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The impact of the COVID-19 pandemic on part-time jobs and the issue of gender equality

Barbora GONTKOVIČOVÁ[1*], Emília DUĽOVÁ SPIŠÁKOVÁ[2]

[1] Associate Professor, Faculty of Business Economy with seat in Košice, University of Economics in Bratislava, Slovakia, Email: barbora.gontkovicova@euba.sk

[2] Associate Professor, Faculty of Business Economy with seat in Košice, University of Economics in Bratislava, Slovakia, Email: emilia.dulova.spisakova@euba.sk

*Corresponding Author

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Abstract

The COVID-19 pandemic brought major changes in several spheres affecting the functioning of the economy. One of the most affected areas was the labor market, which underwent changes in most EU member States in recent years. Various flexible forms of employment, which were until then used only to a limited extent in some countries, came to be necessary. The main aim of this article is to describe the possibilities of using part-time jobs as a flexible form of employment and to analyse gender differences in selected indicators related to part-time jobs in the European labor market in order to monitor the impact of the COVID-19 pandemic on the EU member States. The research sample covers all EU countries, while working with selected employment indicators and data for the years 2018 and 2020. Paired T-test, or its non-parametric equivalent The Wilcoxon signed-rank test (based on the results of the normality test) will be used to assess the statistical significance of differences in dependent samples, in our case the values of the rate of total employment and part-time employment in EU member states in 2018 and 2020. In assessing the statistical significance of gender differences, the T-test for independent samples or its non-parametric alternative Mann-Whitney U test (based on the results of the normality test) will be used. The research results confirmed statistically significant differences in the share of part-time workers before and during the pandemic. It has also been shown that both genders have experienced significant changes in the share of part-time workers due to the pandemic, and also that there are significant gender differences between part-time workers. However, the research results did not confirm the statistical significance of the effects of the level of education achieved on part-time employment during the pandemic.

Keywords: *flexibility; part-time job; gender gap; COVID-19 pandemic*

1. Introduction

The Pandemic caused by COVID-19, which broke out throughout the world in early 2020, affected the lives of the majority of the global population and significantly affected individual areas of the economy. It had a negative effect on the development of basic macroeconomic indicators, such as the development of the GDP growth rate, the inflation rate, the volume of consumption, savings and realized investments by economic entities, but also in the number of unemployed and the unemployment rate. The last-mentioned area is one of the most affected (Garrison et al, 2022), because employment and population income have a direct impact on their consumption and standard of living, which significantly affects the demand for products and services with a consequent impact on the overall production in a country.

This topic is very current due to the urgency and importance of this problem and the impact of the COVID-19 pandemic on unemployment has been relatively well documented. Especially females, young people, minority ethnic groups and front-line workers are disproportionately affected (Moen et al, 2020). However, one demographic group, which was not subjected to the same level of analysis, are part-time employees. This article reflects on this shortcoming.

An important part of this article is the monitoring of gender differences in selected indicators related to part-time jobs, because the current situation contributed to widening the gender gap in some countries (Cook & Grimshaw, 2021; Reichelt et al, 2021, Pech, Klanoit-Hess & Norris, 2021). In the interest of the European Union it is necessary to balance the differences between males and females and fight against gender discrimination. The need for change in this area is also supported by the findings of the Special Eurobarometer, according to which up to 44% of Europeans believe that the most important role of females is to take care of the family and the household (European Commission, 2017), whereas females in the European Union provide up to 75% of unpaid care and domestic work (European Commission, 2020). These findings can contribute to the fact that many females prefer taking care of their family and household over work resp. works only part-time or uses another flexible form of employment. This confirmed also the study realised in Spain which indicated that when the partner is employed, mothers are more likely to work in part-time jobs (to balance work and family life) (Hernandez, 2021). Financial remuneration inequality is the most debated issue in the area of gender differences (Hvastová, 2021; Heine, 2015). At the time of the onset of the pandemic, surveys showed that women in the EU Member States earn on average 16% less than men and women's pensions are on average 30.1% lower

than men's pensions (European Commission, 2020). However, gender differences in remuneration are not the subject of our research.

The aim of this article is to describe the possibilities of using part-time jobs as a flexible form of employment and to analyse gender differences in selected indicators related to part-time jobs in the European labor market in order to monitor the impact of the COVID-19 pandemic in the area. The originality of the elaboration of the topic can be seen in the combination of the analysis of gender differences and the impact of the pandemic on the rate of use of part-time jobs in the EU.

The theoretical view of the researched issues with a focus on a specific flexible form of employment, which is part -time job employment, is elaborated in order to meet the objective of this article. It presents the views of various authors on the reasons for using this form of employment, as well as its advantages and disadvantages. The research part of the paper is aimed at comparing and monitoring the relationship between total employment and part-time employment in EU Member States before and during the pandemic and assessing the statistical significance of the differences by using appropriate tests. An important part of the research is to compare the gender gap in part-time employment in the EU and to test the statistical significance of gender differences.

For the purposes of processing the article, data on selected employment indicators will be used for a period of two years, namely 2018 (before the pandemic caused by COVID-19) and 2020 (during the pandemic). In order to obtain data for all member countries of the EU27, data are used explicitly from the Eurostat database. This ensured the consistency of the sample and the use of the same methods of editing the original data. The basic methods used will be paired tests for dependent as well as independent samples by examining the differences in the values of the total employment rate and part-time employment, with an emphasis on demonstrating gender differences. Regression analysis will also be used in order to point out future trends in the development of gender gap in the European Union in the field of part-time employment.

2. Theoretical background

The issue of using atypical employment contracts to increase flexibility in the labor market is a much discussed topic and several research papers on this topic were published in recent years. Flexible forms of employment most often serve workers to reconcile personal and professional life. Also due to technological changes and competitive pressures, their use is increasing in practice (Bolhaar, 2018; Katz & Krueger, 2017). Part-time jobs (shorter working hours), fixed-term jobs, divided jobs and casual jobs may be included.

Part-time jobs are the most common type of flexible job, it is referred to as when the employee performs part-time work, whereas the amount of part-time work is agreed upon by the employer and the employee. On the other hand, a part-time job allows employees to combine paid work with other activities such as education, family care and leisure. On the demand side, the companies use greater workforce flexibility to respond to fluctuations in production demand and manage labor costs more effectively (Cassidy & Parsons, 2017).

The reasons for part-time jobs can be divided into non-economic reasons and economic reasons. Non-economic problems include the most common problems such as childcare, other family or personal responsibilities, health restrictions, education, or retirement (Dunn, 2018). It is for the above reasons that females are more likely to work part-time (Shiri, 2021; Ewing-Nelson, 2020; Barbieri et al, 2019). However, there are studies that point to an increase in part-time work in context of the involved fatherhood (Mercier, Le Couteur, & Delfabbro, 2022). Miežienė et al (2021) distinguish three groups of determinants of part-time employment. These are cyclical factors related to changes in labor demand, political and institutional factors related to labor market institutions and policies, and structural factors characterizing both the demographic and industrial structure of the country. In its study, the impact of all three groups on the part-time employment rate in the EU-28 is confirmed.

Many part-time employees are students and young people (Lewis & Heyes, 2020), people who have spouses / partners working full time, or some have other full-time jobs. Others work part-time because of health reasons (Vedeler & Anvik, 2020) or because they are responsible for childcare. For the above reasons, they are considered to be voluntary part-time employees (Jaworski, 2018). The findings of Evans and Vaughan (2021) study indicate that while students are aware that part-time work helps in developing personal skills, there is a lack of awareness on how part-time work can provide differentiation in the graduate jobs market and support longterm graduate careers. Elderly workers (aged 65 and over) also have an above-average tendency to work part-time. In addition, the decision of an elderly worker to work part-time may be influenced by the approach of retirement and its level of income (O'Sullivan et al, 2021; Cassidy & Parsons, 2017). Baumann et al (2022) in their study suggest that the combination of a statutory right to work part-time in late careers with a more generous welfare regimes, may simultaneously maintain workers' health and motivate them to remain active in the labor force. An important factor supporting part-time jobs is also the subjective satisfaction of the employee with his or her work-life balance (Bertogg, 2021; Jacobsen & Fjeldbraaten, 2020). Other factors, such as the level of education attained, also have a significant impact on deciding whether an employee accepts a part-time job. It is assumed that the higher the education a person achieved, the higher are the demands on the type and manner of the performed work. This is also reflected in the claims for remuneration for the performed work. The results show that individuals with higher education are more likely to work full time (Bermudez, 2021). The orientation of the economy towards services also contributes to the increase in the share of part-time workers. It is the nature of service sector employment that may involve irregular working hours, which means that part-time and casual work are more common in these sectors. Part-time work has a specific meaning in sectors such as accommodation and catering. Part-time employees are a must for these companies. They are a flexible source of labor during periods of fluctuating demand and also play a key role in customer service and retention, leading to savings in labor costs (Jaworski, 2018). In recent years, the share of part-time workers has also increased in the retail sector (Zeytinoglu, 2004; Shiri, 2021).

The structure of part-time employees is influenced by factors such as age, gender, education, economic orientation, but also possible health disadvantages or subjective preferences of the employee in the area of work-life balance. Working time management is a critical component in finding the best way to combine work and private life (Piasna & De Spiegelaere, 2021). A part-time job can reduce the amount of stress the worker is exposed to, because the same level of responsibility may not be entrusted to the worker and may create a better work-life balance. Many part-time jobs are based on customer service, which allows employees to develop interpersonal or critical

thinking skills.

Also the so-called job sharing plays an important role in the context of part-time employment. While in many countries the incidence of part-time jobs is high and growing, the occurrence of the so-called job sharing is much lower (Williamson et al, 2015). This is an alternative work schedule in which two employees voluntarily share the responsibilities of one full-time job and receive a proportional salary. It turned out that job sharing improves retention, reduces employee absenteeism and helps keep work teams motivated by a stimulating environment (Eurofound, 2015).

In terms of gender equality, part-time jobs allow females in particular to be active participants in the labor market. However, it is important to realize that part-time jobs indirectly affect the amount of gained work experience, oppose the promotion of females (van Osch, & Schaveling, 2020; Blau & Kahn, 2013), and thus it is impossible for these females to be promoted to managerial positions (Carli, 2020). At the same time, part-time jobs increase income inequality because their income is much lower compared to men working full time (Flabbi & Moro, 2012). Antonie, Gatto & Plesca (2020) in their study confirmed that the overall gender wage gap is larger than either the full-time pay gap or the part-time pay gap and also indicate that women of higher earnings potential being overrepresented in the pool of part-time workers. The pandemic contributed to raising awareness of the possibility of using individual flexible forms of employment by both employees and employers. Nevertheless, less than 10% of part-time jobs are advertised according to official statistics, which may not be sufficient for a higher offer of part-time work or another flexible form of work created by population (because on the labor market population create offer of the labor and the companies create demand on of the labor). The results of some authors' research suggest that the pandemic confirmed and in some cases exacerbated the fact that work flexibility is absent in front-line workers, in the so-called everyday jobs, which it automatically relies on - from health and social care to retail (Timewise Foundation, 2021). These are selected types of jobs, where the possibility of using flexible forms of employment is significantly lower (in some cases even impossible) and possibly its use would not bring the desired effect. However, a part-time job does not automatically guarantee the required flexibility. For some workers, working hours may be constant and inflexible, while others may be called to work without any early notice. Overall, at the time of the pandemic, only a few front-line employees had autonomy or control over their working hours (Timewise Foundation, 2021). Also, there is needed to pay attention devoted to part-time employment in context of an insufficient or inadequate work hours. Part-time underemployed workers experience more frequent work-to-family conflict, compared to other part-time workers, and no less than otherwise comparable full-time workers and their elevated work-family conflict is intensified when having limited control over their work hours (Kim & Golden, 2022).

When investigating the issue of part-time work, the authors focus on the factors supporting this type of work. They mainly agree on the importance of factors such as age, gender or education of part-time employees. Separate attention is paid to the need for a balance between personal and working life for various reasons, from subjective need to ensuring the care of children and family members to health limitations. From a macroeconomic point of view, the structure of the country's economy plays an important role, namely the orientation towards the service sector. The pandemic caused by Covid-19 has further increased interest in the subject of flexibility on the labor market and part-time work. This is also the reason why we decided to reflect on this request in our article.

3. Methodology

The following study is based on secondary data from the Eurostat statistical database. The EU Statistical Office is the main source of comparable EU data, and the reason for drawing data from a given database is also to maintain the uniformity of their reporting, and thus their suitability for comparison. Labor Force Survey (LFS) statistics were used, in particular, the latest available data on total employment and part-time jobs published by the Eurostat database on 20.08.2022.

For the purposes of the analysis, selected indicators were used in the spatial comparison of EU member States. The years 2018 and 2020 were compared, in an effort to reflect the current impacts of the COVID-19 pandemic.

Data normality assessment is a prerequisite for many statistical tests and parametric testing options. Data normality was tested by the Shapiro-Wilk test for a significance level of α = 0.05. The results of the test are presented as the value of the test statistic W and the p-value associated with it. The formula for the W value is:

$$W = \frac{(\sum_{i=1}^{n} a_i x_{(1)})^2}{\sum_{i=1}^{n} (x_i - \underline{x})^2}, \qquad (1)$$

where xi are the ordered random sample values, ai are constants generated from the covariances, variances and means of the sample (size n) from a normally distributed sample.

Paired T-test, or its non-parametric equivalent The Wilcoxon signed-rank test was used to assess the statistical significance of differences in dependent samples, in our case the values of the rate of total employment and part-time employment in EU member states in 2018 and 2020. The statistical significance of the differences was tested at a significance level of α = 0.05. If the p-value is lower than α, then the null hypothesis is rejected.

The test statistic for the Paired T-test, denoted t, follows the formula:

$$t = \frac{m}{s/\sqrt{n}} \qquad (2)$$

where t means t-statistic, m presents mean of the group, s is standard deviation of the group and n is a sample size. The formula for the Wilcoxon signed-rank test is:

$$z = \frac{w_s - \frac{n(n+1)}{4}}{\sqrt{\frac{n(n+1)(2n+1)}{24}}} \qquad (3)$$

where n presents number of pairs where difference is not 0 and ws is the smallest of the absolute values of the sums.

Gender differences were confirmed in several studies dealing with atypical forms of employment (Shiri, 2021; Ewing-Nelson, 2020; European Institute for Gender Equality, 2014). Gender differences in the various indicators can be described in more detail by means of a gender gap, which is calculated as follows:

gender gap = Um-Uf (4)

where Um represents the value of the indicator in the male category and Uf represents the value of the indicator for the female category.

A positive gender gap means that men achieve a higher

value in the monitored indicator. On the contrary, a negative gender gap informs us that females recorded a higher value in the indicator. In assessing the statistical significance of gender differences, the T-test for independent samples or its non-parametric alternative Mann-Whitney U test (based on the results of the normality test) were used. The statistical significance of the differences was tested at a significance level of α = 0.05, whereas it holds, if the p-value is lower than α, then the null hypothesis is rejected.

The test statistic for the T-test for independent samples, denoted t, follows the formula:

$$t = \frac{m_A - m_B}{\frac{\sqrt{s^2}}{\sqrt{n_A}} + \frac{\sqrt{s^2}}{\sqrt{n_B}}} \qquad (5)$$

where mA and mB present means of samples from two different groups or populations, nA and nB are respective sample sizes and s2 is standard deviation or common variance of two samples

The result of performing a Mann-Whitney U test is a U statistic:

$$U_1 = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1 \qquad (6)$$

$$U_2 = n_1 n_2 + \frac{n_2(n_2+1)}{2} - R_2 \qquad (7)$$

where n1 and n2 are the size of the two samples, and R1 and R2 are the sum of ranks above.

$$U = min\,(U_1, U_2) \qquad (8)$$

If the sample sizes are greater than 10, then the distribution of U can be approximated by a normal distribution. The U value is then plugged into the formula seen here to calculate a z statistic:

$$z = \frac{U - \frac{n_1 n_2}{2}}{\sqrt{\frac{n_1 n_2 (n_1 + n_2 + 1)}{12}}} \qquad (9)$$

Regression analysis was used to estimate the trends feature for predicting the expected development of the gender gap of part-time employment for EU and Netherland (as the country with the highest gender gap). The suitability of the statistically significant model was assessed with the coefficient of determination (R2 or R-squared), F test (the statistical significance of the regression model) and the p-value (the statistical significance of individual regression coefficients). If two or more tested models were statistically significant, the selection was based on a higher coefficient of determination.

Based on the stated aim of the article, we will verify the following hypotheses in chapter Results and discussion:

H1: The pandemic significantly affected part-time employment.

H2: The share of part-time workers led to significant changes in both genders as a result of the pandemic

H3: There are significant gender differences between part-time workers.

H4: The effects of the pandemic were significant for part-time workers with both primary and secondary education.

4. Results and discussion

Part-time jobs, if accessible, evenly distributed and non-discriminatory, can facilitate labor force participation and provide opportunities to improve a work-life balance for both females and males (European Institute for Gender Equality, 2014). It can also be a good way to maintain work habits or reintegrate the unemployed into the work process. This can ultimately also significantly reduce unemployment as well as increase employment rates.

The aim of this article is to analyse the effects of the pandemic caused by COVID-19 on the employment rate of the workforce aged 15-64 in the Member States of the European Union with a focus on part-time jobs. Based on the available data (Figure 1), it can be stated that compared to 2018, the part-time job employment rate in the EU27 decreased slightly by 0.1 percentage points to 18.2%

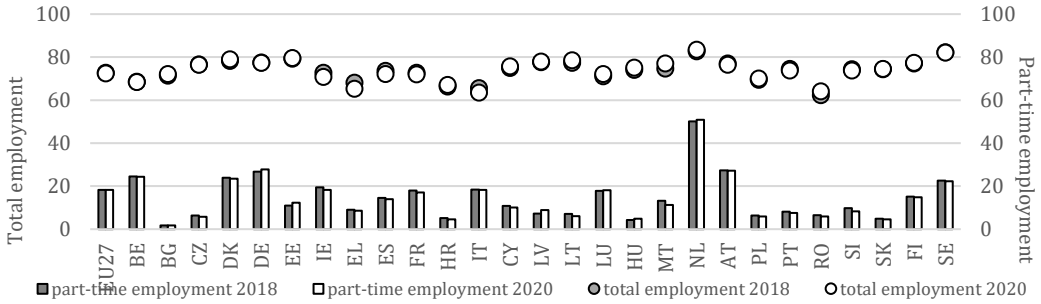

Figure 1: Employment and part-time jobs in the EU (2018, 2020; in %)
Source: own processing based on Eurostat data

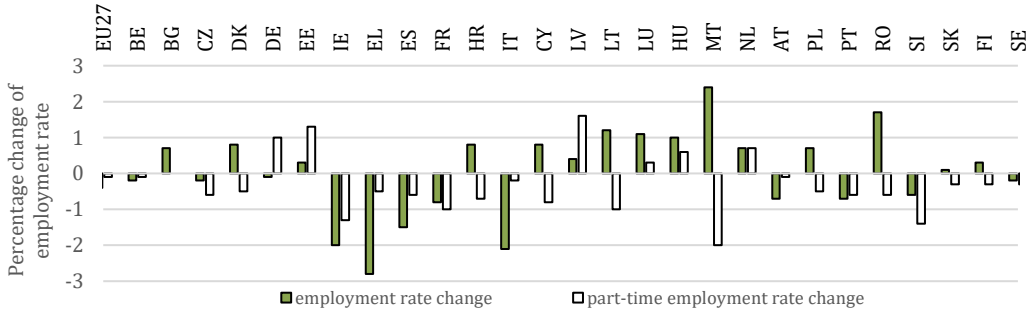

Figure 2: Dynamic approach – percentage change of employment and part-time employment rate between 2018 and 2018 (in

%)
Source: own processing based on Eurostat data

The highest share of part-time workers was recorded in 2020 in the Netherlands (50.8%), which is an extreme value from a descriptive point of view. In 2020, more than 20% of the workforce also worked part-time in Germany (27.8%), Austria (27.2%), Belgium (24.4%), Denmark (23.4%) and Sweden (22.3%). Only these countries show values higher than the EU average (18.2%). In the case of the Netherlands and Sweden, these are the countries with the highest employment rates in the EU, above 80%.

On the basis of the available statistics from Eurostat database, it is also possible to state that people employed in the field of services create the largest share of part-time employment in these developed countries with high employment rates. About a third of part-time workers work in public administration, defense, education, health care and social work and a quarter in wholesale, retail, transport, accommodation and catering.

On the contrary, Italy has the lowest employment rate among the analysed countries at 63.5%, while the share of part-time workers representing the EU average is 18.2%. Countries such as Romania, Greece and Croatia have employment rates of up to 67%, in which part-time jobs are significantly lower than in Italy and are below 8%. Overall, however Bulgaria has the fewest part-time workers (1.8%). The three countries from the Visegrad Group, namely Slovakia (4.6%), Hungary (4.8%) and the Czech Republic (5.7%), are among the last five countries (together with Croatia and Bulgaria). The average employment rate in these five countries is 73.04% (that is more than EU27 average). The low share of part-time workers in these countries can be explained by the fact that most workers are conservative and prefer to do fixed - term work. This is mainly related to their aversion to uncertainty, but also to their responsibility and the need to provide for themselves and their families (Lo Presti et al, 2018). The strength of the link between part-time jobs and insecurity varies depending on the national institutional context of part-time jobs, including the degree of gender segregation of part-time jobs and legal protection for part-time workers (Fullerton et al, 2020). For example, working part-time in Slovakia is not common. Part-time jobs create less than 10% of total job portals. Part-time workers have more frequent volatile plans than full-time workers, whereas employers are more likely to inform part-time employees about work schedules one week or less in advance in comparison to full-time employees (Ewing-Nelson, 2020). Pandemics also contributed to the increased uncertainty associated with this type of job, when part-time employees were more likely to lose income and have a lower chance of being redirected to work from home in comparison to full-time workers (Ingelsrud, 2021).

The stated effects of the pandemic on part-time employment are confirmed by Figure 2. In 20 EU countries, the rate of part-time employment decreased. This decrease was most pronounced in Malta (-2 percentage points), Slovenia (-1.4 percentage points) and Ireland (-1.3 percentage points). At the same time, we have seen an increase in part-time employment in six EU countries (namely Germany, Greece, Latvia, Luxembourg, Hungary and Netherlands).

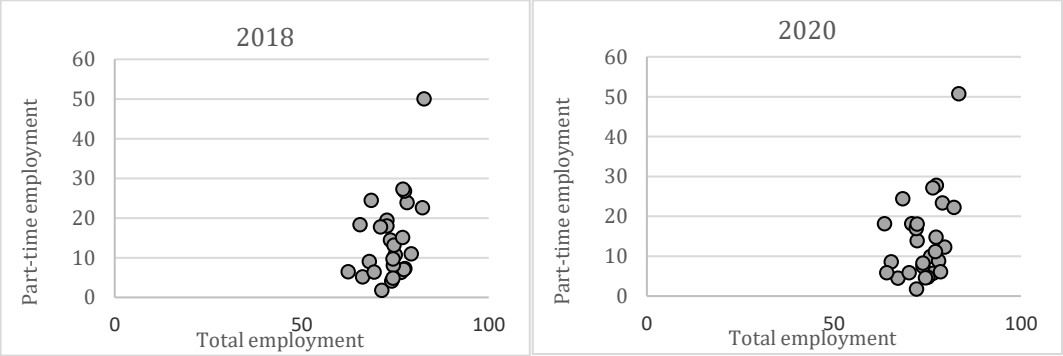

Figure 3: Employment and part-time jobs in the EU (2018, 2020; in %)
Source: own processing based on Eurostat data

The relationship between total employment and part-time jobs is ambiguous (Figure 2 and 3). Different combinations of these two indicators are observed in the sample of countries with the highest employment in 2020. In addition to the already mentioned countries with a high employment rate and at the same time a relatively high rate of part-time jobs, countries such as Estonia, Lithuania and Latvia can also be noted. Employment in these countries converges to 80%, but at the same time the share of part-time workers is 12.3% in Estonia, 8.9% in Latvia and 6.1% in Lithuania. The largest difference between the two monitored indicators is reported in Lithuania. The share of part-time workers does not depend on the overall employment rate in the country, but it is influenced by factors such as the legislative regulation of atypical forms of employment, the promotion of work-life balance, the personal reasons of workers or the conservative approach to work.

Shapiro-Wilk Test				
	employment 2020	employment 2018	part time job 2018	part time job 2020
W-stat	0.9702	0.9700	0.8576	0.8459
p-value	0.6065	0.6026	0.0016	0.0010
alpha	0.05	0.05	0.05	0.05
normal	yes	yes	no	no

Table 1: Data normality test - employment and part-time job

It can be stated that there was a decrease in the employment rate when comparing 2018 and 2020 in twelve countries (Figure 2). The largest decreases were recorded in Greece (2.8 percentage points), Italy (2.1 percentage points) and Ireland (2 percentage points). Part-time jobs also declined in these countries. On the contrary, employment growth between 2018 and 2020 was recorded in Malta (by 2.4 percentage points), while in that country the share of part-time employment of total employment fell by 2 percentage points, which is the highest in the EU. Part-time jobs increased by 1.0 percentage points or more in Latvia, Estonia and Germany.

The statistical significance of the differences in the monitored sample of countries in 2018 and 2020 can be assessed by a paired test, which is preceded by a normality test (Table 1).The T-test for the two paired samples was used for the employment rate in the EU (normal distribution) and the Wilcoxon test for the share of part-time workers (Table 2). Based on the test results of paired samples (p> α), the null hypothesis could not be rejected. "Average employment in EU member states is comparable in both years." Despite the differences between countries and the impact of the pandemic, year-on-year changes in the employment rate are not statistically significant. However, significant differences between EU countries in the share of part-time workers are observed. The values range from 1.8-47.6 %.

T Test for Paired Samples – Total employment			Wilcoxon Signed-Rank Test for Paired Samples – Part time employment		
	One Tail	Two Tail		One Tail	Two Tail
p-value	0.4299	0.8598	std dev	39.3192	ties
t-crit	1.7056	2.0555	z-score	1.8439	yates
lower		-0.5101	effect r	0.2509	
upper		0.4286	p-norm	0.0326	0.0652
sig	no	no	sig	yes	yes

Table 2: Paired sample test results

The difference is also confirmed by the results of a paired test, which identified statistically significant differences in the share of part-time workers before the pandemic in 2018 and during the pandemic in 2020. Based on the achieved results, the first established hypothesis can be confirmed, and thus that the pandemic significantly affected part-time employment.

It is important to further analyse these results from the perspective of gender equality. In practice, females are more likely to switch from full-time employment to shorter working hours than men. Gender differences in part-time jobs have not only implications for the economic independence of females, but can also reinforce norms, attitudes and stereotypes regarding traditional gender roles, which are generally detrimental to gender equality (Carli, 2020; European Institute for Gender Equality, 2014). The most common reasons for doing part-time jobs for females are personal and family responsibilities. Part-time jobs are suitable for several disadvantaged groups in the labor market. They may be particularly suitable for females and mothers of young children (Barbieri et al, 2019). This form of employment can be a chance for them to maintain work habits and skills. Typical part-time employees include also e.g. disabled people who are unable to work full time, although, in practice most of them do not work at all (Vedeler & Anvik, 2020; Kopycińska & Kryńska, 2015).

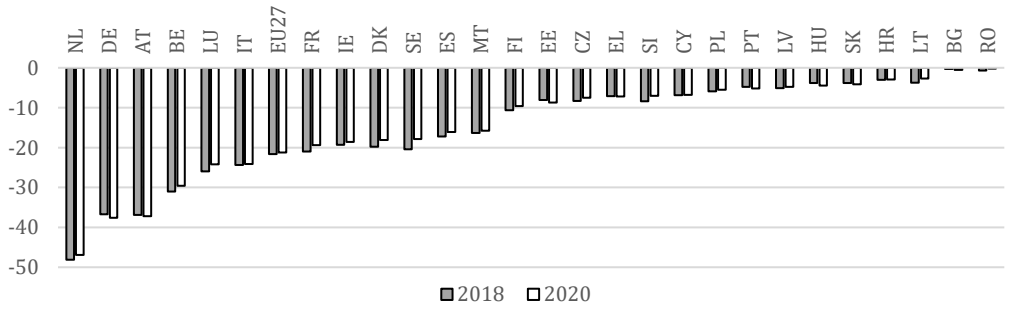

Figure 4: Gender employment gap for shorter working hours (2018, 2020, %)
Source: own processing based on Eurostat data

Figure 4 shows the difference between part-time employment for males and females. In 2020, on average in the EU, more than a quarter (29.6%) of employed females aged 15-64 worked part-time, which is a much higher share than the corresponding share of males (8.4%). Within the analysed countries, the already mentioned Netherlands still exceeds this ratio, where up to 75.5% of females and also a higher share of males (28.6%) preferred this type of employment when compared to 2018. As the main reason for preferring this type of work, up to 33.6% of Dutch females stated the need to care for disabled adults or children. From the perspective of males, up to 37.5% of them stated that the main reason for choosing a part-time job was participation in education or training. The result of these values is therefore a negative gender gap of 46.9%. All other EU member states also show a negative gap, however, the values are lower. In Germany and Austria it is 37%, Romania has a minimum gender gap of less than 1% (-0.2%) and Bulgaria (-0.5%), which can be explained by the generally low part-time employment rate in these countries.

Shapiro-Wilk Test				
	2018 males	2020 males	2018 females	2020 females
W-stat	0.7833	0.7793	0.8757	0.8677
p-value	0.0001	0.0001	0.0039	0.0026
alpha	0.05	0.05	0.05	0.05
normal	no	No	no	no

Table 3: Data normality test - part-time jobs for males-females

The normality test (Table 3) showed that the data samples for males and females do not have a normal distribution. The aim of this article was to find out whether the pandemic caused by COVID-19 had a statistically significant impact on the employment of men and the part-time employment of females in the member states of the European Union. A paired Wilcoxon test was used for this purpose. Its results (Table 4) when comparing the share of part-time working men before and during the pandemic did not show statistically significant differences. The range of values of the employment rate of females working part-time in 2020 was in the range of 2.10 % (in Bulgaria) - 75.50 % (in Netherland). The paired test confirmed statistically significant differences in the employment rate of females working part-time when comparing the two periods. Four countries, namely Bulgaria, Greece, Latvia and Hungary experienced a decline in the employment of part-time working females during the pandemic. There was an increase in the observed indicator in all other countries.

Wilcoxon Signed-Rank Test for Paired Samples				
	2018 males	2020 males	2018 females	2020 females
	one tail	two tail	one tail	two tail
std dev	39.3478	ties	39.3637	ties
z-score	0.4702	yates	2.4769	yates
effect r	0.0640		0.3371	
p-norm	0.3191	0.6382	0.0066	0.0133
p-exact	175.5		0.0055	0.0110
sig.	no	no	yes	yes

Table 4: Test results of paired samples

Based on the achieved results, it is not possible to confirm the second established hypothesis, according to which there was a significant change in the share of part-time workers in both genders as a result of the pandemic. Significant differences were only identified in the case of females.

In an effort to highlight gender differences, the comparative analysis was supplemented by the Mann-Whitney test for two independent samples (Table 5).The share of males and females working part-time before and during the pandemic was compared. In both cases, the test confirmed statistically significant differences between the genders, thus confirming the third hypothesis.

Mann-Whitney Test for Two Independent Samples				
	2018 males	2018 females	2020 males	2020 females
	one tail	two tail	one tail	two tail
U	115		128	
mean	364.5		364.5	
std dev	57.7980	Ties	57.7969	ties
z-score	4.3081	Yates	4.0833	yates
effect r	0.5863		0.5557	
p-norm	8.23297E-06	1.64659E-05	2.2204E-05	4.4408E-05
p-exact	2.74247E-06	5.48494E-06	9.55793E-06	1.91159E-05
sig.	yes	yes	yes	yes

Table 5: Test results of independent samples

In view of the above, it was tested as to whether there were significant changes in the part-time employment rate due to the level of education as a result of the COVID-19 pandemic. Based on the available data from Eurostat, it can be stated that in terms of the level of attained education, part-time work is preferred by employed persons in the EU with upper secondary and post-secondary non-tertiary education (levels 3 and 4).

Shapiro-Wilk Test												
	Primary education (levels 0-2)				Secondary education (levels 3 and 4)				Tertiary education (levels 5-8)			
	2018		2020		2018		2020		2018		2020	
	M	F	M	F	M	F	M	F	M	F	M	F
W-stat	0.680	0.626	0.672	0.616	0.610	0.465	0.604	0.460	0.667	0.653	0.637	0.627
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
alpha	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
normal	no	no	no	no	no	no	no	no	no	no	no	no

Table 6: Data normality test - part-time work according to education

So far, the results confirmed statistically significant differences in part-time employment of females (Table 5). Based on the results of the normality test (Table 6), the differences in the part-time employment rate of males and females before and during the pandemic, based on the level of education attained, were tested by the Wilcoxon Signed-Rank Test for Paired Samples (Table 7).

	Wilcoxon Signed-Rank Test for Paired Samples – males						Wilcoxon Signed-Rank Test for Paired Samples – females					
	Primary education (levels 0-2)		Secondary education (levels 3 and 4)		Tertiary education (levels 5-8)		Primary education (levels 0-2)		Secondary education (levels 3 and 4)		Tertiary education (levels 5-8)	
	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020
	one tail	two tail	one tail	two tail	one tail	two tail	one tail	two tail	one tail	two tail	one tail	two tail
Mean	189		189		162.5		189		189		162.5	
std dev	41.622	ties	41.620	ties	37.165	ties	41.622	ties	41.623	ties	37.162	ties
z-score	2.727	yates	1.273	yates	2.395	yates	3.688	yates	2.967	yates	2.355	yates
effect r	0.371		0.173		0.332		0.502		0.404		0.327	
p-norm	0.003	0.006	0.101	0.203	0.008	0.016	0.000	0.000	0.002	0.003	0.009	0.019
p-exact	0.003	0.005	0.101	0.202	0.007	0.015	0.000	0.000	0.001	0.002	0.008	0.016
sig.	yes	yes	no	no	yes	yes	yes	yes	yes	yes	yes	yes

Table 7: Test results of paired samples

As we can see, the statistical significance differences in part-time employment due to Covid-19 pandemic were recorded in case of primary education and tertiary education of men and in all education levels of women. The differences are not statistically significant for men with secondary education. This may be due to the fact that the number of men working part-time with this level of education is almost twice as high as the number of men working part-time with primary or tertiary education. As a result of the pandemic, this group reacted much less sensitively to changes in the labor market, as part-time work does not represent a big change for many of them.

Using the Mann-Whitney test (Table 8), the share of males and females working part-time was compared with the level of attained education before and during the pandemic. Statistically significant differences were confirmed in tertiary education in both tested years. This means that gender inequality in part-time employment is manifested in the population with the highest education. Women with higher education have a significantly higher tendency to work part-time than men with the same education. And the Covid-19 pandemic did not significantly affect this situation.

	Mann-Whitney Test for Two Independent Samples – 2018						Mann-Whitney Test for Two Independent Samples – 2020					
	Primary education (levels 0-2)		Secondary education (levels 3 and 4)		Tertiary education (levels 5-8)		Primary education (levels 0-2)		Secondary education (levels 3 and 4)		Tertiary education (levels 5-8)	
	M	F	M	F	M	F	M	F	M	F	M	F
	one tail	two tail	one tail	two tail	one tail	two tail	one tail	two tail	one tail	two tail	one tail	two tail
U	311.5		276		227		304.5		276		227	

Mean	364.5		364.5		338		364.5		364.5		338	
std dev	57.801	ties	57.804	ties	54.639	ties	57.798	ties	57.804	ties	54.641	ties
z-score	0.908	yates	1.522	yates	2.022	yates	1.029	yates	1.522	yates	2.022	yates
effect r	0.124		0.207		0.281		0.140		0.207		0.280	
p-norm	0.182	0.364	0.064	0.128	0.022	0.043	0.152	0.303	0.064	0.128	0.022	0.043
p-exact	0.181	0.362	0.064	0.129	0.021	0.043	0.151	0.302	0.064	0.129	0.021	0.043
sig.	no	no	no	no	yes	yes	no	no	no	no	yes	yes

Table 8: Test results of independent samples

In the next part of the article, we focused on predicting the future development of gender gap in part-time employment for the next two years using regression analysis. We specifically focused on the Netherlands, as the country that showed the highest gender gap in part-time employment of all EU member countries in the monitored years. We compared the results with average values for the EU27.

There is a relatively strong governmental support for women to reduce their working hours for family responsibilities in many Western European countries despite less traditional gender roles (Fahlén, 2014, Pollmann-Schult, 2016). In these countries, a modified male breadwinner model is promoted and shorter part-time working hours (less than 20 hours per week) (Beham et al, 2018). Gender Inequality Index is a composite measure of objective indicators reflecting gender inequality in reproductive health, female empowerment, and labor force participation. The Netherlands assume a unique position as highly gender egalitarian society (based on Gender Inequality Index) with the highest part-time employment rates for both men and women in Europe.

The current trend of the development of the indicator expressing the gender gap in part-time employment in Netherland and EU27 can be described by several functions (Table 9). To select the most appropriate and accurate trend, it is necessary to monitor the determination coefficient (R2) but also the p-value and the F test result, which must be less than 0.05 (Tables 10 and 11).

	Trend	Function	R Squared
EU27	linear polynomial 2nd degree logaritmic	y = 0.1786x - 24.0577 y = -0.0417x2 -0.4053x -22.5979 y = 0.6531ln(x) – 23.941	0.5857 0.9371 0.3027
NL	linear polynomial 2nd degree logaritmic	y = 0.4593x -48.3 y = 0.0309x2 - 0.0272x -47.2196 y = 1.9933ln(x) – 48.543	0.9036 0.9485 0.6574

Table 9: Expected development of the gender gap in part-time employment
Source: own research

Based on the results of testing, the most appropriate function describing the indicator's development in EU27 is the polynomial function of the second degree. The p-value for the constant is 5.34E-16 < 0.05, while for the regression coefficients, it is 0.000499 < 0.05 and 2.12E-05 < 0.05, which proves the statistical importance of the constant and the regression coefficients. The result of the F test 9.82E-07< 0.05 proves the statistical importance of the estimated model (Tables 10 and 11). Such a development of the monitored indicator can be expected in the future with a probability of 93.71 %.

Similarly, in the case of Netherland, to select a suitable development trend, in addition to the determination coefficient (R2), the p-value and the F test result must be monitored (Tables 10 and 11). Based on the test results, the linear function whose p-value for the constant is 24.79E-19< 0.05 is the most appropriate function describing the development of the indicator so far, indicating the statistical significance of the constant. The p-value for the regression coefficient is 0.000389 < 0.05, which also confirms its statistical significance. The F test result is 6.34E-07 < 0.05, indicating that the selected model is statistically significant. The probability that the indicator will follow this trend in the future is only 90.36%.

Testing Results	EU27	NL
Multiple R	0.9681	0.9506
R Square	0.9371	0.9036
Adjusted R Square	0.9246	0.8949
Standard Error	0.2496	0.6102
Observations	13	13
F-test	9.82E-07	6.3377E-07
Significance of individual regression coefficients	yes	yes

Table 10: Testing results for regression models

		coeff	std err	t stat	p-value	lower	upper
EU27	Intercept	-22.5979	0.244311	-92.4966	5.34E-16	-23.1423	-22.0535
	Degree 1	-0.40534	0.080261	-5.05035	0.000499	-0.58418	-0.22651
	Degree 2	0.041708	0.005579	7.476606	2.12E-05	0.029279	0.054138
NL	Intercept	-48.3	0.359022	-134.532	4.79E-19	-49.0902	-47.5098
	Degree 1	0.459341	0.045232	10.15511	6.34E-07	0.359785	0.558897

Table 11: Estimated parameters for regression models

Based on the above (statistically significant) trends, we tried to estimate the future values of the indicator expressing the gender gap in part-time employment in Netherland and EU27 in 2022 and 2023 (Figure 5). If the current development of the monitored indicator in EU27 will be governed by the polynomial function of the second degree, the gender gap will decrease to 19.3% by 2023. Similarly for Netherland, if the current development of the monitored indicator in this country will be governed by the linear function, the gender gap will decrease to 41.41% by 2023.

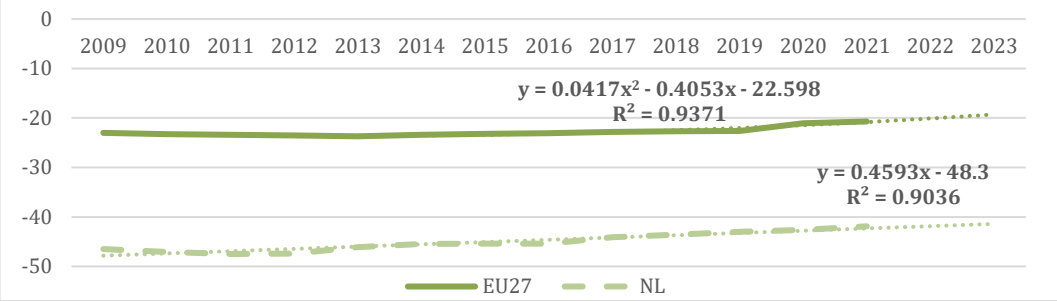

Figure 5: Expected development of the gender gap in part-time employment in EU27 and Netherland

5. Conclusions

The aim of this article was to describe the possibilities of using part-time jobs as a flexible form of employment and to analyse gender differences in selected indicators related to part-time jobs in the European labor market in order to monitor the impact of the COVID-19 pandemic in the EU27 area.

Indicators of the development of forms of employment indicate a tendency for a greater flexibility of the labor market. The relationship between the main forms of employment, permanent employment (fixed-term employment contracts) and temporary employment (fixed-term employment contracts - temporary, occasional and seasonal work) gradually changed over the last 20 years in favor of temporary employment. Based on the results, we can state that the share of part-time workers does not depend on the overall employment rate in the country, but it is influenced by factors such as the legislative regulation of atypical forms of employment, the promotion of work-life balance, the personal reasons of workers or the conservative approach to work. Nowadays,the highest share of part-time employment was noticed in the developed countries of Western and Northern Europe, such as the Netherlands, Germany, Austria, Denmark and Sweden. However, as a result of the pandemic, this positive development slowed down, as confirmed by the results. There was a decrease in the EU 27 from 18.3% to 18.2% when comparing the years 2018 and 2020. The representation of countries with very low part-time employment rates is evident. These are often countries with below-average total employment among the EU27 countries, such as Romania, Greece or Croatia, where an increase in part-time employment could have a significant positive effect on their labor market. However, there was even a decrease in part-time employment in Greece in the monitored period.

We are currently facing both the opportunity, but also the real social necessity, to create flexible jobs as part of economic recovery. This is particularly important for females who lost their jobs or were forced to quit for various reasons, as well as for those who remained in work, but are now stagnant and have few opportunities for promotion.

In the last two years, part-time workers have been disproportionately affected by the pandemic situation compared to full-time workers, facing higher rates of part-time job redundancy and termination of employment. Their working hours were reduced, especially during the lockdown period, whereas part-time workers could be expected to remain temporarily unemployed in one quarter and to remain temporarily unemployed in the following quarter. As a result it was possible to see the difference when compared to full-time employees, who returned to their normal working hours at a higher rate than part-time employees (Timewise Foundation, 2021). This fact was verified by means of H1: The pandemic significantly affected part-time employment. Statistically significant differences were identified in the share of part-time workers before the pandemic in 2018 and during the pandemic in 2020, thus confirming H1. While the differences in the overall employment rate were not statistically significant.

It was not possible to confirm H2 based on the achieved results: There was a significant change in the share of part-time workers in both genders as a result of the pandemic. Significant differences were only identified in the case of females. In some countries (mostly southern and eastern European) the employment rate of part-time working females was twice as high in the reference years than the rate of part-time working males. However, employment rates for part-time working females were almost five times higher in other countries than the rates for part-

time working males (e.g. Austria, Malta, Germany, Luxembourg and the Czech Republic). In the Netherlands, up to 75.5% of employed females worked part-time in 2020, which is much higher than the share of employed men (28.6%). Overall, significant heterogeneity in atypical employment is dominant among EU member states despite the fact that across the EU27 countries we observe a negative gender gap in all cases.

Gender differences in part-time employment were documented by means of H3: There are significant gender differences between part-time workers. The share of males and females working part-time before and during the pandemic was compared. In both cases, the test confirmed statistically significant differences between the genders, thus confirming H3. The pandemic thus significantly affected part-time unemployment, regardless of gender.

As theory indicated (Bermudez, 2021), the level of education attained, have the impact on deciding whether an employee accepts a part-time job.. For both genders, the highest representation of part-time workers is among workers with secondary education. Based on H4, the effects of the pandemic were expected to be significant for part-time workers with primary and secondary education. However, H4 could not be confirmed because in the case of males with secondary education working part-time the statistical significance of the differences was not confirmed. On the contrary, the results pointed to the fact that the pandemic affected part-time workers with a university education to the greatest extent, regardless of gender.

The current pandemic situation contributed to the changing nature of part time work. Despite the increase in part-time jobs in the last decade, COVID-19 caused a slight decline in this form of work in up to 20 member countries between 2018 and 2020. In all countries, the share of part-time working females is dominant compared to the share of part-time working males. Their share of full employment is therefore lower, even for the reason that females, especially in Western Europe, perform two-thirds of all unpaid care, including domestic work, childcare and care for the elderly.

The selection of data for our research and their source corresponded to the purpose of the paper to analyse the effects of the pandemic caused by COVID-19 on the part-time employment rate in the Member States. The choice of the source data was conditional by condition of the uniformity of data reporting, actuality and subsequent comparability. That is why this study is based on secondary data from the Eurostat statistical database. This could also be the potential limitation of our research. For a deeper analysis of part-time employment, it would be appropriate to work with primary data obtained, e.g. from a questionnaire survey. This would allow the analysis of the causality of the factors supporting part-time employment in a particular country.

The state has an important role to play in supporting women's work. It needs to increase the benefits that employers are obliged to provide to part-time employees, including paid incapacity for work, parental leave and health insurance (Shaw et al, 2020). At the same time, there is a need for action by employers, which could be supported by the state, for example through the organization of training that would teach employers to give their employees greater work flexibility. This would greatly benefit employees who have responsibility for care, by reducing stress and mental distress (Kossek et al, 2019).Employers can thus attract and retain females by offering them more flexible plans, part-time work and teleworking opportunities that can help their work-life balance. Also, the task of the employer is to build an environment where the employees on part-time jobs feel respected at work and understood. These factors have a significant impact on their overall workplace satisfaction and desire to stay at an organization. Governments can also provide tax incentives for people with a second income in the family and ensure that public care programs for children and the elderly are widely available (Smit, et al.2020)

At the same time, the gradual elimination of gender differences remains a necessary challenge for the coming years (Stebe & Vovk, 2021; Carli, 2020; Marois et al, 2019), and not only in employment. The percentage of working females can be expected to continue to rise, as more families than ever before are dependent on working for their survival. The number of single working mothers with young children is increasing, and human resources professionals will also need to adapt their personnel policies to better suit these individuals. In order to improve the perception of part-time work, it would be appropriate for the HR managers themselves to change their approach to the provision of these temporary jobs as well as appropriately communicate the benefits of part-time work.

In this context, it is essential to be aware of another very important fact. Not everyone who works part-time works voluntarily. Involuntary part-time employees want to move forward and work full time, but they do not have the opportunity. Due to unfavorable business conditions, their number is relatively high in the services sector (Cajner, 2014). It would be appropriate to supplement the research done in the future with an indicator of the share of involuntary part-time workers with a renewed emphasis on the issue of gender differences.

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