AN ANALYSIS OF THE IMPACT OF EXTERNAL SHOCKS ON THE ECONOMIC PERFORMANCE INDEX OF THE EUROPEAN UNION COUNTRIES: THE CASE OF THE RUSSIAN INVASION OF UKRAINE

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Abstract

This study will use secondary data to assess the economic performance of European Union (EU) countries over the last two decades, from 2000 to 2022. The Economic Performance Index (EPI) is produced using numerous critical factors, including unemployment, inflation, public debt, and economic growth. This study will first examine the influence of COVID-19 on the performance of these countries before going on to examine the impact of Russia's invasion of Ukraine. The war has had a direct impact on the world economy, notably in Asian countries (Umoru et al., 2023). Furthermore, the pandemic has harmed all economic sectors in EU countries (Su et al., 2022). The use of graphs and the interpretation of descriptive statistics will be used to investigate the influence of the aforementioned exogenous shocks. Furthermore, panel data regression analysis between EPI and average earnings in the public and private sectors will be used to examine whether economic performance transfers into the real economy. The findings appear to indicate that both external shocks have had a negative impact on the economic performance of all 27 EU member countries, but in the case of COVID-19, economies reliant on tourism have suffered the most, while the Russian invasion of Ukraine has put more pressure on Hungary, the Czech Republic, and the Republic of Ireland. This research will add to the growing body of post-Russian invasion literature.

Keywords: Inflation, Unemployment, Public Debt, Economic Growth, EPI

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1. INTRODUCTION

This research looks at the economic performance of specific European Union (EU) member countries. A plethora of indicators are employed to show how well an economy is operating. It is very uncommon for such indicators to be abused, sometimes deliberately, to paint a rosy picture of an economy that is not doing well in fact. However, most of the time, the "mismatch" between the indicator and the economy under consideration originates from the fact that standard macroeconomic indicators, such as inflation, unemployment, public debt, and economic growth, do not behave consistently across economies. This, it might be argued, arises from the distinctive characteristics of different countries, which means that greater public debt translates into higher economic performance in certain countries but not in others. The same is true for economic growth, which, while high in certain countries, fails to reduce unemployment or raise citizens' living standards. The disparity between these economies can be shown by a simple observation of unemployment averaged over 22 years of data among 27 EU countries. Over the period 2000–2021, Greece had an average employment rate of 15.69%, followed by Croatia at 15.55%, Poland at 10.46%, Bulgaria at 9.79%, and so on (International Monetary Fund [IMF], 2022b).

The goal of this research is to assess the influence of two recent crises in the world: COVID-19 and Russia's invasion of Ukraine. As a result, the purpose of this paper is to measure the economic performance of European Union countries. We will present what impact COVID-19 has had on the economic performance of these countries, as well as what impact the war or Russian occupation of Ukraine has had on the economic performance of the EU's 27 member states.

The originality of this article is that it analyzes 27 countries of the European Union, and we will obtain true overviews of the economic performance of each country from 2000 to 2022. Also, the paper's contribution will be about what impact COVID-19 has had on changing the economic performance of these countries, as well as what impact the Russia–Ukraine war has had on economic performance because COVID-19 and the war have affected the economic performance of many countries around the world. The paper's aim is to measure only European Union countries, compare the performance between these countries, and measure what impact COVID-19 has had on economic performance.

Misini and Tosuni (2023) studied the economic performance of the Western Balkan countries or states and, after analyzing the findings, came to the conclusion that COVID-19 had a negative impact on the states that were dependent on coastal tourism, while the Russia–Ukraine war had an impact on all of the Western Balkan countries, but primarily on the countries that are dependent on imports.

The economic performance of the member states of the European Union has been and continues to be impacted by the war in Ukraine. By lowering household purchasing power and driving up the cost, the conflict has made the energy problem worse. In their respective nations, European leaders are dealing with significant economic and social problems. In coping with this condition, policies must stay adaptable in order to respond to unforeseen events or shocks (IMF, 2022a).

The use of the Economic Performance Index (EPI) appears to address the majority of the difficulties encountered by the aforementioned macroeconomic measures. EPI, calculated using Khramov and Ridings Lee's (2013) raw-EPI technique, will be used to compare and contrast the performance of each EU member country.

The Russian invasion of Ukraine, as well as other geopolitical events, continue to raise uncertainty regarding economic projections. Short-term inflation risks continue to be primarily influenced by changes in the energy markets, which will have an impact on an overall global inflation rate (European Commission, 2023).

This study will continue with the theoretical basis in Section 2. Then, the methodology technique will be presented in Section 3. Section 4 will give the empirical analysis and present the study's findings. Section 5 will conclude the paper.

2. THEORETICAL BACKGROUND

The use of EPI to measure, as the name implies, an economy's economic performance is gaining traction among researchers, following the IMF's working paper and the approach introduced by Khramov and Lee (2013), in which the authors attempt to overcome the problems associated with using individual indicators such as economic growth, inflation, unemployment, public debt, and so on. Divergences in measurement caused by particular indicators are supposed to be smoothed out by introducing a more complex index. This indicates that Khramov and Lee (2013) have provided researchers with a more trustworthy comparison instrument for estimating the differences between economies. According to Khramov and Lee (2013), economic performance is a macrofactorial analysis of the macroeconomic deviation of an economy that affects its EPI.

The gross domestic product (GDP) is regarded as a critical indicator for any given economy since it symbolizes the ongoing advances in a country's domestic economy, signaling overall performance. However, in recent decades, the use of GDP to measure an economy's overall performance has been criticized because it fails to account for social and personal aspects such as citizen well-being or human suffering (Kordos, 2012; Vojtoví & Krajáková, 2014; Ivanová & Masárová, 2018). However, this study does not imply that GDP as an indicator should be ignored but rather used with caution.

Politicians appear to be preoccupied with GDP development but fail to pursue improvements in living standards and social fairness. There are occasions when there are inconsistencies between what government entities claim and what the general public benefits from. The benefits of GDP growth are frequently appreciated by the privileged few of society, which suggests that attention should be directed to the matrix of average income per capita, which has a greater impact on well-being and is a more appropriate indicator of a country's economic performance (Stiglitz et al., 2009).

Another often-used aspect by politicians is the public debt as it can increase the aggregate demand and offer the perception of economic growth, at least in the short term. However, there is evidence that in the longer term, public debt has an adverse impact on the economic performance of a country (Elmendorf & Mankiw, 1999). High public debt can be a hindrance to investment in the long term (Modigliani, 1961; Orszag & Gale, 2002; Baldacci & Kumar, 2010). In general, public debt would cause skewed taxation in the future, or alternatively, high inflation in order to pay for this debt, which in turn, reduces potential growth in the future (Aghion & Kharroubi, 2007; Woo, 2009).

According to Reinhart and Rogoff (2010), the link between public debt and economic growth is non-linear. Checherita-Westphal and Rother (2010), who report a non-linear link between growth and state debt, back up this thesis. Some empirical research covering the period 1970–2010 and using data from a diverse variety of nations has reached the same conclusion: a negative link between economic development and public debt.

A similar relationship seems to exist between inflation and growth. According to Andrés and Hernando (1997), in most of the countries studied, and focusing on the Organisation for Economic Co-operation and Development (OECD) countries, in a dataset for the period 1960–1992, there is a significant negative correlation between inflation and the increase of income for the said period. Moderate inflation rates exercise a negative impact on economic growth by reducing income per capita. Mamo (2012) shows that the relationship between economic growth and inflation can be either positive, negative, or neutral. Fischer (1993) finds a negative relationship between economic growth and inflation. In contrast, other authors report a positive relationship between inflation and economic growth (Mallik & Chowdhuri, 2001).

The findings of the above-mentioned studies are supported by Ghosh and Phillips (1998), who find that the relationship between economic growth and inflation remains positive for low inflation rates but turns negative when inflation increases. On the other hand, there are studies that fail to find a statistically significant relationship between economic growth and inflation (Sidrauski, 1967; Švigir & Miloš, 2017).

On the Philips curve, the opposite axis from inflation is unemployment, which is an equally important macroeconomic statistic. Several studies have found a statistically significant association between unemployment and growth. Countries that have witnessed consistent growth from year to year have seen unemployment rates fall. Antigua and Barbuda, as well as the Bahamas and Barbados, were studied (Baker, 1997; Osinubi, 2005).

However, economic growth has failed to produce similar drop-in unemployment rates in Arab countries such as Algeria, Jordan, and similar (Al-Habees & Rumman, 2012), a finding that can be observed also in the countries of Western Balkans. The model of economic growth and equal redistribution of income is important for any given country as it can improve economic performance (Vijayakumar, 2013).

Our findings highlight the significance of the effects of a pandemic shock on air price changes and volatility. The authors underline the importance of policymakers and real-world players explicitly taking changes in global health conditions into account when analyzing impacts and impacts on them (Christopoulos et al., 2021).

The COVID-19 crisis has had an unforeseen impact on the 27-country European Union's economy. In the third quarter of 2020, most manufacturing-based industries began to recover pretty swiftly. The COVID-19 crisis caused numerous economic shocks across all economic sectors, particularly in the automotive and tourism industries (de Vet et al., 2021).

Before and after the COVID-19 epidemic, European economies faced significant challenges. Unemployment has been one of the signs. Europe's unemployment rate has skyrocketed. According to the author's findings, France and Italy have been severely impacted in the labor market, but Germany, Spain, and the United Kingdom have seen a large decrease in unemployment as a result of COVID-19. The increase in the number of COVID-19 cases in Europe has a more negative impact on the labor market than an increase in the number of deaths by lowering the employment rate. Furthermore, COVID-19 has slowed economic growth by reducing employment in the third and industrial sectors, and services have diminished throughout Europe (Su et al., 2022).

The global economy has been seriously harmed by the COVID-19 outbreak and the associated control measures. The global economy is in a profound slump, with global GDP falling by 3.5% in 2020 and eurozone GDP falling by 6.75%. Tourism demand fell dramatically in 2020 as a result of the economic crisis and the implementation of control measures: closed hotels and restaurants, travel agencies, cancelled air travel, and mobility restrictions all harmed the tourism industry (Plzáková & Smeral, 2022).

COVID-19 has had a significant impact on the world economy. This is the third time in a decade that the global economy has faced major economic issues. The first was the subprime mortgage crisis in the United States in 2007–2008, and the second was the sovereign debt crisis in Europe in 2010, which harmed the actual economy by freezing lending. The COVID-19 economic crisis resulted from lockdown policies and heightened uncertainty around the world, resulting in lower consumption and, as a result, lower energy demand and lower energy prices (Katsampoxakis et al., 2022).

3. RESEARCH METHODOLOGY

This research will examine some of the most important macroeconomic variables, including unemployment, inflation, public debt, and economic growth. Using the information from the aforementioned indicators, the EPI of 27 EU nations will be estimated using 22 years of secondary data from the World Bank, IMF, and OECD databases for the period 2000–2021.

The EPI will be generated for each individual country within the EU for each year in the dataset using the methodology pioneered by Khramov and Lee (2013) in the IMF (2013) working paper using the following formula:

$$EPI_t = 100\% - |Inf(\%) - It| - (Unem(\%) - Ut) - (Def/GDP(\%) - Def/GDP_t) + (\Delta GDP(\%) - \Delta GDP_t) \quad (1)$$

where, *Inf(%)* is the current inflation rate; *Unem(%)* is the current unemployment rate; *Def/GDP(%)* is the current budget deficit as a share of GDP; and *ΔGDP(%)* is the real GDP growth rate. *EPI$_t$* is the dependent variable while *Inf(%), Unem(%), Def(%),* and *ΔGDP(%)* are the independent ones.

The obtained EPI values using panel data were used to test the following model:

$$Y = \beta_0 + \beta_1 X1 + \beta_2 X2 + \beta_3 X3 + \beta_4 X4 + \omega \qquad (2)$$

or

$$YEPI_t = \beta_0 + \beta_1 Xp_t + \beta_2 Xa_t + \beta_3 Xex_t + \beta_4 Xc_t + \varphi \qquad (3)$$

The econometric model will be discussed in more detail in Section 4 presenting the empirical analysis.

4. EMPIRICAL ANALYSIS

The empirical analysis will focus on the actual EPI and what it means for the nations in terms of ranking. As a scholarly exercise, the actual data will be used for the years 2000–2019, and the data will be extrapolated for the remaining 2020–2022, using the statistical linear approach as explained by Levin et al. (1986), to see how the new "assumed" EPI values contrast to the actual ones, thus attempting to explain the impact of the Russian invasion of Ukraine. Keeping this in mind, the research will begin with data visualization.

Figure 1. EPI average over the period 2000–2022
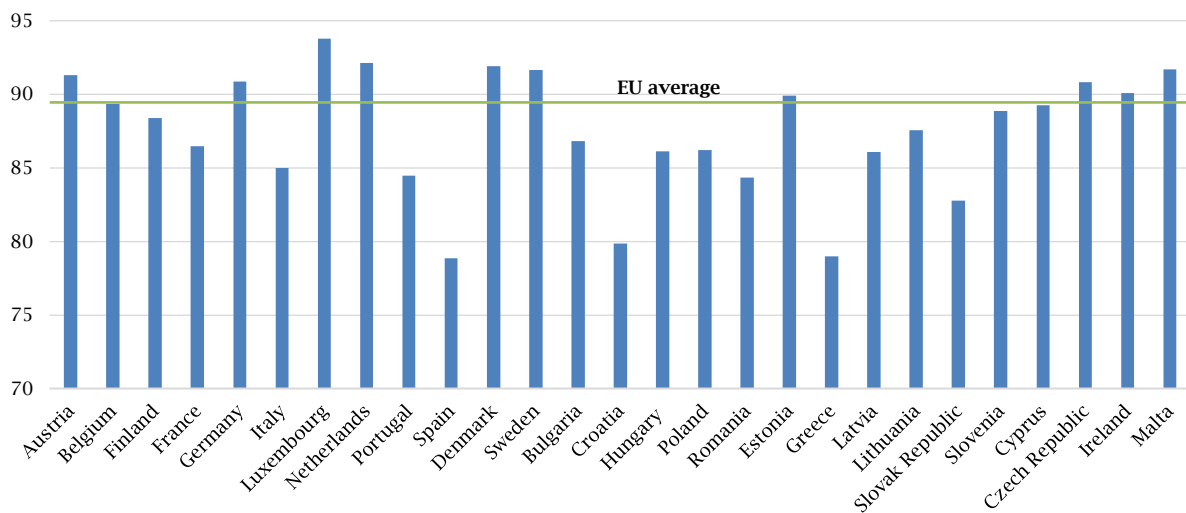
Source: Authors' calculation.

The graph above depicts the enormous disparities across nations based on their computed EPIs over the period 2000–2022, with Luxembourg averaging slightly more than 93% as the highest performer and Spain on the other end of the spectrum at about 79%. In addition, the orange line representing the average EPI for the 27 EU countries from 2000 to 2022 shows how each country compares to the EU average.

Using the Economic performance grading system as laid out in the IMF (2013) paper, the following table can be observed. The period for this calculation is 2000–2021.

Table 1 shows the degree of performance of the European Union countries included in the analysis for 27 countries, with data ranging from 2000 to 2021. The purpose of this table study is to assess the influence of COVID-19 on these countries' economic performance. In the analysis, all countries were used as a base and categorized based on the average economic structure they have, as determined by the authors of this article, and the levels of categorization of the structure are also

diverse, as shown in the table below. Luxembourg, the Netherlands, and Denmark have the best economic performances in the European Union. Spain, Greece, and Croatia have the worst reputations among the 27 European Union member states. COVID-19 has had the greatest impact on these low-performing countries since their economies rely heavily on beach tourism. Following is Table 2, which includes the impact of the Russia–Ukraine war on the economic performance of the European Union's 27 member countries.

Table 2 below shows the EPI averages computed after incorporating the 2022 data, and despite the expected negative impact of the Russian invasion on economic performance, which is visible in the computed mean values, the impact is small. This finding can be related to the nature of the statistical indicator, as one single year should not have a large impact on the computed average of the series minus one observation. This is also visible in the graphs below, with blue showing the mean EPI value for the period 2000–2021, and orange for the period 2000–2022, for each country.

Table 1. Country grade[a] of 27 EU countries (2000–2021)

No.	Country	Years	Mean	Grade	Economic performance
1.	Luxembourg	2000–2021	93.88	B	Good
2.	Netherlands	2000–2021	92.38	B	Good
3.	Denmark	2000–2021	92.09	B	Good
4.	Sweden	2000–2021	92.01	B	Good
5.	Malta	2000–2021	91.81	B	Good
6.	Austria	2000–2021	91.58	B	Good
7.	Czech Republic	2000–2021	91.34	B	Good
8.	Germany	2000–2021	90.9	B-	Good
9.	Estonia	2000–2021	90.43	B-	Good
10.	Ireland	2000–2021	90.3	B-	Good
11.	Belgium	2000–2021	89.64	C+	Fair
12.	Cyprus	2000–2021	89.34	C+	Fair
13.	Slovenia	2000–2021	88.99	C+	Fair
14.	Finland	2000–2021	88.56	C+	Fair
15.	Lithuania	2000–2021	88.11	C+	Fair
16.	Bulgaria	2000–2021	87	C	Fair
17.	Latvia	2000–2021	86.93	C	Fair
18.	Hungary	2000–2021	86.85	C	Fair
19.	France	2000–2021	86.56	C	Fair
20.	Poland	2000–2021	86.29	C	Fair
21.	Italy	2000–2021	85.42	C	Fair
22.	Romania	2000–2021	84.53	C	Fair
23.	Portugal	2000–2021	84.37	C	Fair
24.	Slovak Republic	2000–2021	82.94	C-	Fair
25.	Croatia	2000–2021	79.72	D+	Poor
26.	Greece	2000–2021	79.04	D+	Poor
27.	Spain	2000–2021	78.72	D+	Poor

Note: a. Economic performance grading system (IMF, 2013).
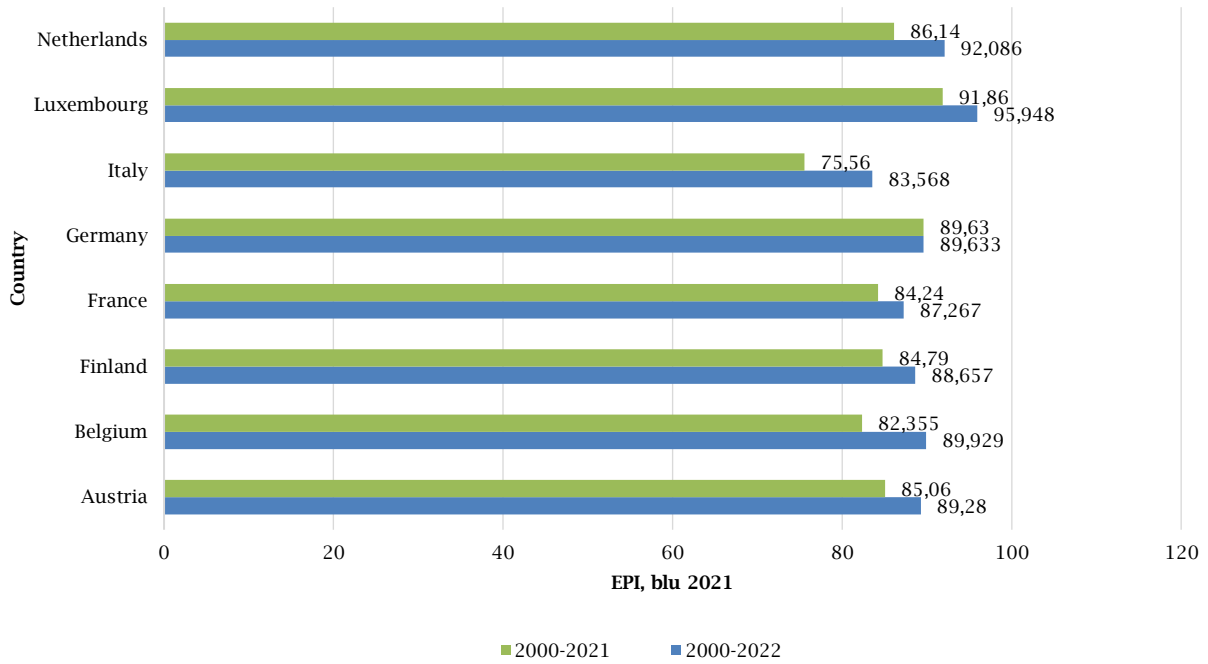*Source: Author's calculation.*

Table 2. Country grade[a] of the impact of the invasion on 27 EU countries (2000–2022)

No.	Country	Year	Min	Max	Mean	Grade	Economic performance
1.	Luxembourg	2000–2022	86.95	97.23	93.79	B	Good
2.	Netherlands	2000–2022	85.91	97.93	92.11	B	Good
3.	Denmark	2000–2022	84.87	97.10	91.91	B	Good
4.	Malta	2000–2022	76.71	102.57	91.68	B	Good
5.	Sweden	2000–2022	83.8	96.13	91.65	B	Good
6.	Austria	2000–2022	78.25	95.47	91.30	B	Good
7.	Germany	2000–2022	83.26	96.57	90.85	B-	Good
8.	Czech Republic	2000–2022	79.02	99.5	90.80	B-	Good
9.	Estonia	2000–2022	69.43	96.86	90.64	B-	Good
10.	Ireland	2000–2022	53.41	113.15	90.07	B-	Good
11.	Belgium	2000–2022	78.35	94.30	89.32	C+	Fair
12.	Cyprus	2000–2022	72.04	96.87	89.27	C+	Fair
13.	Slovenia	2000–2022	72.44	98.40	88.84	C+	Fair
14.	Finland	2000–2022	79.48	92.87	88.39	C+	Fair
15.	Lithuania	2000–2022	57.87	100.10	87.55	C	Fair
16.	Bulgaria	2000–2022	73.08	96.13	86.81	C	Fair
17.	France	2000–2022	74.28	91.78	86.46	C	Fair
18.	Poland	2000–2022	72.73	99.66	86.22	C	Fair
19.	Hungary	2000–2022	70.37	96.85	86.13	C	Fair
20.	Latvia	2000–2022	57.94	97.91	86.07	C	Fair
21.	Italy	2000–2022	72.17	91.91	84.99	C	Fair
22.	Portugal	2000–2022	70.47	95.66	84.45	C	Fair
23.	Romania	2000–2022	45.61	98.21	84.35	C	Fair
24.	Slovak Republic	2000–2022	57.47	95.66	82.76	C-	Fair
25.	Croatia	2000–2022	69.73	94.02	79.84	D+	Poor
26.	Spain	2000–2022	59.07	90.69	78.83	D+	Poor
27.	Greece	2000–2022	66.05	91.79	78.65	D+	Poor

Note: a. Economic performance grading system (IMF, 2013).
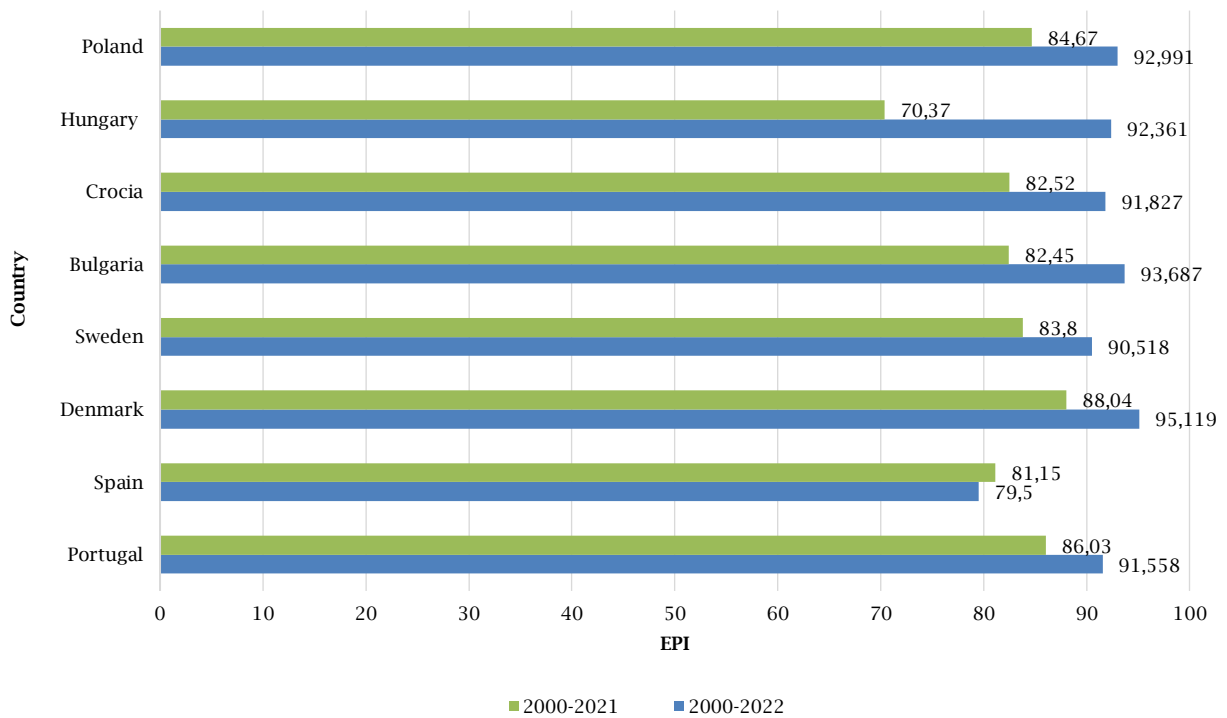*Source: Authors' calculation.*

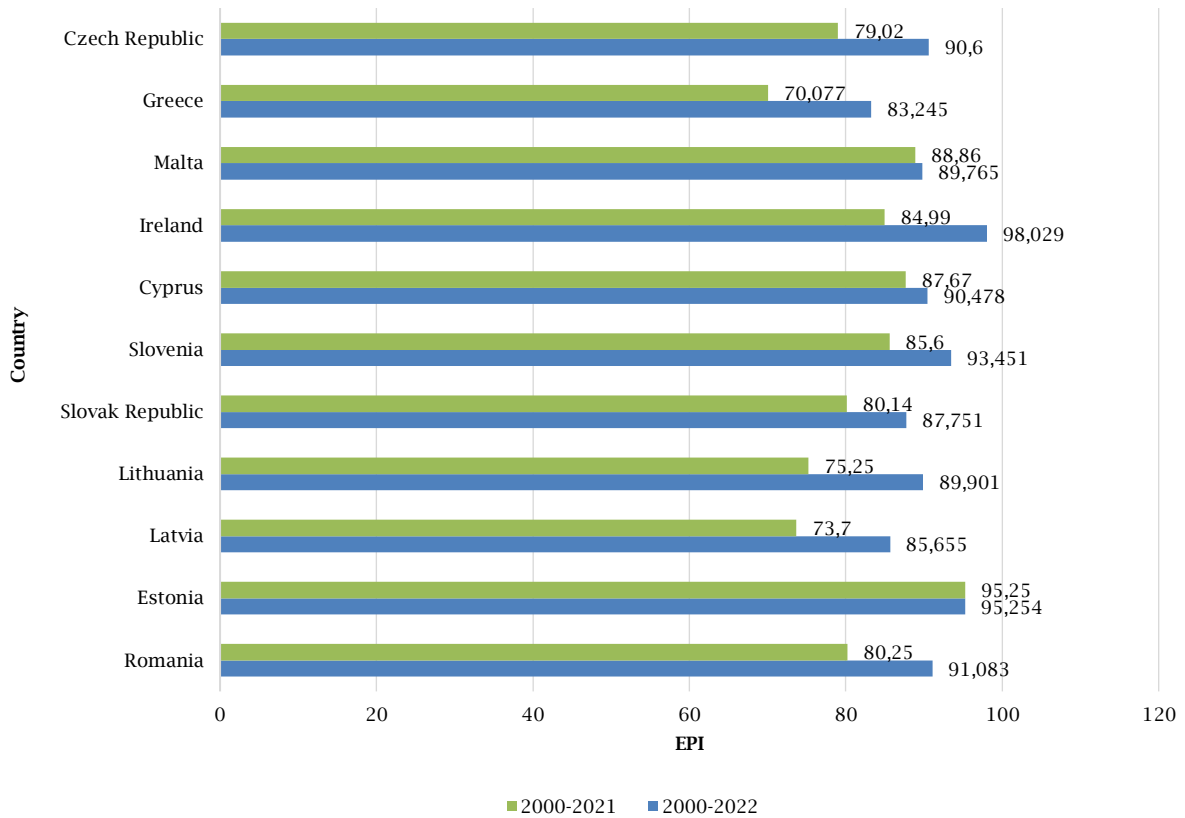**Figure 2.** EPI average countries difference (2000–2021; 2000–2022) (Part 1)

Source: Authors' calculation.

Figure 2. EPI average countries difference (2000–2021; 2000–2022) (Part 2)

Source: Authors' calculation.

**Figure 2.** EPI average countries difference (2000–2021; 2000–2022) (Part 3)

Source: Authors' calculation.

Having said that, as stated at the outset of this section, this study has attempted to extrapolate the actual EPI of different nations over the last three years using the method described in Levin et al. (1986). For example, for every given country, EPI data from 2000 to 2019 was utilized to anticipate EPI for the years 2020, 2021, and 2022. Obviously, this necessitates some huge assumptions of ceteris paribus, as well as the fact that COVID-19 effects are only detected in the EPI generated for 2019.

After calculating the extrapolated EPI for each country in the dataset during the last three years, it was placed on a graph against the actual EPI. This research yielded some intriguing results since most countries exhibit the expected behavior of projected EPI outperforming actual EPI over a three-year period. As an example, consider the following data graphs for Austria and Germany:
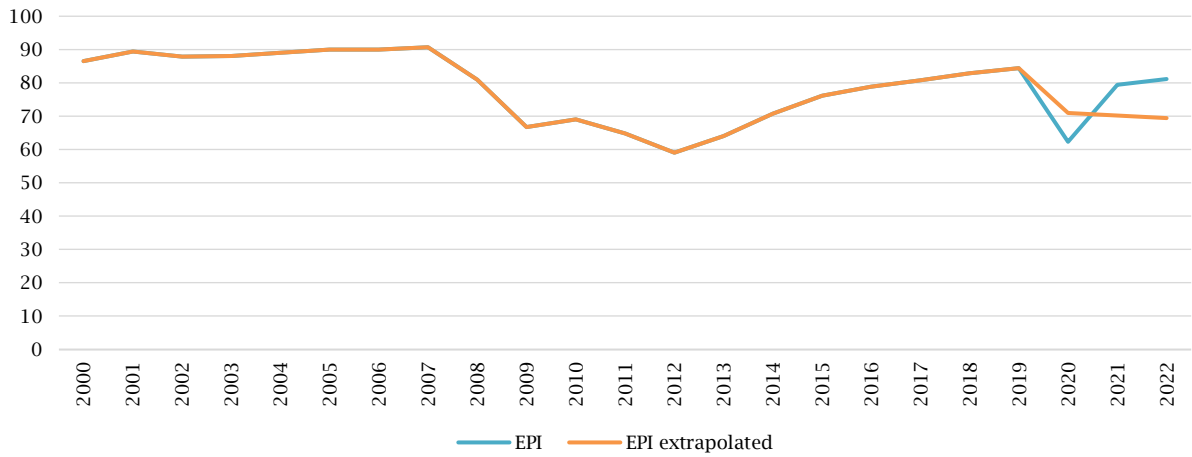
Figure 3. EPI for Austria
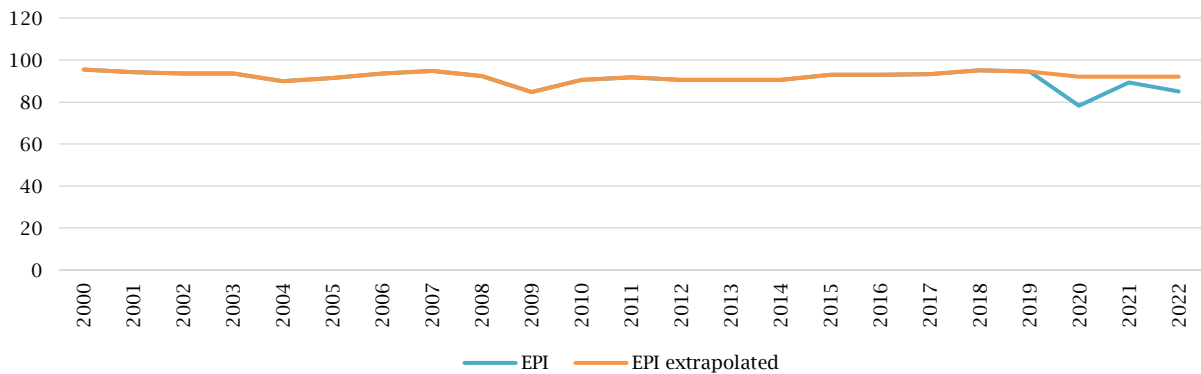
Source: Authors' calculation.
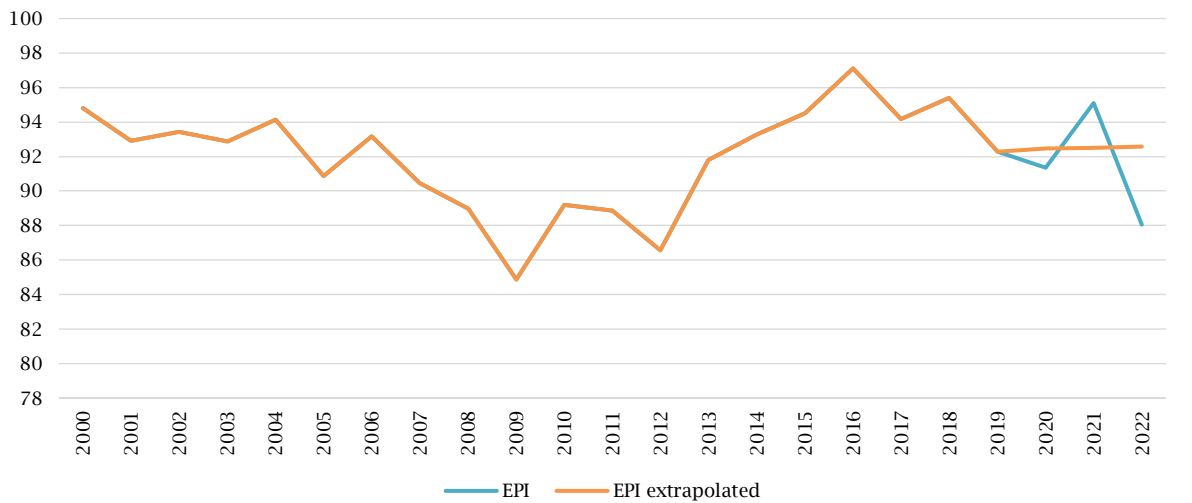
Figure 4. EPI for Germany
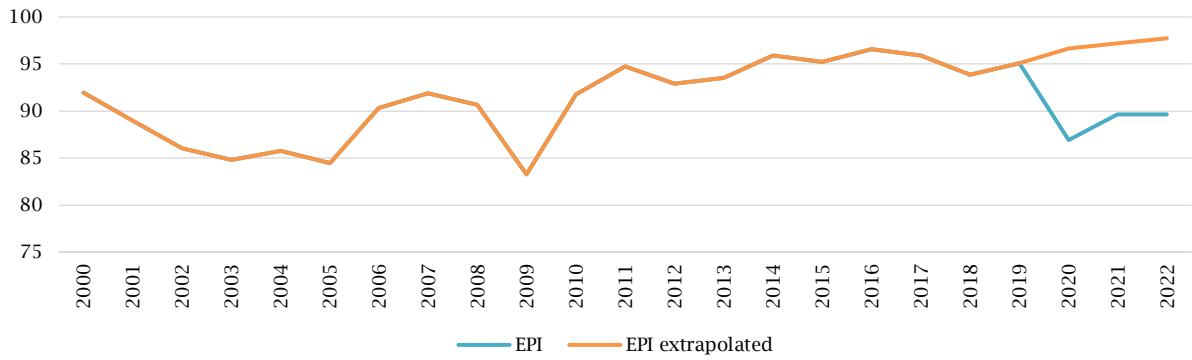
This group includes the vast majority of countries (17 out of 27). However, a sizable proportion of nations exhibit counterintuitive behavior, with the real EPI exceeding the extrapolated EPI at least once in the last 3 years. The following are some examples:

Figure 5. EPI for Spain

Figure 6. EPI for Denmark

The reasons for such behavior are beyond the scope of this paper, as there is a lot of historical information stored in these estimates, but observing the countries that have displayed such EPI behavior, one potential road to understanding this phenomenon can be the geographical proximity to the Ukrainian border, which appears to have an inverse relationship with the extrapolated EPI. Countries in this category are France, Luxembourg, Denmark, Portugal, Spain, Croatia, Greece, Cyprus, and Ireland.

5. CONCLUSION

To summarize the preceding discussion, the findings reported in this study confirm the negative impact of the Russian invasion on the Ukrainian economy inside the EU in 2021. Each EU country has had challenges as a result of the external shock created by the invasion, and the tool utilized in this study, EPI, has proven beneficial in capturing such an impact.

To highlight the impact of this external shock, this study extrapolated EPI values for the last three years, and it discovered that different countries behaved differently, with some following the intuitive drop in EPI values compared to the extrapolated ones, and others outperforming the extrapolated values. Many causes, both historical and geographical, that are beyond the scope of this study can conceivably explain such behavior. Future studies will have to address this issue. With that in mind, this research has helped to establish the EPI as a solid and dependable indication of how well economies are operating.

Christopoulos et al. (2021), de Vet et al. (2021), Su et al. (2022), Plzáková and Smeral (2022), and Katsampoxakis et al. (2022) conclude that the pandemic hit and the Russian invasion of Ukraine have had a significant impact on the European Union's economy. The price has influenced each area, which has resulted in price increases for other products.

The paper is particularly significant to the study because no other paper has examined the profile of European Union nations during the past two decades. The effect of COVID-19 on the economic performance of various European Union member countries has been objectively examined in this research. The impact of the Russian occupation in Ukraine has also been examined in the paper, and empirical research has been done to determine how it has impacted the member states of the European Union's economic performance. The empirical analysis was done for a short-term period of one year, assessing its negative impact. We will have the chance to examine in the future what influence the most recent war had on the economic performance of these European Union states.

The political implications of Russia's invasion of Ukraine have influenced the European Union states and other countries of the world to impose sanctions on Russia, and these sanctions have also influenced the market's deregulation, since oil, gas, wheat, oil, etc., and many other products have been exported from Russia and Ukraine to different countries around the world. Sanctions also have an impact on the prices of all products and the economies of these countries.

Similarly, the article has emphasized the influence of COVID-19 on the economies of numerous European Union nations, analyzing each state's economic performance before and after COVID-19, picking them according to categories, and looking at the performance of these countries in color. Spain, Greece, and Croatia have had the largest reductions in economic performance or have been influenced by COVID-19 in their economic performance because these countries are dependent on the coast and are growing as a result of COVID-19. While the Russian war has economically harmed all European Union states, it has had a greater impact on the loss of economic performance in these states: Malta, Germany, France, and so on, when compared to the year 2021.

The article is unique for the readers and the authors because there are no other works that have analyzed the economic performance of the 27 European Union countries. The paper is a true scientific analysis that measures the impact of COVID-19 on the economies of these countries as well as the impact of the war between Russia and the rest of the world on the economies of these countries, taking into account the impact of COVID-19 and the Russian invasion of Ukraine for each country.

The main limitation of this study is the proximity to the events, time-wise. The fact that the invasion of Ukraine is still ongoing, for this study means that the estimates produced will change with the passing of time. Furthermore, the longevity of this particular situation in Ukraine may trigger adjustment of economies to the external shocks discussed here, and the same may be in some way internalized by the countries in our sample, thus changing their behaviour. At the same time, this opens the door for future research which at least could compare findings of this study with actual effects, once enough time distance is created and the data is available.

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