CHANGES IN THE VISEGRAD GROUP ECONOMIES IN LIGHT OF THE MISERY INDEX

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Abstract: *The economic performance of countries depends on the stages of the business cycle and changes due to various factors and influences. While the economic crisis of 2008 was triggered by financial factors, the crisis of 2020 was caused by factors of a non-economic nature – the COVID-19 pandemic. The purpose of this paper is to assess changes in the performance and level of economic activity in the Visegrad Group economies in 2009, 2019 and 2020. This assessment is performed using GDP per capita, magic square and the misery index. In 2009, the best performing country was the Czech Republic and the worst was Hungary. In 2019 and 2020, Poland reached a performance level similar to the Czech Republic, and Slovakia performed the worst.*

Keywords: *performance, Visegrad group, magic square, economic stability index, misery index.*

JEL Codes: *E1, E6*

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1. Introduction

The issue of improving the performance of economies has received much attention in research and practice. Tracking the performance of a particular national economy and analysing the factors of its economic growth and fluctuations are among the primary objectives of economic research. Measuring economic progress has been of great value for both economic theory and economic policy. Economic performance is assessed through the evolution of basic macroeconomic indicators, the most common of which are gross domestic product (GDP) or gross domestic product per capita. Economic performance and the achievement of economic goals can also be assessed through the magic square. In addition, various other alternative indicators, or a combination thereof, can be made use of. The purpose of this paper is to assess changes in the performance and level of economic activity in the Visegrad Group (V4) economies in 2009, 2019 and 2020. This assessment is performed using GDP per capita, magic square and the misery index. In this paper, the economic performance of the Czech Republic, Hungary, Poland, and the Slovak Republic is assessed. V4 is a dynamic regional group of EU Member States, where each shows typical features of supporting competitiveness and economic growth. The V4 countries are interconnected within their history, geographical location, and values. Within this group, space is created to strengthen coordination mechanisms to find common positions in terms of the current issues of foreign and European policy, regional development, and economic cooperation.

2. Literature review

The concept of performance has been frequently used in terms of the economic success of countries. Roguľa (2011) defines economic performance as a certain monetary value generated by a given economy over a certain period, using the system of national accounts.

Economic performance refers to the condition and evolution of the economic situation in respective countries. It deals with trends in the evolution of key macroeconomic indicators, or the results of the functioning of the economy as a whole achieved over a certain period of time and generally recorded and evaluated through selected indicators (Draková, 2012).

Large numbers of authors and institutions deal with performance measurement, assessing the performance of economies either by traditional macroeconomic indicators (GDP, inflation, employment, unemployment, etc.), alternative indicators (Human Development Index, Prosperity Index, Global Competitiveness Index, and others), or a combination thereof. (Masárová & Ivanová, 2017).

Most authors use gross domestic product as the basic macroeconomic variable to measure economic performance and progress. The overall performance of economic activity can be best assessed through the current and historic GDP data of the country concerned. For international comparisons of differently sized economies, per capita gross domestic product – expressed, for instance in USD, EUR, PPP – is used.

Nicholas Kaldor (1908–1986), one of the founders of post-Keynesian economics, considered GDP, employment, inflation, and the balance of trade to be the primary indicators to assess the achievement of economic policy objectives. Karl Schiller, an economist and former Minister for Finance and Economic Matters in Germany, invented a magic square to see how economic objectives are being met. The word magic is used because these four objectives are very hard to

attain in real-life (Hamdini & Gaidi, 2021).

The **magic square** consists of four mutually perpendicular half-lines with a superimposed scale in percentages, each of which records one economic policy objective and its indicator value (Draková, 2012):

- sustainable rate of economic growth (rate of economic growth in % – G);
- low unemployment (unemployment rate in % – U);
- stable price level (inflation rate in % – P);
- external economic balance (balance of payment ratio to GDP in % – B).

Picek (2017) claims that the square typically serves as a teaser for a thorough discussion of the individual goals and their mutual interaction. While some are complementary (high GDP growth and low unemployment), others may be prone to unfavourable trade-offs (unemployment and inflation via the Phillips curve, or high GDP growth and a balanced current account).

A lot of research work has addressed economic performance and its evaluation. Firme and Teixeira (2014) used the magic square to assess the macroeconomic performance of Brazil and other selected countries between 1997 and 2012, and quantified the standardized Index of Economic Welfare (created by Medrano and Teixeira in 2013). Nehme (2014) used the magic square, Hicks' IS-LM model, and Mundell's incompatibility triangle in examining economic efficiency and monetary policy in Lebanon.

Draková (2012) used the magic square to assess the economic performance of the BRICS countries (Brazil, Russia, India, and China), whilst Hamdini and Gaidi (2021) assessed economic performance and stability in Algeria over the period of 1980–2019 and proposed the so-called economic stability index. Similarly, Özkaya and Alhuwesh (2021) made use of the magic square to evaluate the performance of Yemen's economy between 2001 and 2015. Brokešová and Vachálková (2016) used the magic square to investigate changes in the insurance industry depending on the evolution of macroeconomic environment. The magic square was also used by Sivák and Staněk (2011) to examine the effects of the global financial crisis on Slovakia in 2008–2010.

Some researchers use the magic square indicators to calculate other indicators and indices. Inflation and unemployment are the key variables that play a decisive role in determining national welfare. These two variables are part of the **misery index**, which is used to assess the misery felt by average citizens in a country.

The misery index, a combination of inflation and unemployment rates created by economist Arthur Okun, is resurfacing as a measure of interest across developed countries as inflation rates increase and unemployment remains relatively high (Clemens et al., 2022).

Okun arguably made the first attempt to aggregate a range of macroeconomic indicators into a single statistic to track the health of the macroeconomy over the business cycle. The original misery index combined two fundamental targets of macroeconomic policy (unemployment and inflation) in a basic aggregate disutility function. This function gauges the level of economic discomfort as the unweighted sum of unemployment and inflation rates.

The level of misery is undoubtedly one of the factors of crucial importance for the assessment of the economic system's efficiency. If poverty strikes a significant part of the society, this definitely proves that the system lacks in efficiency (Grabia, 2011).

The simplicity of the calculation of this index is claimed to be both an advantage and a disadvantage, and the index has been criticized for its low research relevance. Recently, however, the

misery index has been used extensively by researchers and economists, who have modified and expanded its original version to gauge the overall health of the global economy.

Cohen et al. (2014) consider the index a useful tool as it seems to provide a useful approximation of the influence of macroeconomic conditions on population well-being. Various modifications and extensions to the misery index have been presented in research by Barro, Hanke, and Henderson and others. A Harvard economist, Robert Barro, was the first to augment the index with the indicators of growth rate and interest rate in 1999.

In 2011, Steve Hanke came up with the modified misery index, which was the sum of unemployment, inflation, and bank lending rates minus the change in real GDP per capita. Higher readings of the first three elements are "bad", and make people miserable. These are offset by a "good" GDP per capita growth, which is subtracted from the sum of the "bads". A higher misery index score shows a higher level of misery. Cohen et al. (2014) reformulated the index, focusing on the output gap and cyclical unemployment. The new index allows a distinction between short-run and long-run phenomena, places more emphasis on output and unemployment rather than inflation, is based only on objective variables, and gives more weight to recessions than to expansions.

Henderson (2015) points out that although both Barro and Hanke did the right thing in including economic growth into the examination, they made the mistake of using interest and inflation rates in their calculations. His view is supported by Irving Fisher's contribution, who notes that nominal interest rates already incorporate market expectations of inflation. This would double-count inflation in the calculation. Therefore, Fisher suggests that the misery index should be calculated as the sum of the inflation rate and the unemployment rate, minus the growth rate of real GDP.

3. Methodology

3.1 Goal

The purpose of this paper is to assess the changes in the economic performance of the four Visegrad countries – the Czech Republic, Hungary, Poland, and the Slovak Republic – in 2009, 2019 and 2020. This assessment is performed using GDP per capita, the magic square and the misery index.

In 2009, global economies suffered from the economic crisis that was precipitated by the financial crisis of 2007–2008 in the United States. In 2019, the V4 economies were evolving in a favourable way. In late 2019, however, COVID-19 emerged in China, and spread rapidly and globally. The negative economic effects of the pandemic were felt by these countries, especially in 2020.

3.2 Method

The works of Medrano-B and Teixeira (2013) and Hamdini and Gaidi (2021) were followed to construct the magic square. Minimum and maximum values of each indicator under study (Table 1) were determined based on the recommended values and the actual indicator values in the V4 countries in 2009, 2019 and 2020.

Table 1. *Minimum and maximum indicator values*

	Minimum Value	Maximum Value	Nature of the indicator
Real GDP growth (%) – G	−7	7	Maximising
Unemployment rate (%) – U	2	15	Minimizing
Inflation rate (%) – P	2	6	Minimizing
Current account balance (% of GDP) – B	−5	5	Maximising

As indicators with different scales were present, it was necessary to transform the original statistical data. Based on the determined minimum and maximum values, the following equations were formed:

For real GDP growth – G:

$$-7 \leq G \leq 7$$

For unemployment rate – U:

$$15 \geq U \geq 2$$

For inflation rate – P:

$$6 \geq P \geq 2$$

For current account balance – B:

$$5 \leq B \leq 5$$

It is necessary to redefine the four scales to be uniform from 0 to α, where α is a numerical constant to be evaluated by normalising the modified indicators to a uniform scale:

$$0 \leq G \leq \alpha; \qquad 0 \leq U \leq \alpha; \qquad 0 \leq P \leq \alpha; \qquad 0 \leq B \leq \alpha.$$

Thus, a perfect square with uniform axes rotated by 45 degrees is formed. The area of the square of a country achieving ideal values of all indicators equals to one (The α value is then determined as follows:

$$W'_A = 2 \times \alpha^2 = 1$$

Then:

$$\alpha^2 = \frac{1}{2}$$

Next, the original values will be transformed to new ones. As Medrano-B and Teixeira (2013) state, just as all original variables have linear scales, so new ones should also be linear. Thus, the modified indicator values are obtained through the following equations:

$$G' = \frac{\alpha}{14}(G+7); \qquad U' = \frac{\alpha}{13}(15-U); \qquad P' = \frac{\alpha}{4}(6-P); \qquad B' = \frac{\alpha}{10}(B+5).$$

Based on the study by Hamdini and Gaidi (2021), the Economic Stability Index (ESI) was calculated:

$$ESI= \frac{1}{4}\left[\frac{1}{14}(G+7)+\frac{1}{13}(15-U)+\frac{1}{4}\ (6-P)+\frac{1}{10}(B+5)\right]$$

Whereby: 0≤ESI≤1

If the economy is performing at its worst (based on Table 1) – i.e., real GDP growth of −7%, unemployment rate of 15%, inflation rate of 6% and current account balance of −5% – then the value of the ESI indicator will be 0. On the contrary, if the economy is performing at its best – i.e., real GDP growth of 6%, unemployment rate of 2%, inflation rate of 2% and current account balance of 5% – then the value of the ESI will be 1.

The misery index was determined in the following way:
Okun's Misery Index (OMI):

$$OMI=P+U$$

Henderson's Misery Index (HMI):

$$HMI=P+U-G$$

To assess the performance of the V4 economies, statistical data published by The World Bank were used.

4. Assessment of V4 performance

First, the economic performance of the Slovak Republic, the Czech Republic, Hungary and Poland will be examined and assessed using GDP per capita. Next, their economic performance using the magic square will be assessed. Finally, the evolution of the misery index in the V4 countries will be examined and countries will be ranked.

4.1. Evolution of GDP per capita in the V4 countries

The gross domestic product per capita indicator expresses the results of economic activity taking place in the territory of a given country, converted on a per capita basis for the sake of objectivity of comparison. Differences in the GDP per capita value in the V4 countries in 2009, 2019 and 2020 are shown in Figure 1.
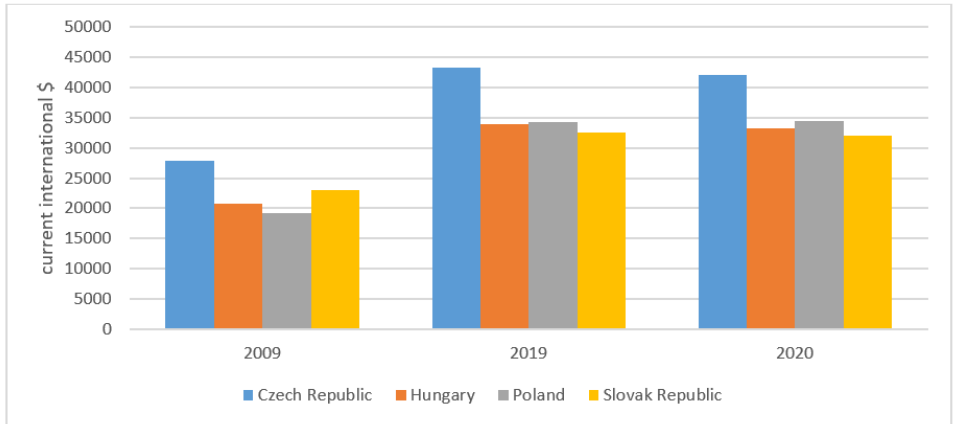
Figure 1. *GDP per capita in PPP in the V4 countries*
Source: *authors' own elaboration based on data from the World Bank (n.d.)*

As illustrated above, the Czech Republic had the highest GDP per capita in each of the analysed years, with a significant gap between the remaining V4 countries. In 2009, GDP per capita in the Czech Republic reached USD 27,782. The Slovak Republic followed with a GDP of USD 23,098 per capita. The lowest GDP per capita value was recorded in Poland. The situation was different in 2019 and 2020, with Poland achieving the second highest GDP per capita with Slovakia lagging behind and ending up in the lowest position among the V4 countries. In 2020, GDP per capita decreased compared to 2019 in the Czech Republic, Hungary and Slovakia, while Poland recorded a slight increase (despite the decrease in GDP).

4.2. Economic performance of the V4 countries in 2009

In the following sections, the magic square will be used to assess the performance of the V4 countries in 2009, i.e., the first year under analysis (the crisis year); in 2019; and in 2020, in which the economy suffered from the COVID-19 pandemic.

In late 2008 and especially in 2009 and 2010, the V4 countries, like other nations, experienced a recession. The recession came as an unexpected external shock causing a sharp decline in economic activity. GDP declined in Slovakia, the Czech Republic and Hungary, which translated into negative economic growth. The biggest declines in GDP were identified in Hungary (by 6.60%), the Slovak Republic (by 5.46%) and the Czech Republic (by 4.66%). Poland was only moderately affected by the recession, and its GDP growth slowed to 2.83%. Figure 2 shows the performance of the V4 countries in 2009.
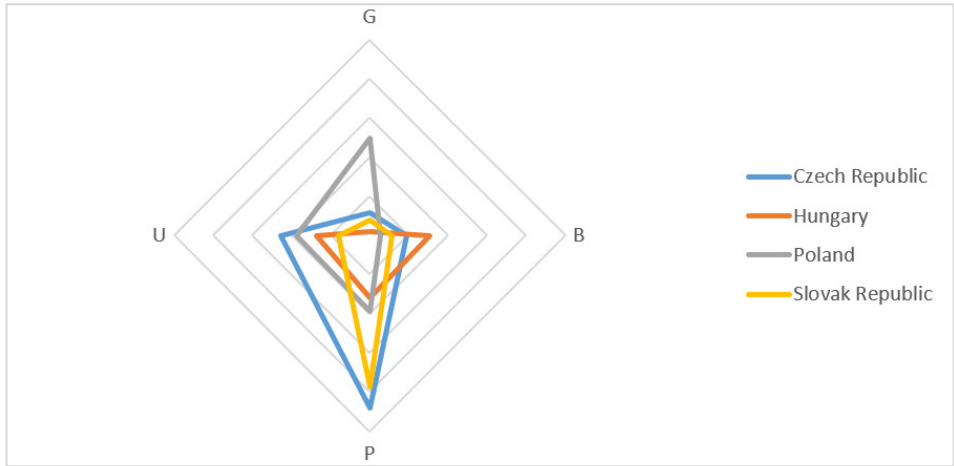
Figure 2. *Magic square in 2009*
Source: *authors' own elaboration*

Lowered economic performance was accompanied by slowed inflation. The inflation rate stood at 4.21% in Hungary, 3.80% in Poland, 1.62% in the Slovak Republic and only 1.02% in the Czech Republic. Low production and job cuts resulted in increased unemployment rates. The highest unemployment rate (12.03%) was recorded in the Slovak Republic. The unemployment rate went up to 10.03% in Hungary, to 6.66 in the Czech Republic, and to 8.17% in Poland.

Concerning external balance, all V4 countries achieved negative current account balance on their balances of payments. The most favourable value of the current account balance of payments to GDP was achieved by Hungary (−0.68%), followed by the Czech Republic (−2.35%) and Slovakia (−3.39%), with Poland as the worst V4 performer (−4.22%).

4.3. Economic performance of the V4 countries in 2019

Having recovered from the negative effects of the 2009 recession, the economies of the V4 countries regained their former conditions. They recorded moderate GDP growth, record-low unemployment rates, and improved external balances.

Over 2019, GDP growth in Slovakia slowed down. The slowdown, however, had no connection with the upcoming depression of 2020 whatsoever. The slowdown was cyclical, and had already been foreseen in the course of 2018. Within the V4 economies, the slowdown was most pronounced in Slovakia. The slowdown in the Slovak economy was accompanied by a similar slowdown across the EU28 (Morvay et al., 2020). Figure 3 shows the magic square for the V4 countries in 2019.
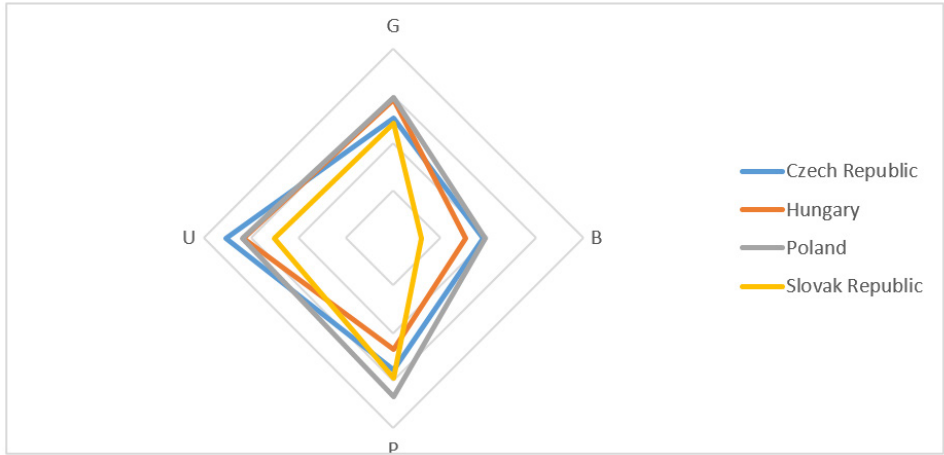
Figure 3. *Magic square for 2019*
Source: *authors' own elaboration*

Compared to 2009, improvements can mainly be observed in the labour market. The unemployment rate in the Czech Republic dropped to 2.01%. In Slovakia, jobless rates fell to record lows of 5.75%. The economic growth rate ranged from 2.61% in Slovakia to 4.74% in Poland. The Czech Republic and Poland also achieved positive BOP current account balances, but Slovakia achieved a negative BOP current account balance of −3.35%. The inflation rate was favourable, reaching 2.23% in Poland and 3.34% in Hungary.

4.4. Economic performance of the V4 countries in 2020

In 2020, the COVID-19 pandemic negatively affected the economic performance of the V4 countries, bringing about periods of decline in economic activity and rises in unemployment. The COVID-19 pandemic had a social and economic impact on all countries of the world, including the V4 nations.

While the depression of 2009 was of an economic nature (external from the point of view of the Slovak economy) in the form of a shock on global financial markets, the depression of 2020 was not, as economic activity was limited and labour force went unused to contain the spread of COVID-19. Restrictions on some activities and on the workforce brought widespread shock to the supply side of the economy. However, the unused labour force meant limited household income and a resulting negative shock for the demand side of the economy (Hudcovsky et al., 2021).

Measures adopted by governments to stop the spread of COVID-19 negatively affected the economic performance of countries and disrupted national labour markets. Countries saw falling GDP and employment rates, and rising unemployment rates. Figure 4 shows the performance of the V4 countries in 2020.
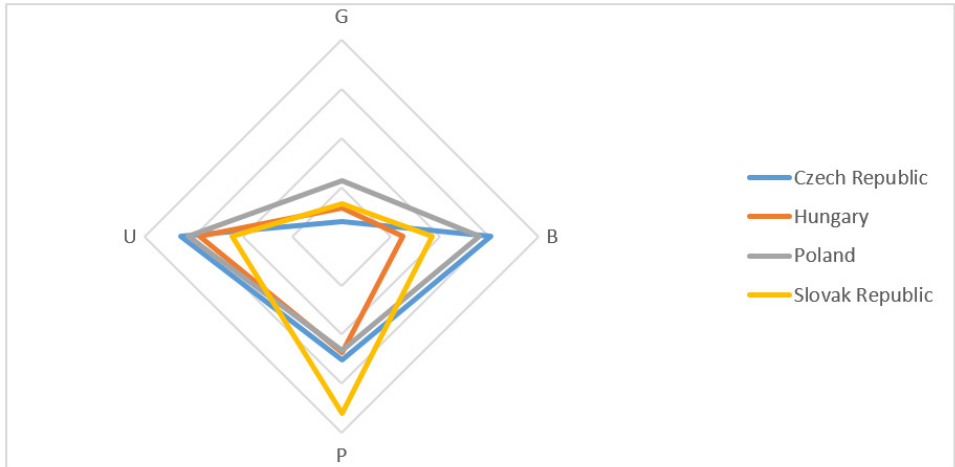
Figure 4. *Magic square in 2020*
Source: *authors' own elaboration*

The COVID-19 pandemic brought about a fundamental change which went hand in hand with deteriorating economic and social indicators. (Hudcovsky et al., 2021). In an attempt to stop the spread of the disease, restrictive measures were adopted. These measures led to declining or slowing GDP growth and dramatically impacted global labour markets. The Czech Republic, Hungary and Slovakia recorded a decline in GDP – the Czech Republic by up to 5.79%. Unemployment did not increase significantly due to the measures adopted to mitigate the negative impact of the pandemic on the labour market. In Poland, unemployment rose by 0.27%, and by around 1% in the remaining V4 countries. Concerning price stability, inflation was the lowest in Slovakia, at slightly below 2%. In Poland, the Czech Republic and Hungary, inflation exceeded 3%. When assessing the external balance, a favourable situation can be observed in the Czech Republic and Poland, which both recorded positives regarding the current account of the balance of payments. Slovakia achieved a slight surplus on the current account of the balance of payments, while Hungary recorded a significant deterioration of this indicator compared to the previous year: 1.48%.

4.5. Comparison of the ESI in V4 countries

Country scores in the magic square were calculated using the ESI; the results for the years under analysis are illustrated in Figure 5.
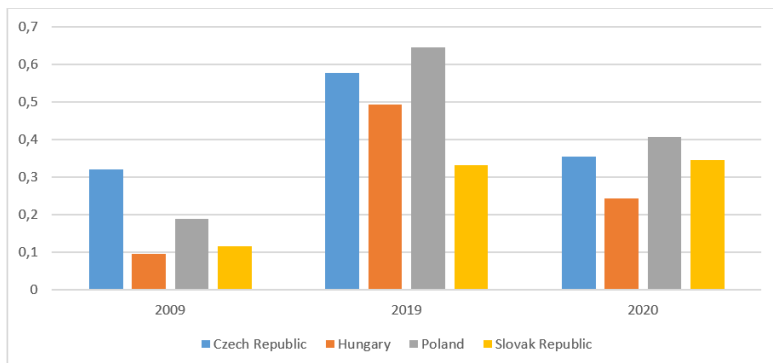
Figure 5. *ESI in V4 countries*
Source: *authors' own elaboration*

A comprehensive assessment of the V4 performance using the ESI yielded interesting results. In 2009, the best position was achieved by the Czech Republic, where the ESI reached 0.320, while the ESI in Hungary was only 0.097. In 2019, ESI values were significantly higher. Poland scored best (mainly due to its higher GDP growth rate) with an ESI value of 0.646. Slovakia lagged far behind with its ESI value of only 0.333. In the pandemic year of 2020, Poland scored the best again (0.407), while Hungary scored the worst (0.244).

4.6. The misery index in the V4 countries

The principle of the misery index is different from the principle on which the magic square works. The lower the misery index values, the stronger the economy and the less misery. The values of OMI and HMI were recalculated, and are shown in Figures 6 and 7.
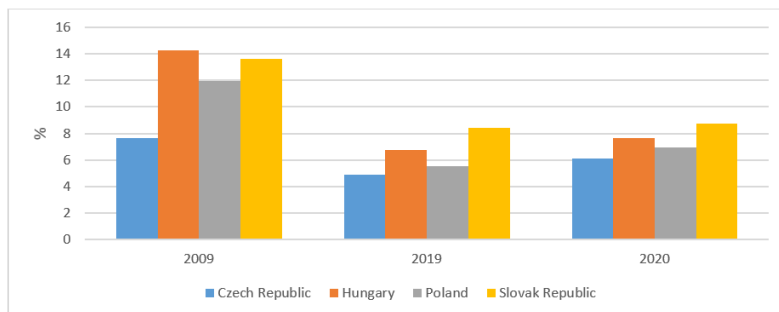

Figure 6. *Okun's Misery Index*
Source: *authors' own calculations*

OMI values were highest in 2009 because the economic crisis caused unemployment rates to climb. The highest OMI value was achieved by Hungary, up to 14.24% compared to 7.68% by the Czech Republic.

In 2019, the V4 economies saw both low inflation and unemployment, which translated into better OMI values than in 2009. In the Czech Republic, the OMI value was only 4.86% and the highest OMI value of 8.41% was found to be in the Slovak Republic. As a result of the COVID-19 pandemic, OMI values went down slightly to 6.10% in the Czech Republic and 8.73% in the Slovak Republic in 2020.

Different results are shown by HMI, in which the rate of economic growth (Figure 7) is incorporated.
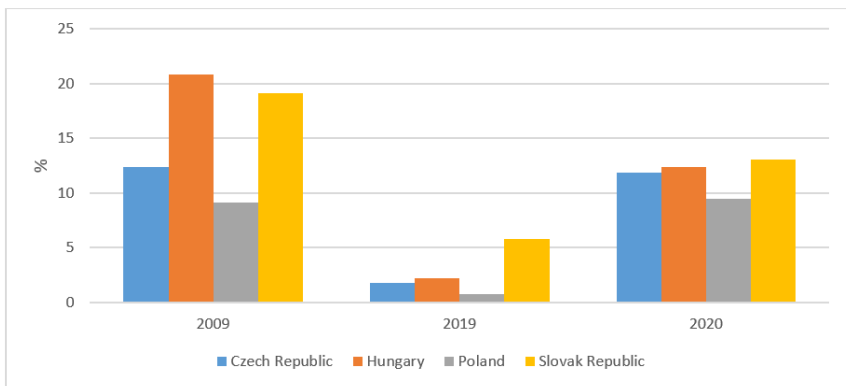

Figure 7. *Henderson's Misery Index*
Source: *authors' own calculations*

The addition of the GDP growth rate to the HMI calculation resulted in larger differences between the V4 countries and also larger differences in the value of the index in the years analysed. In 2009, Hungary (20.84%) and Slovakia (19.10%) scored the worst, while Poland scored 9.13% due to GDP growth. The favourable economic situation of 2019 translated into low HMI values – only 0.76% in Poland compared to 5.81% in the Slovak Republic. In 2020, HMI indicator values decreased in all countries, with Slovakia performing the poorest (13.09%), followed by Hungary and the Czech Republic, with Poland achieving the best score (9.47%).

4.7. Assessment of economic performance and level of economic activity in the V4 countries

Lastly, the V4 economies were assessed and ranked by performance using the relevant indicators. The results are presented in Table 2.

Table 2. *Assessment of economic performance and level of economic activity in the V4 countries*

	2009					2019					2020				
	GDP	ESI	OMI	HMI	total	GDP	ESI	OMI	HMI	total	GDP	ESI	OMI	HMI	total
Czech Republic	1	1	1	2	**1**	1	2	1	2	**1–2**	1	2	1	2	**1–2**
Hungary	3	4	4	4	**4**	4	3	3	3	**3**	3	4	3	3	**3**
Poland	4	2	2	1	**2**	2	1	2	1	**1–2**	2	1	2	1	**1–2**
Slovak Republic	2	3	3	3	**3**	3	4	4	4	**4**	4	3	4	4	**4**

In 2009, the highest ranked country was the Czech Republic, with the best indicator values (except HMI). Poland took second place, although it was ranked fourth in GDP per capita value, and was followed by Slovakia and Hungary. The situation was different in 2019, when Poland saw an improvement in the value of GDP per capita, which translated into the overall ranking. In 2019, Poland's ranking was the same as that of the Czech Republic. On the other hand, the economic performance of Slovakia deteriorated; thus, Slovakia was ranked worst in three of the four indicators examined. The performance ranking did not change in 2020.

Conclusion

When addressing the assessment of economic performance, central to economic debates has been the issue of sustainable economic and social development. This paper addressed the performance of the V4 economies and their assessment using GDP per capita, magic square and the misery index. The research found that the Czech Republic had the highest GDP per capita of all the V4 countries in each of the analysed years, which also translated into economic performance.

The economic performance of nations is affected by internal and external factors. Regarding the V4 economies in 2009, the Slovak Republic, the Czech Republic and Hungary experienced a decline in gross domestic product, which translated into negative economic growth. Poland was impacted by the recession in a moderate manner, and its GDP growth only slowed down. The highest unemployment rate was recorded in the Slovak Republic. In 2019, the projected cyclical slowdown occurred, and was most pronounced in Slovakia. Compared to 2009, the situation improved mainly in the V4 labour markets. The unemployment rate fell to 2.01% in the Czech Republic and to 5.75% in Slovakia. In 2020, the COVID-19 pandemic negatively affected all V4 countries, and brought about a gradual decline of economic and social indicators. This was due to the restrictive measures taken to stop the spread of the disease, which, in turn, caused a decline or slowdown in GDP growth and disruptions in the labour markets.

A comprehensive assessment of the performance of the V4 countries using the ESI yielded interesting results. In 2009, the best position was achieved by the Czech Republic, where the ESI reached 0.320, while the ESI in Hungary was only 0.097. In 2019, ESI values were significantly higher. Poland scored best (mainly due to its higher GDP growth rate) with an ESI value of 0.646. Slovakia lagged far behind with its ESI value of only 0.333. In the pandemic year of 2020, Poland scored the best again (0.407), while Hungary scored the worst (0.244).

To assess the overall performance and level of economic activity in the V4 countries, the

evolution of the misery index was examined. Recently, misery index modifications have been used extensively to gauge the overall health of the global economy. The values of the original OMI and of HMI were identified, and the ranking of the V4 economic assessment was made. The best performing country was the Czech Republic in all three years under analysis. Slovakia performed the worst in 2019 and 2020.

It is evident that this research has several limitations in terms of the current political and military situation. As the war in Ukraine has been a major blow to the global economy, further research should be done to supplement the current findings.

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