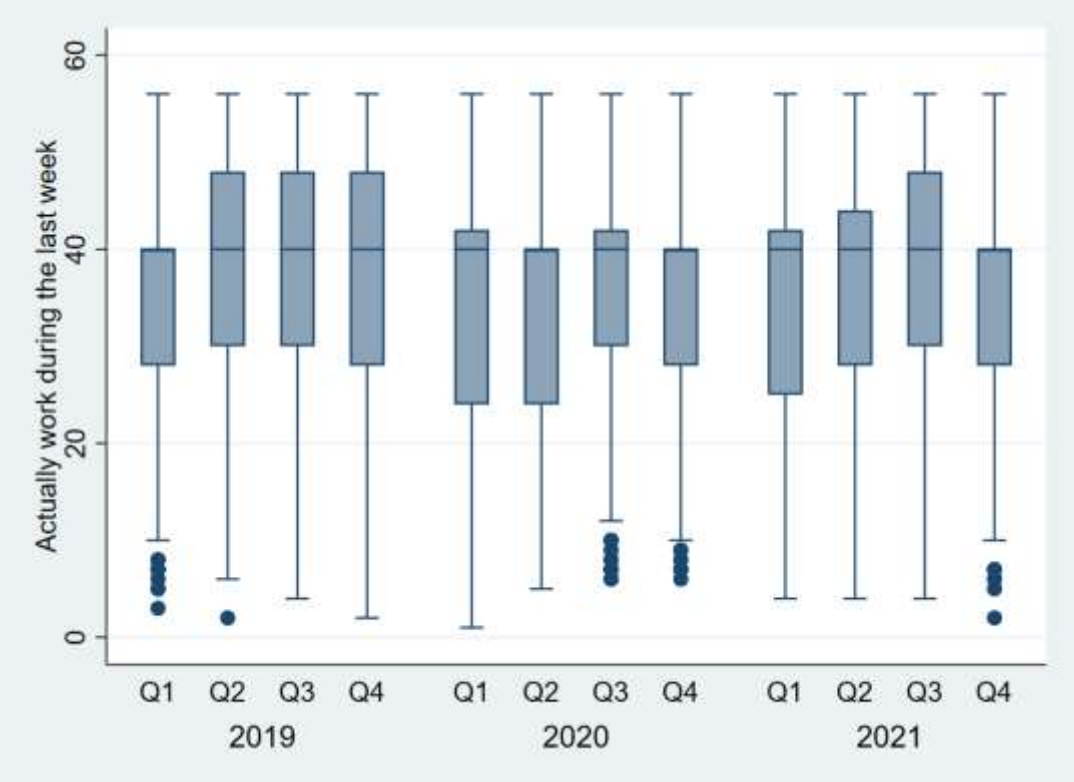


Table 4: Proportion of employees reporting zero actual hours worked in the main job.

2019Q1	2019Q2	2019Q3	2019Q4	2020Q1	2020Q2	2020Q3	2020Q4	2021Q1	2021Q2	2021Q3	2021Q4
6.6%	1.4%	8.8%	6.2%	10.9%	21.7%	14.9%	5.7%	7.6%	2.6%	9.4%	4.2%

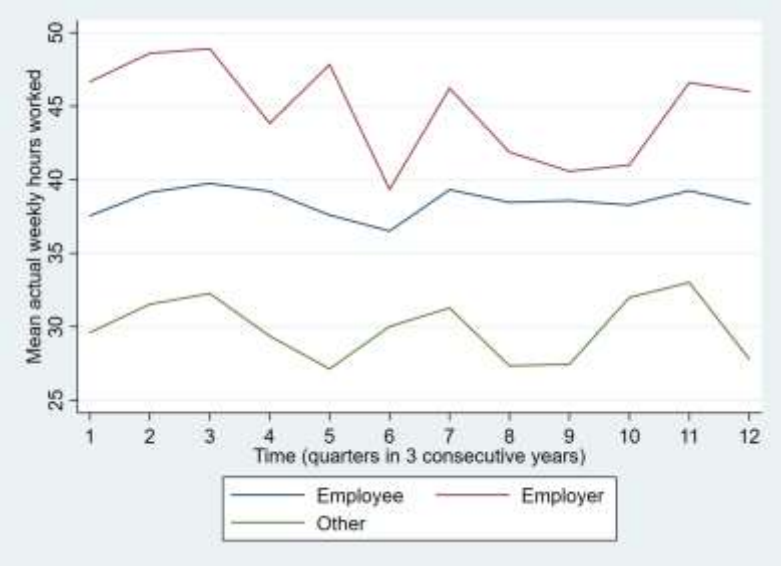
As one can notice, the median (the line inside the box) did not change very much over these three years. The boxes themselves represent the interquartile range (IQR), which contains the middle 50% of the data. As the length of the box indicates the spread of the data within this 50%, it is clearly noticeable from the chart that the values of actual weekly hours worked starting from the first quarter of 2020 are more spread on the lower side. This signals the reduction of hours worked as a consequence of the outbreak. Also, in 2020 and 2021 most of the time the median lies on the upper bound of the box, which means that the majority of the data points are concentrated toward the lower end of the range, while a few extreme values pull the overall distribution towards higher values. Some individual data points outside the lower whiskers are also visible, which are potential outliers during specific quarters.

Now, let's analyze the progress of the mean weekly hours worked in the second job. Overall, a very small portion of the respondents reported having a second job - around 3-4% of the employed population and most of these people have a professional occupation in their main job. There is a significant increase in the mean usual weekly hours from the first quarter of 2019 until the third quarter of 2020. Indeed, in the third quarter of 2020 I see the highest number of mean usual weekly working hours. However, starting from that quarter the usual hours worked per week is declining in the last quarter of 2020. In the first and second quarters of 2021 I see an increase in the mean usual hours worked, however during the last 2 quarters of 2021 it decreases and remains the same.

Compared to the obvious differences in the usual and actual weekly working hours in the main job, in the second job I see parallel behavior between the usual and actual hours worked. Most of the time the actual hours worked are less than the usual hours, except in the third quarters of all the three years and the fourth quarter of 2020 when the actual hours worked is slightly higher than the usual hours.

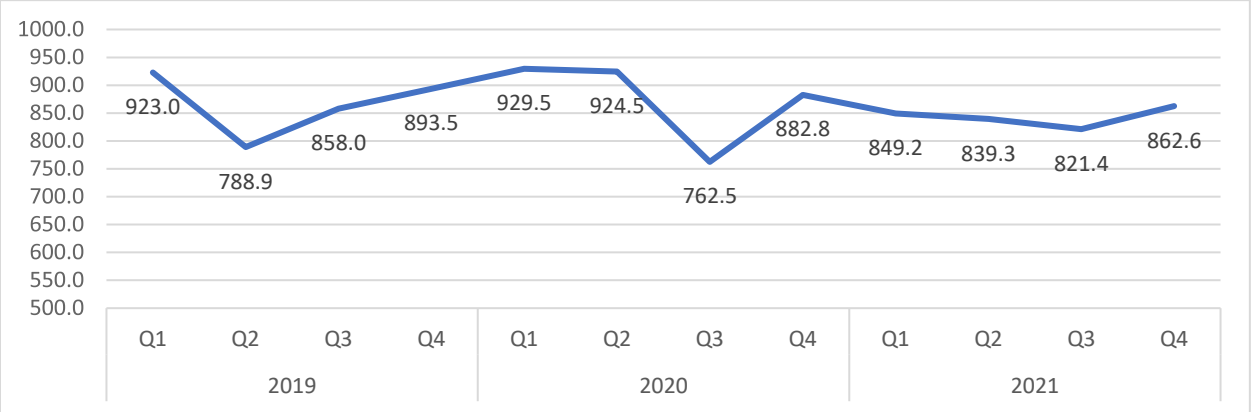
When it comes to the status in employment, based on the surveys I created three groups:

Figure 15. Mean actual weekly hours worked by status in employment.



employees which include the employed population with both written and verbal contracts; employers which are owners with permanent employees; and other who are own-account workers (also in a farm), unpaid family workers and members of producers', consumer's cooperatives. As we can see from the figure below all three categories of employees experienced a similar trend in terms of actual hours worked in the three consecutive years. There is a sharp decline in the actual weekly hours worked from 2019 to 2020 for the three different types of workers. By 2021, there is a slight increase in the average weekly hours worked compared to 2020. Also, employers consistently recorded the highest average weekly hours worked across all three years.

Figure 16. Mean hourly wage rate in the main job.



The surveys also contain information about the monetary and/or in-kind monthly earnings generated from employment from the main job based on the responses of the employed population.

The reference period was the last month preceding the survey period. The data on earnings is based on the respondents' answers or subjective assessments to the questions of the standardized questionnaire. There were also cases when the same respondent provided answers about herself and others in the same household by proxy. Due to this and the fact that respondents usually tend to underestimate or hide the real size of their earnings as the statistical committee claims, I expect that the earnings might suffer from some measurement error.

Those individuals who did not want to mention the exact amount of their earnings, had the option to select a specific earnings range. For such cases I calculated the average from each earnings interval and combined with exact amounts data. This could be another source of measurement error. The presented data refers to the net earnings (after deduction of taxes defined by law and other compulsory payments) received from the main activities of the employed population. The data excludes those who failed to generate any employment income in the last month preceding the survey or refused to respond to questions on amount of income.

Based on the information about the monthly earnings and the actual hours worked, I am able to construct a variable for the wage rate which is defined as the amount of net money paid to the worker per unit of time (in our case per hour).

In figure 20 I depicted the evolution of the calculated hourly wage rate over the three consecutive years. First, the chart reveals that there are fluctuations in the hourly wage rates across different quarters within each year. In 2019 I see the highest wage rate in the first quarter, which is experiencing a sharp decline in the second quarter. After that during the three consecutive quarters the wage rate increases and then starting from the second quarter of 2020 declines again. The lowest amount it reaches happens during the third quarter of 2020 before recovering in quarter four.

I also took the natural logarithm of the calculated wage rate for the normalization and depicted a box plot for this. The analysis of the working age population showed that out of it around 40% represents the employed population. Some of these employed respondents did not report their monthly earnings (20%) and some reported zero earnings for the previous month (13%). The proportion of such cases in the employed population is summarized in the table below the box plot.

Figure 17: Natural logarithm of the hourly wage rate over time

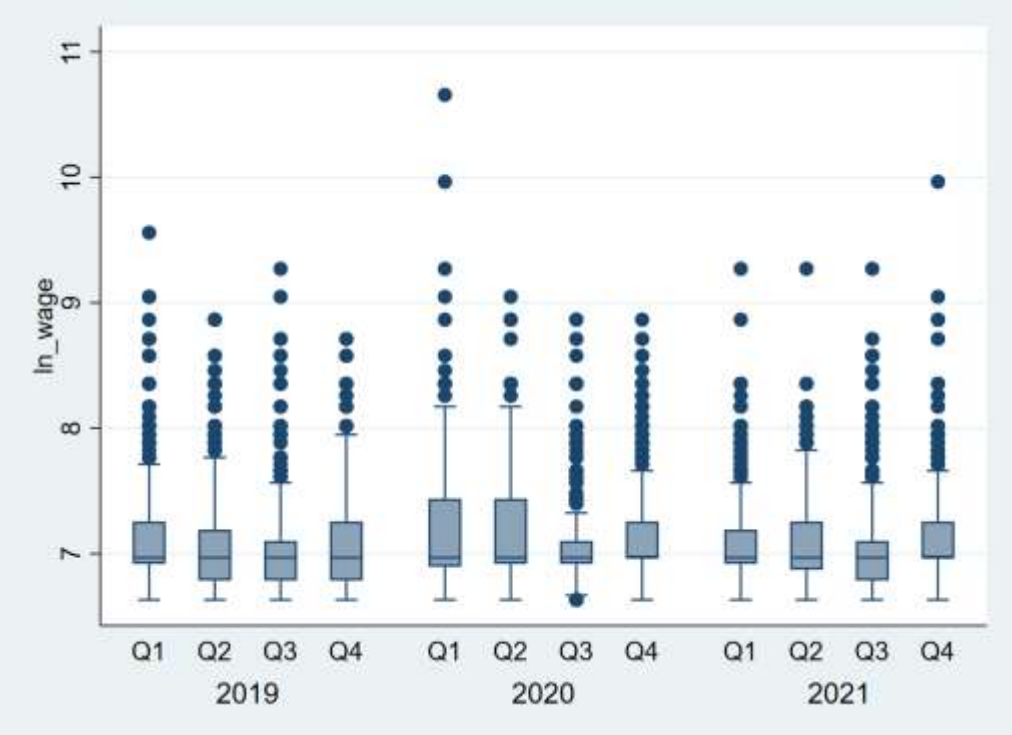


Table 5: Proportion of employed respondents reporting zero earnings or not reporting earnings data.

	2019Q1	2019Q2	2019Q3	2019Q4	2020Q1	2020Q2	2020Q3	2020Q4	2021Q1	2021Q2	2021Q3	2021Q4
Reported 0	17.5%	17.1%	14.4%	12.5%	10.5%	17.2%	12.5%	7.6%	14.9%	16.0%	13.0%	9.7%
Non-response	21.3%	18.4%	20.0%	19.2%	20.3%	17.8%	20.2%	21.7%	19.5%	19.8%	21.3%	25.1%

As we can see from the box plot, the spread of the wage rate shrank during the third quarter of 2020, also during the first, third, and fourth quarters of 2021. Besides the decrease in the size of the box, the whiskers also became shorter in certain quarters of 2020 and 2021, but especially in the third quarter of 2020. This means that the data is more tightly clustered around the median and the data points are less spread out – there is less variability in the data. However, there are a lot of data points outside the whiskers which are outliers.

3 Methodology

The aim of the research is to estimate the contribution of individual factors on women's probabilities of working before and during the Covid-19 pandemic. To estimate the probabilities

of working, I apply the linear probability model (LPM) approach. In this model the response probability is a linear function of the regressors. The key advantage of linear probability model is that it's simple to interpret. The specification has the following form:

$$work_{it} = \beta_0 + \beta_1 edu_{it} + \beta_2 child_{it} + \beta_3 urban_{it} + \beta_4 married_{it} + \beta_5 yerevan_{it} + \beta_6 age_{it} + u_{it}$$

Where $work_{it}$ is the binary response variable. It equals to 1 when the respondent *i* reported to be working during the previous week and 0 when she is not working. The subscript *t* denotes the surveyed quarter of a particular year. All in all, I have 12 quarters – four for each year. For this analysis, I kept only female respondents who belong to the 20 to 59 age group. Also, I excluded full-time students and people with disabilities because they cannot influence their working decisions.

edu_{it} is the highest education level achieved, which is vector of dummy variables with three alternatives: secondary school, vocational, and tertiary education.

$child_{it}$ is a binary dummy variable which equals to one if there is a child under four years old in the household where the woman lives, and zero otherwise. Women usually bear a significant share of childcare responsibilities which may impact their labor market participation decisions. That's why having a child under four years may be decisive for women's working probabilities especially during the pandemic, when the childcare services were closed.

$urban_{it}$ is another binary dummy variable which equals to one for the respondents residing in urban areas, and zero for the ones living in rural areas.

$married_{it}$ is another variable showing the marital status of the respondent.

$yerevan_{it}$ shows if the respondent resides in the capital city Yerevan or in one of the ten provinces of Armenia. As most of the work opportunities are concentrated in the capital city, I expect that the population residing in Yerevan will have higher chances of being employed.

age_{it} is again a dummy variable that shows the four age groups that respondent belongs to: (20-29, 30-39, 40-49, 50-59).

u_{it} is the error term, which is generally assumed to have zero mean: $\mathbb{E}[u_{it}] = 0$

In general, my list of independent variables is similar to previous studies on the labor market outcomes in transition countries, Torosyan et al. (2018). The β coefficients show the marginal effects. This model equals the linear regression model since the response probability equals the conditional mean. Due to linearity the estimation is simple, and the least squares method could be used to estimate the coefficients.

4 Results

The main estimation results from the linear probability model are summarized in the table below for each reported year with its consecutive quarters.

Table 6: Results of the LPM regressions for the year 2019

	(1)	(2)	(3)	(4)
VARIABLES	2019Q1	2019Q2	2019Q3	2019Q4
vocational	0.0883***	0.116***	0.0555*	0.0922***
	(0.0309)	(0.0323)	(0.0328)	(0.0326)
tertiary	0.266***	0.272***	0.183***	0.293***
	(0.0341)	(0.0336)	(0.0360)	(0.0336)
child_under_4	-0.0577*	-0.114***	-0.0839**	-0.117***
	(0.0297)	(0.0292)	(0.0330)	(0.0316)
urban	-0.163***	-0.178***	-0.144***	-0.101***
	(0.0271)	(0.0273)	(0.0287)	(0.0280)
married	-0.0833**	-0.122***	-0.130***	-0.135***
	(0.0326)	(0.0319)	(0.0348)	(0.0328)
yerevan	0.0581*	0.0756**	0.0169	-0.00777
	(0.0335)	(0.0346)	(0.0358)	(0.0361)
dummy_30_39	0.0926**	0.122***	0.0842**	0.101***
	(0.0372)	(0.0359)	(0.0391)	(0.0374)
dummy_40_49	0.174***	0.271***	0.211***	0.228***
	(0.0418)	(0.0401)	(0.0436)	(0.0430)
dummy_50_59	0.140***	0.147***	0.151***	0.111***
	(0.0377)	(0.0388)	(0.0415)	(0.0386)
Constant	0.375***	0.414***	0.476***	0.428***
	(0.0399)	(0.0405)	(0.0434)	(0.0389)
Observations	1,878	1,804	1,748	1,765
R-squared	0.082	0.130	0.070	0.105

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

For the pre-Covid period I found that, for all the quarters tertiary education graduates have higher probability of working in the labor market relative to the secondary school graduates (reference

group is the secondary school education dummy). Also, having a child under four years old in the household has a negative impact on the working probabilities of women during all the quarters. The highest negative impact of this variable during 2019 I observe during the fourth quarter – around 12%. Next thing that I found for the pre-pandemic period is the negative impact of being married on the probability of working. A gradual increase in the impact of this variable could be noticed over the quarters. Also, residing in urban areas has a negative impact on women's labor market participation. The dummy variable for the place of settlement shows that during the first two quarters of 2019 living the capital city Yerevan increased the probability of labor market participation for women about 5-7%. When it comes to age group dummies, all the coefficients are statistically significant. The reference category for these dummies is the lowest 20-29 age group. It can be seen that the highest probability of working in the labor market for all the quarters belongs to the middle age group – 40-49 years old people.

Table 7: Results of the LPM regressions for the year 2020

	(1)	(2)	(3)	(4)
VARIABLES	2020Q1	2020Q2	2020Q3	2020Q4
vocational	0.0936***	0.0883***	0.0785**	0.155***
	(0.0332)	(0.0328)	(0.0325)	(0.0326)
tertiary	0.226***	0.156***	0.257***	0.333***
	(0.0322)	(0.0340)	(0.0317)	(0.0315)
child_under_4	-0.0847***	-0.0920***	-0.106***	-0.148***
	(0.0304)	(0.0319)	(0.0319)	(0.0321)
urban	-0.0316	-0.0551*	-0.183***	-0.0877***
	(0.0278)	(0.0289)	(0.0280)	(0.0270)
married	-0.167***	-0.106***	-0.0365	-0.0486
	(0.0317)	(0.0332)	(0.0316)	(0.0314)
yerevan	0.0392	0.0249	0.0285	0.0813**
	(0.0358)	(0.0364)	(0.0360)	(0.0376)
dummy_30_39	0.0603	0.114***	0.163***	0.148***
	(0.0367)	(0.0386)	(0.0375)	(0.0380)
dummy_40_49	0.229***	0.218***	0.318***	0.262***
	(0.0413)	(0.0426)	(0.0422)	(0.0405)
dummy_50_59	0.204***	0.166***	0.255***	0.246***
	(0.0374)	(0.0404)	(0.0392)	(0.0393)
Constant	0.382***	0.403***	0.328***	0.273***
	(0.0407)	(0.0404)	(0.0392)	(0.0385)
Observations	1,813	1,867	1,789	1,781
R-squared	0.112	0.057	0.116	0.148

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

For the first year of pandemic period, overall, I see similar patterns and signs of coefficients. However, there are also some differences in terms of the statistical significance of some variables during specific quarters. Compared to the pre-pandemic period, during the first quarter of 2020 residing in urban areas did not have a statistically significant effect on the labor market participation. Also, living in the capital city only had a positive significant effect during the last quarter of 2020. What is more interesting to know is how the magnitude of coefficients changed relative to the pre-pandemic period, which I will discuss soon.

Table 8: Results of the LPM regressions for the year 2021

	(1)	(2)	(3)	(4)
VARIABLES	2021Q1	2021Q1	2021Q1	2021Q1
vocational	0.107***	0.0743**	0.107***	0.160***
	(0.0324)	(0.0320)	(0.0334)	(0.0336)
tertiary	0.297***	0.259***	0.248***	0.286***
	(0.0354)	(0.0324)	(0.0351)	(0.0312)
child_under_4	-0.122***	-0.162***	-0.163***	-0.140***
	(0.0324)	(0.0319)	(0.0335)	(0.0315)
urban	-0.0592*	-0.176***	-0.196***	-0.130***
	(0.0307)	(0.0271)	(0.0284)	(0.0280)
married	-0.0253	-0.0785**	-0.0963***	-0.105***
	(0.0360)	(0.0315)	(0.0352)	(0.0320)
yerevan	-0.0611	0.0373	0.0502	0.0465
	(0.0383)	(0.0376)	(0.0394)	(0.0369)
dummy_30_39	0.146***	0.180***	0.111***	0.157***
	(0.0385)	(0.0374)	(0.0397)	(0.0373)
dummy_40_49	0.183***	0.208***	0.168***	0.320***
	(0.0476)	(0.0425)	(0.0452)	(0.0418)
dummy_50_59	0.163***	0.174***	0.173***	0.168***
	(0.0411)	(0.0401)	(0.0428)	(0.0410)
Constant	0.310***	0.418***	0.473***	0.330***
	(0.0398)	(0.0395)	(0.0457)	(0.0403)
Observations	1,755	1,732	1,619	1,756
R-squared	0.089	0.112	0.100	0.136

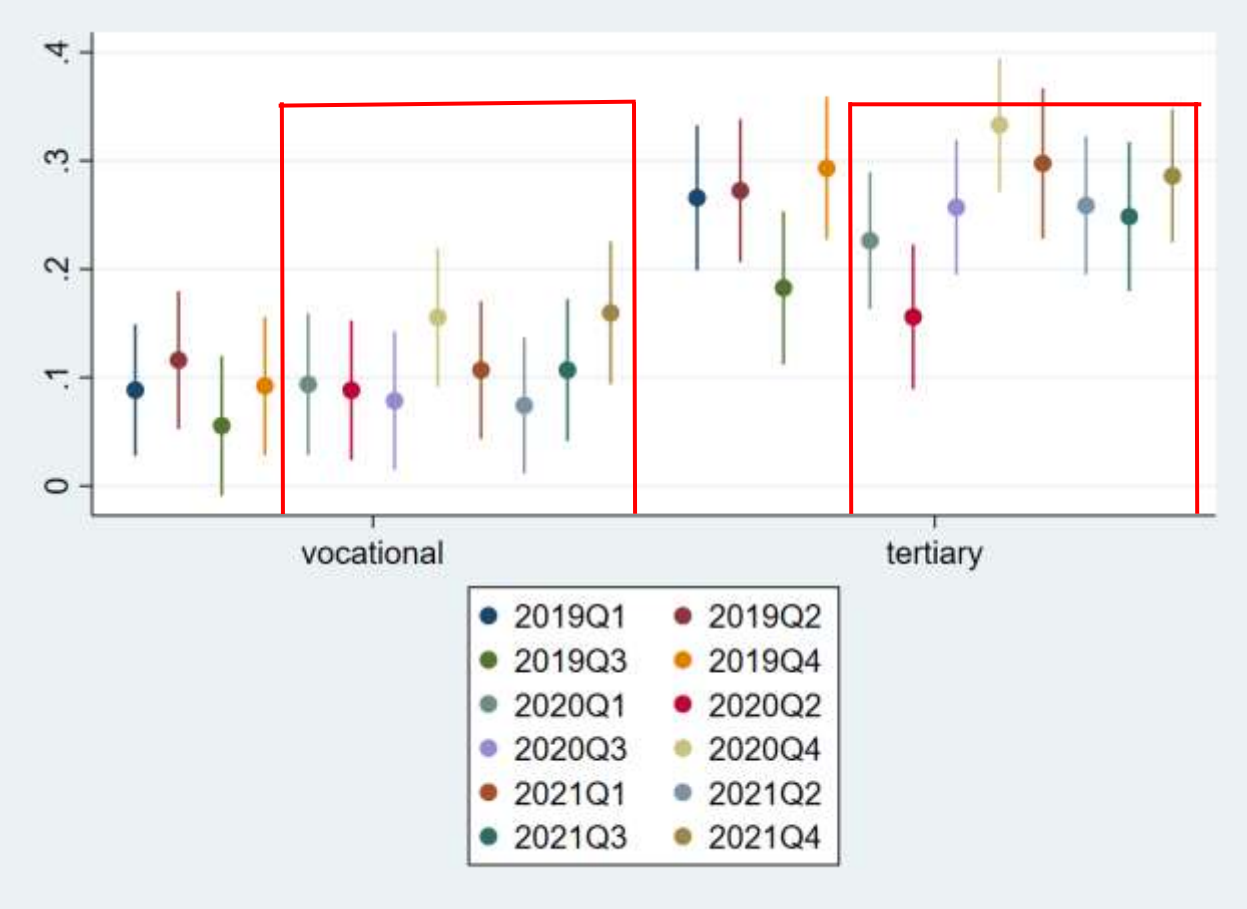
Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

It is worth mentioning that the year 2021 is still a pandemic period, even though no lockdown was imposed by the government. In 2021 the economy was showing signs of recovery from the

pandemic shock; however, the number of infected people was still increasing leading to the third and fourth waves of the virus. The impact is clearly visible on my results. Higher education continues to increase women's probability of working with even higher magnitudes. Furthermore, having a child under 4 years old in the household decreases the chances of labor market participation even more than during 2020.

Figure 18. Coefficients of vocational and tertiary education (secondary education is the reference group) by quarters. 95% Confidence Intervals shown. The area between red lines is the pandemic period.



From the figure it is visible that both the vocational and tertiary education graduates suffered during 2020 in terms of labor market participation probabilities. Vocational education graduates had the lowest probability of participation during the third quarter of 2020 – around 8%. Compared to vocational education graduates, for the tertiary education graduates the worst period was the 2nd quarter of 2020 and the difference is statistically significant. After the 2nd quarter of 2020 the situation is becoming better for tertiary education graduates.

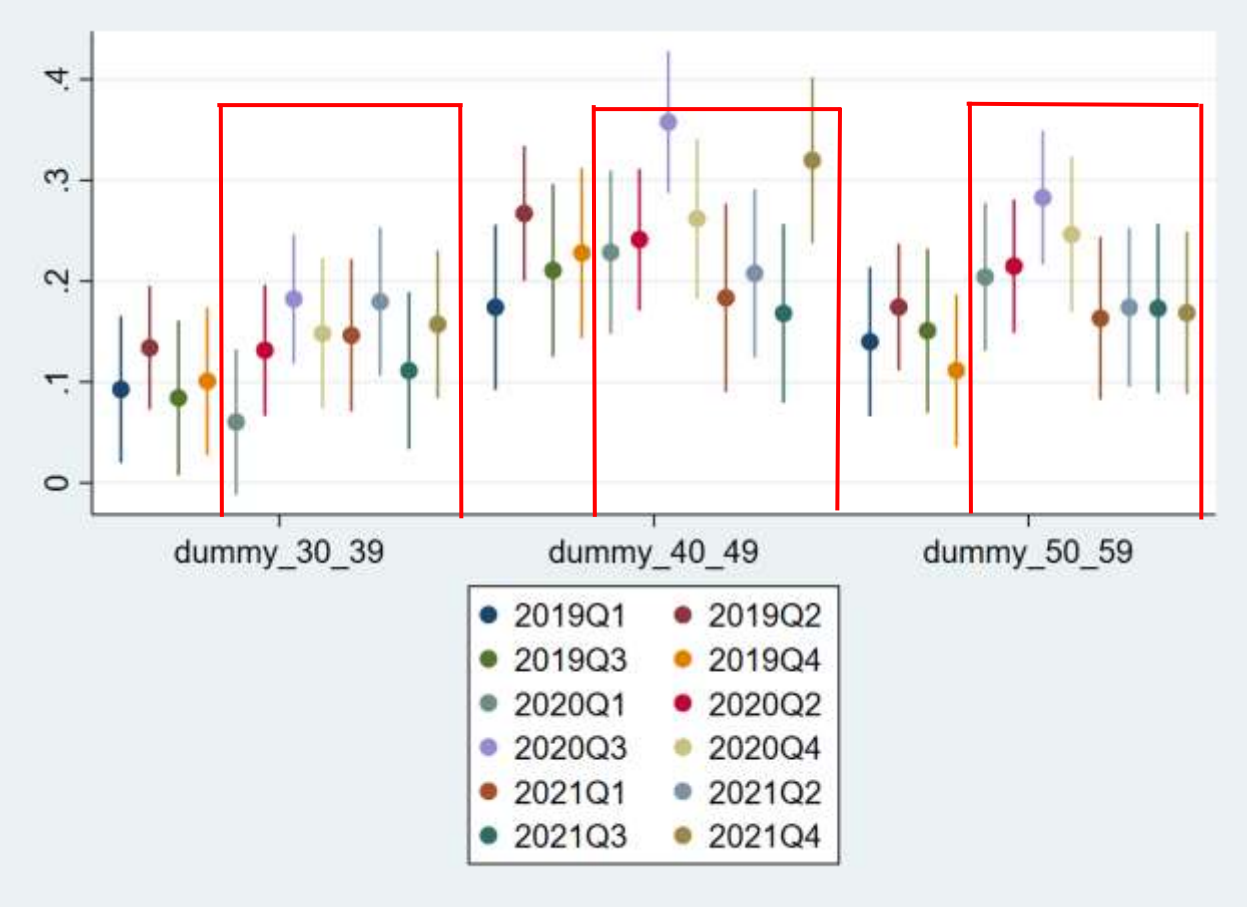
Figure 19. Coefficients of Having a Child under Four by quarters. 95% Confidence Intervals shown. The red line shows the start of the pandemic.

When I compare the coefficient of the variable for child across quarters, I see that during the third quarter of 2020 having a child under four in the household was decreasing the probability of labor market participation more (11%) than during the same quarter of the previous years (8%). The difference is again statistically significant. During the second and third quarters of 2021 this variable has the biggest negative impact on women's working probabilities.

Figure 20: Coefficients of being Married by quarters. 95% Confidence Intervals shown. The red line shows the start of the pandemic.

Being married had the highest negative impact on participation probabilities during the first quarter of 2020. The results show that during that time married women had around 17% less chance of participation in the labor market compared to not married women – who are either single, divorced or widowed. During the second quarter of 2020 there are higher chances of participation for the married respondents compared to the same quarter of 2019, however the difference between these two coefficients is not statistically significant.

Figure 21: Coefficients of age group dummies (age group 20-29 is the reference group) by quarters. 95% Confidence Intervals shown. The area between red lines is the pandemic period.



Looking at the coefficients of the age dummies it is visible that the 30-39 years old women had the lowest chances of labor market participation among all the others compared to the youngest group during 2020. The third quarter of 2020 for all the age groups seems to be beneficial, whereas in the last quarter of 2020 the probabilities are again declining for all age groups.

5 Discussion

To the best of my knowledge, this paper represents one of the initial studies exploring the impact of Covid-19 on the job market in Armenia. Previous research has primarily concentrated on high-income countries possessing well-established labor markets and stable social support systems.

My contribution to the existing literature lies in the utilization of the latest available labor force surveys, enabling an examination of the Covid-19 effects within the context of a transition country.

Overall, the results clearly show that individuals factors such as education, age, marital status, the presence of child and the type of residence had significant impact on women's working probabilities during the Covid-19 pandemic. The mentioned factors were also significant during the pre-pandemic period in 2019 for women's labor market participation. However, the magnitude of the coefficients changed after the Covid-19 started in Armenia. 30-39 years old married women having a child under 4 years in the household and having vocational education had lower chances of working in 2020 and 2021 compared to pre-pandemic period.

As a continuation of the study, I suggest applying the Heckman's two-step bias correction procedure (Heckman, 1974) to estimate the influence of Covid-19 on labor supply and wages in Armenia. Heckman's two-step model is commonly used in econometrics to address sample selection bias, which arises when the selection process affects both the likelihood of being in the sample and the outcome of interest. The exclusion restriction is a crucial assumption in Heckman's two-step model. It states that the variable used in the first step of the model (the participation equation) affects the selection process but does not directly influence the outcome equation. In other words, the variable should only affect the probability of being selected into the sample and should not have a direct effect on the outcome being studied. By having a valid exclusion restriction, it is possible to isolate the impact of sample selection on the estimated outcome equation, allowing us to obtain unbiased and consistent estimates of the relationship between the independent variables and the outcome variable.

If the exclusion restriction is not valid, it means that the variable used in the first step of the model is not only affecting the selection process but also directly influencing the outcome. In such cases, the estimates obtained from Heckman's two-step model may be biased and unreliable, leading to incorrect inferences and conclusions. Therefore, ensuring a valid exclusion restriction is crucial to obtain accurate estimates and make valid statistical inferences using Heckman's two-step model.

According to Little and Rubin (1987), for the Heckman method to work in practice one needs variables that are good predictors of the probability to work but are not associated with wage, when other covariates are controlled. Sadly, it is often very difficult for these variables to be found in

practice. According to Puhani (2000), household variables like children and the income of the spouse are likely to influence the reservation wage, but unlikely to influence the gross offered wage and hence should only be included in the selection equation. However, it is not certain that they are a good indicator of the propensity to work. But even if they are, the household variables may well be also associated with the offered wage, especially if the after-tax wage is being observed, as children and the income of other family members have an impact on the tax rate in many tax regimes.

Conclusion

In this paper I estimate the impact of the Covid-19 pandemic on women's working probabilities using the Armenian Labor Force Surveys data from 2019, 2020, and 2021. The main estimation technique that I use is the linear probability model (LPM) which specifies the probability of working as a function of individual characteristics. The estimates show that education played an important role in determining women's labor market participation both before and during the pandemic. I found that the probability of working in specific quarters in 2020 and 2021 was lower for women 30 to 39 years of age with vocational training than for graduates of tertiary education. Also having a child under 4 years old in the household, being married and residing in urban areas decreases the probability of labor market participation for women during the pandemic.

In addition, the paper offers a comprehensive critical review of the existing literature on how the pandemic impacted labor markets across various countries. Also, the paper provides an exploratory analysis with data visualizations that showed the decrease in actual weekly hours worked and wage rate during the Covid-19 outbreak. The paper contributes to the existing literature on the topic for Armenia because of the lack of existing studies.

As a recommendation for future work, application of Heckman's two-stage bias correction procedure could be considered for estimating the labor supply. This technique is a commonly used approach for dealing with sample selection bias, which arises when the selection process affects both the likelihood of being in the sample and the results of interest. However, for Heckman's two-step model to work one needs a valid exclusion restriction, otherwise the estimates will be biased.

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Appendix

Figure 22. Mean usual and actual weekly hours worked in the second job.

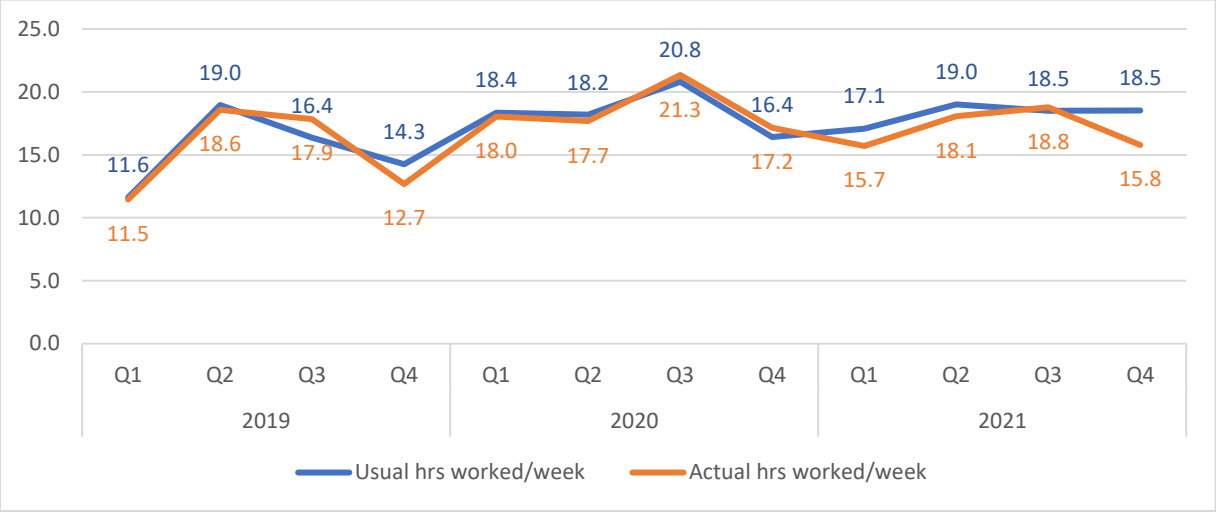

Figure. 23 Labor force participation rate by RA Regions and Yerevan City

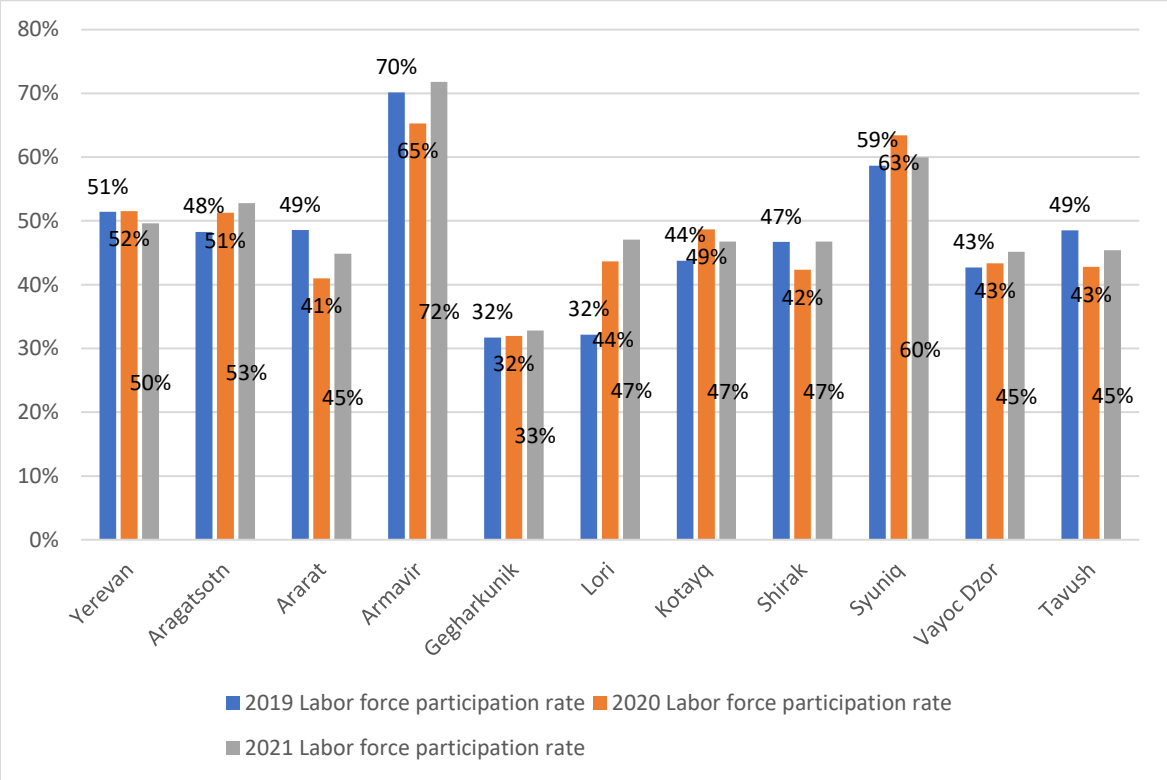

Figure 24. Female population outside the labor force by the category of participants