European Research Studies Journal
Volume XXVIII, Issue 1, 2025

pp. 127-137

Unemployment Structure in the Visegrad Group Countries in 2009-2023

Submitted 14/12/24, 1st revision 21/12/24, 2nd revision 19/01/25, accepted 15/02/25

Anna Landowska[1]

Abstract:

Purpose: *The aim of the article is to analyse the unemployment level and its interdependencies in the Visegrad Group countries in the years 2009–2023.*
Design/Methodology/Approach: *The research used Eurostat data on unemployment in the Czech Republic, Hungary, Poland and Slovakia. To achieve the research objective, statistical indicators and verification of statistical hypotheses were used.*
Findings: *There are differences in the percentage distribution of the number of unemployed people in the years 2009-2023 in the individual Visegrad Group (V4) countries, both for the entire unemployed population and for women and men. The number of unemployed women and men in the individual V4 countries does not differ significantly. There is a very strong positive correlation between the number of unemployed women and men in the V4 countries.*
Practical Implications: *Indicating differences and similarities in the structure of unemployment between the V4 countries is important due to their similar geographical location and the same date of accession to the EU structures. Studies indicate that despite similarities, the structure of unemployment in the given countries in the period under review is diverse.*
Originality/Value: *The article makes a significant contribution to the development of knowledge on the differences and relationships between the unemployment structure of the Visegrad Group countries in recent years, i.e. the period after their accession to the EU structures. The statistical methods used for the analysis indicate that it is possible to assess the scale of unemployment in individual countries comparatively.*

Keywords: *Unemployment, labour market, Visegrad Group.*

JEL codes: *C1, C12, J01, J4.*

Paper type: *Research article.*

Research funding: *Co-financed by the Minister of Science under the "Regional Excellence Initiative".*

[1]*Ph.D., University of Szczecin, Institute of Spatial Management and Socio-Economic Geography, Poland, e-mail: anna.landowska@usz.edu.pl;*

1. Introduction

The labor market in the European Union countries is a market of many development opportunities for the population living in this area. The number of unemployed residents of the EU has been changing over the last few years, especially in the countries that have recently joined the EU structures.

The paper presents an analysis of the unemployment level of the Visegrad Group (V4) countries, which include: Czechia, Hungary, Poland, and Slovakia. This topic is still relevant, in the scientific literature we can find many works on the labor market and the level of unemployment in the EU countries.

In the article (Zieliński, 2015), the labor market of the Visegrad Group at the turn of 2007-2012 was described, and the impact of the economic crisis on these countries was presented. In this work, the authors conclude, among other things, that discrimination against women was not observed on the labor market, but the economic crisis caused an increase in unemployment among young people.

The work (Bieszk-Stolorz *et al.*, 2020) presents an assessment of the labor market of the Visegrad Group in the years 2002-2019 in relation to other European Union countries. The conclusions presented in the article indicate that the accession of the V4 countries to the EU has had a beneficial effect on the labor market in these countries at the turn of recent years. In the work (Skrętowicz *et al.*, 2016), the authors presented how unemployment developed in selected European Union countries in the years 2000-2014. The presented comparison of unemployment data also applies to the countries of the Visegrad Group.

The authors noted that the economic crisis occurring at that time had an even impact on the labor market of EU countries. The differentiation of the labor market between EU countries is high. Due to these differences, the EU labor market at that time was not uniform. A study of the labor market in the 27 EU member states in terms of the degree of unemployment persistence was described by (Caporale *et al.*, 2022). The conducted studies indicate a high level of unemployment persistence in all 27 EU countries. The authors of the work indicate that the pandemic had a mixed impact on the labor market in these countries.

The analysis of the labor market of the EU Central and Eastern European countries in the years 2011-2022 was described by (Kwiatkowski *et al.*, 2024). In their work, they present differences between the countries under consideration in terms of the unemployment rate, or the flow of people between employment and unemployment.

Another work on the labor market in EU countries is work (Zieliński, 2019). The authors examine the correlation between the level of employment, the unemployment rate and changes in the share of non-standard forms of employment on the labor market, the research period covers the years 2006-2017.

Other examples of scientific works on unemployment include (Dvouletý, 2017, Ederveen, 2007, Fad'oš, 2019; Furuoka, 2014, Tvrdon, 2011; Hakim and Thalassinos, 2021; Thalassinos *et al.,* 2022; 2015).

The V4 countries joined the EU structures at the same time, their location is similar, but the scale of unemployment is different. The aim of the article is to analyze the level of unemployment and the dependencies related to it in the Visegrad Group countries in the years 2009-2023.

In this work, the author, based on data from Eurostat (Eurostat, 2025, Unemployment by sex and age), conducts an analysis of the unemployment rate in the Visegrad Group countries.

The analysis conducted examines the following hypotheses. There are significant differences between the distributions of the percentage value of the number of unemployed people in the years 2009-2023 in individual V4 countries, both for the entire unemployed population and divided into women and men. The number of unemployed women and men in individual V4 countries does not differ significantly. There is a strong correlation between the number of unemployed women and men in the V4 countries.

The rest of the article is organized as follows. Section 2 presents the source of data for the analysis and the methods used. Section 3 provides a detailed analysis of unemployment data in the V4 countries. Section 4 presents the conclusions from the conducted research.

2. Data and Methods

The authors of the article used publicly available data from the websites of the Statistical Office of the European Union based in Luxembourg, Eutostat, on unemployed people divided into women and men and the population of Poland, the Czech Republic, Slovakia and Hungary (Eurostat, 2025, Unemployment by sex and age; Eurostat, 2025, Population change).

In terms of population, the largest country in this group is Poland (36,687,353 inhabitants, 2023), followed by Czechia (10,864,042 inhabitants, 2023), Hungary (9,592,186 inhabitants, 2023), and Slovakia (5,426,740 inhabitants, 2023) (Eurostat, 2025, Population change).

Quantitative data were presented as mean, standard deviation, median and quartile deviation, as well as percentages. Kruskal-Wallis rank sum test and Mann-Whitney U test were used to analyze differences between distributions. The significance level of alpha = 0.05 was assumed for all tests. Spearman's rank correlation coefficient was used to examine correlations.

3. Analysis of the Data on the Number of Unemployed in the Visegrad Group Countries

This section presents an analysis of the number of unemployed persons for the total population and by gender in four V4 countries (Czechia, Hungary, Poland and Slovakia).

Due to the country's population, the most unemployed are in Poland, where the average annual number of unemployed in this country at the turn of 2009-2023 was 1094.8 thousand people. The second country with the highest average number of unemployed is Hungary, the annual average and standard deviation in this case was mean ± SD = 295.47 ± 125.9 thousand people.

The third country in terms of the average number of unemployed is Slovakia, where the average annual number of unemployed and standard deviation from 2009-2023 is mean ± SD = 275.07 ± 95.52 thousand people. The lowest unemployment was recorded in the Czech Republic, where the average for the analysed period was 236.67 thousand people.

Considering the number of unemployed as a percentage of the entire population of the country, the highest average value of the percentage of unemployed from 2009-2023 was obtained for Slovakia 6.44% unemployed, then Hungary 3.92%, Poland 3.85% and Czechia 2.8% unemployed.

The highest number of unemployed people in Poland aged 15-74 in the years 2009-2023 was recorded in 2013, the number of unemployed people was 1,792 thousand people, the lowest in 2023 - 502 thousand people. In the Czech Republic, the highest number of unemployed people aged 15-74 was recorded in 2010 and amounted to 384 thousand people, the least unemployed 109 thousand people in the Czech Republic were in 2019.

In Slovakia, the highest unemployment was recorded in 2013 - 398 thousand people, and the lowest in 2019 - 161 thousand people. In Hungary, the highest value of the number of unemployed people was 473 thousand people in 2012, the lowest was 158 thousand people in 2019. The highest unemployment rate in relation to the population of the whole country was recorded in Slovakia 9.2% in 2010 and 2013. The lowest unemployment rate was recorded in Czechia 1.3% in 2019.

Considering the group of women aged 15-74, the mean number and standard deviation of unemployed women in the years 2009-2023 in Poland was 516.27 ± 250.12 thousand, in the Czech Republic mean ± SD = 123.8 ± 55.3 thousand, in Slovakia mean ± SD = 135.93 ± 46.25 thousand, and in Hungary mean ± SD = 136.13 ± 55.01 thousand women. In the analyzed period, the highest number of unemployed women in Poland was 865 thousand people in 2013, and the lowest was 234 thousand women in 2023.

In the Czech Republic, the highest unemployment among women occurred in 2013 and amounted to 194 thousand women, a similar value of 193 thousand unemployed women was obtained in 2010. The lowest unemployment among women in the Czech Republic was recorded in 2019, amounting to 57 thousand people. Among Slovak women, the highest unemployment was recorded in 2010 and amounted to 191 thousand people, close to this value was the number of unemployed women in 2012 and 2013.

The lowest unemployment in Slovakia was recorded in 2023 - 77 thousand unemployed women. In Hungary, the highest unemployment among women in the analyzed period was recorded in 2011 - 214 thousand unemployed women, and the lowest in 2019 - 72 thousand unemployed women.

Considering the percentage values of female unemployment in relation to the entire female population in the country, the highest average percentage of unemployment among women was obtained in Slovakia and it is 6.28% of unemployed women. In Poland, the average percentage of unemployed women in the years 2009-2023 was 3.56%, in Hungary 3.49%, and in the Czech Republic 3%.

The highest percentage of unemployed women in relation to the entire female population of the country was recorded in Slovakia 8.7% in 2010, 2012 and 2013, the lowest percentage of unemployed women in Slovakia was recorded in 2019 and 20123 amounting to 3.7%. On the other hand, the lowest percentage of unemployed women was received in the Czech Republic 1.4% of unemployed in 2019, in this country the highest percentage of unemployed women 4.7% was recorded in 2013.

In Poland, the minimum percentage of unemployed women was 1.6% in 2022 and 2023, and the maximum was 5.9% of unemployed women in 2013. In Hungary, the highest percentage of unemployed women in relation to the entire female population of this country was 5.4% in 2011, the lowest was 1.9% in 2019.

Analyzing the group of unemployed men in the Visegrad Group countries aged 15-74 from the period 2009-2023, we get that the highest unemployment among men occurred in the analyzed period in Slovakia. The average annual percentage of unemployed men in relation to the entire male population in Slovakia was 6.61% of unemployed people.

This value in Poland was 4.15% of unemployed men, in Hungary 4.37%, and in the Czech Republic 2.76% of unemployed men. Quantitatively, the average annual number of unemployed men is the highest in Poland and amounted to 578.6 thousand unemployed men, then in Hungary 159.53 thousand people, in Slovakia 139 thousand people, and in the Czech Republic 113 thousand unemployed men. The maximum number of unemployed men in Poland occurred in 2013, it amounted to 927 thousand unemployed men, and the lowest in 2023, it was 268 thousand men.

In Czechia, the highest number of unemployed men was recorded in 2010, it was 191 thousand people, and the lowest in 2019, it was 57 thousand men. In Slovakia, the highest number of unemployed men was recorded in 2010, it was 207 thousand people, and the lowest in 2019, it was 81 thousand men.

In Hungary, the highest unemployment in the period under consideration among men was recorded in 2010 and 2012, amounting to 262 thousand men, and the lowest, amounting to 86 thousand men, was received in 2019.

The highest percentage of unemployed men in relation to the male population of the country was recorded in Slovakia at 9.8% of unemployed men in 2010, in this country the lowest percentage of unemployed men was 3.9% in 2019. The lowest percentage of unemployed men in the analyzed period was recorded in Czechia at 1.3% of unemployed men in 2018, 2018 and 2022.

In Czechia the highest percentage of unemployed men at 4.6% was recorded in 2010. In Poland in the period 2009-2023 the highest percentage of unemployed men at 6.6% was recorded in 2013, and the lowest 2% of unemployed men was received in 2022 and 2023. In Hungaria the highest percentage of unemployed men was 7.1% in 2010 and 2012, and the lowest at 2.4% of unemployed men in 2018 and 2019.

Detailed data on average rates and minimum and maximum unemployment values in thousands of people and as a percentage of the country's population are presented in Table 1.

Table 1. *Mean values, standard deviations, minimum and maximum numbers of unemployed persons in individual Visegrad Group countries expressed in thousands and percentages of the total population, divided into all unemployed persons, women and men.*

Group	**Statistics**	**Czechia**	**Hungary**	**Poland**	**Slovakia**
Total	N	15	15	15	15
	mean ± SD *	236.67 ± 110.28	295.47 ± 125.9	1094.8 ± 511.82	275.07 ± 95.52
	min – max *	109 – 384	158 – 473	502 – 1792	161 – 398
	mean ± SD **	2.8 ± 1.3	3.92 ±1.6	3.85 ± 1.78	6.44 ± 2.18
	min – max **	1.3 – 4.6	2.1 – 6.2	1.8 – 6.3	3.8 – 9.2
Female	N	15	15	15	15
	mean ± SD *	123.8 ± 55.3	136.13 ± 55.01	516.27 ± 250.12	135.93 ± 46.25
	min – max *	57 – 194	72 – 214	234 – 865	77 – 191
	mean ± SD **	3 ± 1.3	3.49 ± 1.33	3.56 ±1.7	6.28 ± 2.08
	min – max **	1.4 – 4.7	1.9 – 5.4	1.6 – 5.9	3.7 – 8.7
Male	N	15	15	15	15
	mean ± SD *	113.07 ± 54.9	159.53 ± 71.05	578.6 ± 262.38	139 ± 50.25
	min – max *	52 – 191	86 – 262	268 – 927	81 – 207

	mean ± SD **	2.76 ± 1.33	4.37 ± 1.9	4.15 ± 1.84	6.61 ± 2.36
	min – max **	1.3 – 4.6	2.4 – 7.1	2 – 6.6	3.9 – 9.8

Note: ** Thousand persons, ** Percentage of total population*
Source: *Author's calculations.*

Figure 1 shows the percentage of unemployed people in relation to the entire population in the Visegrad Group countries in the years 2009-2023, the data includes people aged 15-74. The graphs show that the highest unemployment in the period considered in relation to the entire population of the country occurs in Slovakia, and the lowest in the Czech Republic. This property occurs for the entire group of unemployed people and for groups divided by gender.

Nonparametric tests were conducted, the Kruskal-Wallis rank sum test comparing the distributions of the percentage of unemployed persons for individual countries, the alpha significance level of 0.5 was assumed in the tests. The tests indicated a statistically significant difference between the distributions of the percentage of unemployed persons in individual countries, also in the case of division into groups of women and men ($p < 0.001$).

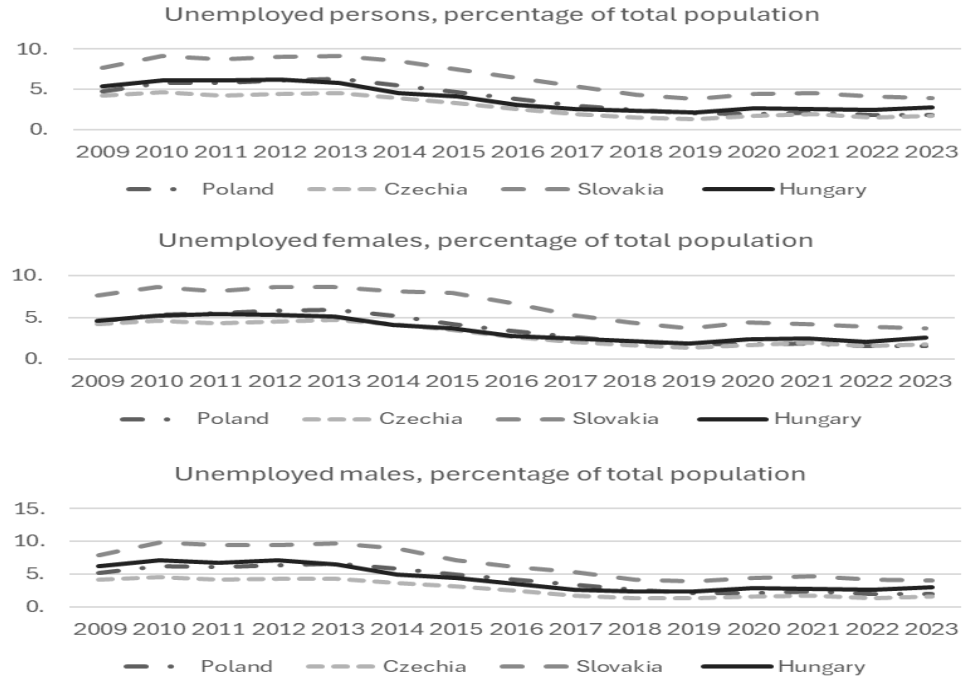
Table 2 presents the results of the Kruskal-Wallis rank sum test, a statistically significant difference between the distributions of the number of unemployed persons considering all unemployed persons was obtained for the countries Poland and Slovakia ($p < 0.05$) and for the Czech Republic and Slovakia ($p < 0.001$).

This means that the distribution of the percentage of unemployed for the country Slovakia (median ± QD = 6.4 ± 2.2) is statistically significantly different than for Poland (median ± QD = 3.8 ± 1.9) and Czechia (median ± QD = 2.6 ± 1.25). The Kruskal-Wallis rank sum test in this case did not find a statistically significant difference between the distribution for Hungary and the other countries.

Considering the group of women, the statistical tests showed a statistically significant difference between the distribution for Slovakia and the distributions of the other three countries. The median value and quartile deviation of the percentage of unemployed women for Slovakia are median ± QD = 6.7 ± 2 and this median is statistically significantly higher than the median for Poland (median ± QD = 3.4 ± 1.7), Czechia (median ± QD = 2.7 ± 1.3) and Hungary (median ± QD = 2.8 ± 1.35).

Tests examining the differences between the distributions of the percentage of unemployed including the group of men showed a statistically significant difference in the distributions of the countries Czechia and Slovakia ($p < 0.001$). The median value and quartile deviation of the percentage of unemployed men in Slovakia were median ± QD = 6.1 ± 2.6 and are statistically significantly higher than the median value and quartile deviation for the Czech Republic (median ± QD = 2.5 ± 1.3). For the other countries for the data concerning the group of men, statistical tests did not show a statistically significant difference.

Figure 1. *Percentage of unemployed all people, women and man, aged 15-74, in the Visegrad Group countries in 2009–2023, percentage of total population.*



Source: *Author's calculations.*

Table 2. *Comparison of the median of percentage unemployment of the population in the analysed countries using the Kruskal-Wallis rank sum test, taking into account the groups: total population, women and men, 2009-2023.*

Group of people /Country	**N**	**median ± QD ***	**H-stat**	**df**	**p**	**A vs C p**	**B vs C p**	**C vs D p**
Total								
Poland Czechia Slovakia Hungary	15 15 15 15	3.8 ± 1.9 2.6 ± 1.25 6.4 ± 2.2 3.1 ± 1.6	18.39	3	<0.001	< 0.05	<0.001	0.083
Female								
Poland Czechia Slovakia Hungary	15 15 15 15	3.4 ± 1.7 2.7 ± 1.3 6.7 ± 2 2.8 ± 1.35	16.82	3	<0.001	< 0.05	<0.001	<0.05
Male								

Poland	15	4.2 ± 2	19.2	3	<0.001	0.079	<0.001	0.219
Czechia	15	2.5 ± 1.3						
Slovakia	15	6.1 ± 2.6						
Hungary	15	3.5 ± 1.9						

Note: **Percentage of total population, A – Poland, B – Czechia, C – Slovakia, D – Hungary,*
Source: *Author's calculations.*

Additionally, an analysis of the distribution of the number of unemployed people by gender in individual countries in the years 2009-2023 was carried out. The U-Mann-Whitney test showed that there are no statistically significant differences between the distribution of the number of unemployed people in individual countries by gender ($p > 0.05$). The tests adopted an alpha significance level of 0.5. The median and quartile deviation of the group of unemployed women and men in Poland do not differ statistically significantly and are 482 ± 248 and 582 ± 280, respectively.

A similar situation occurs in the Czech Republic, the distribution of unemployed women and men does not differ statistically significantly, and the median and quartile deviation are 111 ± 55 and 101 ± 55.5, respectively. For the data on the number of unemployed women and men in Slovakia, the test also did not show statistically significant differences. The median and quartile deviation of the number of unemployed women and men in Slovakia are 145 ± 44.5 and 128 ± 54.5, respectively. In the case of Hungary the situation is analogous, in this case the median and quartile deviation for the group of unemployed women is 107 ± 55, and for the group of unemployed men 128 ± 71.5 (Table 3).

Table 3. *Comparison of the distribution of the groups of female and male of thousand unemployment persons in the analysed countries using the U-Mann-Whitney test, 2009-2023.*

Country / Group of people	**N**	**median ± QD ***	**Z-stat**	**p**
Poland				
Female	15	482 ± 248	- 0.975	0.33
Male	15	582 ± 280		
Czechia				
Female	15	111 ± 55	1.037	0.299
Male	15	101 ± 55.5		
Slovakia				
Female	15	145 ± 44.5	- 0.436	0.663
Male	15	128 ± 54.5		
Hungary				
Female	15	107 ± 55	- 1.203	0.229
Male	15	128 ± 71.5		

Note: ** Thousand persons*
Source: *Author's calculations.*

It was examined whether the number of unemployed women and men in individual countries is correlated. The tests showed a statistically significant positive very

strong Spearman rank linear correlation between the number of women and men in all analyzed Visegrad Group countries. The correlation coefficient for Poland was 0.99 ($p < 0.001$) and means a very strong positive correlation between the number of unemployed women and men. A similar situation occurs in the Czech Republic ($r = 0.98$, $p < 0.001$), Slovakia ($r = 0.97$, $p < 0.001$) and Hungary ($r = 0.96$, $p < 0.001$). Table 4 presents the values of Spearman rank correlation of the number of unemployed women and men in the analyzed countries.

Table 4. *Spearman rank correlation coefficient value between the number of unemployed women and men in individual countries, 2009-2023.*

Country	**Spearman rank correlation – male & female, r**	**p**
Poland	0.99	< 0.001
Czechia	0.98	< 0.001
Slovakia	0.97	< 0.001
Hungary	0.96	< 0.001

Source: *Author's calculations.*

4. Conclusions

The paper presents an analysis of the unemployment level and the relationships related to it in the Visegrad Group countries in the years 2009-2023. In the analyzed period, the highest unemployment in relation to the size of the country's population occurred in Slovakia and the lowest in the Czech Republic.

This relationship occurs both for all unemployed people and by gender. Statistical studies have shown that there are statistically significant differences in the distribution of the percentage value of the number of unemployed people in the years 2009-2023 in individual V4 countries, both for the entire unemployed population and by women and men.

Additionally, the number of unemployed women and men in individual V4 countries does not differ significantly. In addition, it has been shown that there is a statistically significant, very strong positive correlation between the number of unemployed women and men in the V4 countries. In the further part of the research, we can focus on comparing the unemployment structure of the V4 countries with other EU countries, analyzing the period of changes in unemployment after the V4 countries joined the EU structures.

References:

Bieszk-Stolorz, B., Dmytrów, K. 2020. Influence of Accession of the Visegrad Group Countries to the EU on the Situation in Their Labour Markets. Sustainability, 12(16), 6694, 1-17.

Caporale, G.M., Gil-Alana, L.A., Trejo, P.V. 2022. Unemployment persistence in Europe: evidence from the 27 EU countries. Heliyon 8(2), e08898, 1-7.

Dvouletý, O. 2017. What is the Relationship between Entrepreneurship and Unemployment in Visegrad Countries? Cent. Eur. Bus. Rev., 6, 42-53.

Ederveen, S., Thissen, L. 2007. Can labour market institutions explain high unemployment rates in the new EU member states? Empirica 34, 299-317.

Eurostat. 2025. The statistical office of the European Union, Unemployment by sex and age – annual data. Available at: https://ec.europa.eu/eurostat/databrowser/view/une_rt_a__custom_13973760/default/table?lang=en.

Eurostat. 2025. The statistical office of the European Union, Population change - Demographic balance and crude rates at national level. Available at: https://ec.europa.eu/eurostat/databrowser/view/demo_gind/default/table?lang=en.

Fad'oš, M., Bohdalová, M. 2019. Unemployment gender inequality: Evidence from the 27 European Union countries. Eurasian Econ. Rev., 3, 349-371.

Furuoka, F. 2014. Hysteresis Effect on Unemployment: Evidence from the Visegrad Countries. Ekon. Casopis, 62, 185-198.

Hakim, A., Thalassinos, E. 2021. Risk Sharing, Macro-Prudential Policy and Welfare in an Overlapping Generations Model (OLG) Economy. European Research Studies, 24(4B), 585-611.

Kwiatkowski, E., Krzętowska, A. 2024. Unemployment In The Countries Of Central And Eastern Europe - Stagnant Or Dynamic? Economy & Business Journal, International Scientific Publications, Bulgaria, 8(1), 129-144.

Skrętowicz, B., Wójcik, M. 2016. Unemployment in Selected EU Countries. Olsztyn Economic Journal 11(3), 211-226.

Thalassinos, E.I., Hachicha, N., Hakim, A. 2022. The International Spillover Among Sectors and the Interconnectedness to the Global Inflation Cycle. International Journal of Finance, Insurance and Risk Management, 12(1), 3-11.

Thalassinos, I.E., Thalassinos, E.P., Venedictova, B., Yordanov, V. 2015. Currency Board Arrangement Capital Structure Macro-Financial Diagnostic. SSRN-id2624333.

Tvrdon, M. 2011. Unemployment as the Macroeconomic Problem: The Case of Visegrad Group Countries. Int. J. Syst. Appl. Eng. Dev., 2, 187-197.

Zieliński, M. 2015. Unemployment and Labor Market Policy in Visegrad Group Countries. Equilibrium Quarterly J. of Economics and Economic Policy, 10(3), 185-201.

Zieliński, M. 2019. Impact of the employment and unemployment level on the use of flexible forms of employment in EU countries. Research Pappers of Wrocław University of Economics 63(4), 127-136.