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## Article

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## Article

# Impact of the COVID-19 Pandemic on EU Convergence

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**Abstract:** The effects of the COVID-19 pandemic were global and led to an economic decline in most countries of the EU. The development and values of economic indicators varied from country to country and showed significant regional differences. The study evaluates the coverage of selected economic indicators in the Member States of the EU in the period 2010–2020. The analytical part is based on empirical statistical data. As a methodological procedure for testing the convergence of the EU, we compared the results of the coefficient of variation of GDP per capita in PPP and the unemployment rate. The findings of this study confirm the predicted development trends. The pandemic has reversed major convergence trends. Divergence within the EU was affected by a lower decline in GDP in the developed countries of the EU. The tendencies of social disparities in the unemployment rate were different from the development of the coefficient of variation of GDP per capita. The first year of the pandemic marked a decline in disparities between the countries of the EU. For future research, we recommend monitoring the development of convergence in the next pandemic period.

**Keywords:** COVID; convergence; European Union; regional disparities; unemployment; gross domestic product



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## 1. Introduction

The COVID-19 pandemic, which took on global proportions, disrupted economic activities, leading to an economic recession in many countries (Jindřichovská and Ugurlu 2021). The effects on the economy, trade, and finance were comparable to the global financial crisis (Yarovaya et al. 2020). The pandemic caused supply and demand shocks (Rizvi et al. 2020). Economists and policymakers proposed increased state intervention to solve supply and demand shocks. Krugman (2020) and Hintringer et al. (2021) support public spending but argues that this spending should be rational and efficient. They recommend focusing on suitable segments, innovation, science, and research, increasing productivity. Porter (1990) ranks productivity among the factors of national competitiveness.

The causes of the current crisis are different from the previous financial and debt crisis, which began in 2008. The main difference is that the current pandemic crisis is not structural. The pandemic shows signs of an exogenous shock. The global economy is showing supply chain disruption and also demand shock. These mixed causes and highly correlated effects, which are difficult to estimate, make it difficult to cope with the current crisis in terms of economic policy measures. Negative impacts of the pandemic crisis fall on the service sector and especially on the segments of tourism and hospitality (Fedajev et al. 2021; Vilcanqui Velásquez et al. 2022).

The current pandemic crisis is creating new economic phenomena. Fiscal stimulus in most developed countries is extremely high and strongly affects the functioning of markets and economic agents. Deformation increases inflationary pressures (Leandro and Jimeno 2020). The effects of the recession are uneven by country and sector. Strong

fiscal stimulus and different economic models within the European Union may lead to dissimilar development in individual Member States. Gräbner et al. (2020) pointed out that the differences in GDP and unemployment correspond to different growth patterns in the European Monetary Union (EMU). Southern European countries have used growth models based on debt and the accumulation of current account deficits. On the contrary, the economic growth of the developed countries of Northwestern Europe was based on exports, which resulted in the current account surpluses as explained by Gräbner et al. (2020). Petrakos et al. (2005) provided a different view of convergence, arguing that developed economies and regions show higher growth dynamics during periods of expansion and slower ones during periods of recession. They do not see economic growth as a factor in reducing economic and social disparities between countries and regions (Papanikos 2021). Based on published studies, it is possible to identify the research gap to which this article responds. Published studies focused only on the development of economic indicators. They did not examine in more detail the effects on economic differentiation and convergence. The studies published cover the first year of the pandemic. The paper includes comprehensive data on GDP per capita and the unemployment rate from 2020 to 2021. The authors analyze the data within a longer time series of 2010–2021.

The paper aims to assess the convergence of the Member States of the European Union in the period 2010–2021. The analysis includes two economic indicators (gross domestic product per capita and unemployment rate). The analysis focuses on the 27 Member States of the European Union. The paper expands the studies published so far, which focused only on the macroeconomic development of GDP and unemployment. This paper presents an introductory analysis of the impact of a pandemic on economic convergence. The final research will be suitable as an ex-post evaluation after the end of the crisis period.

## 2. State of Art

The conclusions and results of published studies on the convergence of the European Union differ according to the methodology used, models, research period, and monitored convergence indicators. For decades, theoretical approaches to examining national and interregional differences included two main groups. The first group of authors claimed that the differences are growing (confirming divergence). The second group leaned towards convergence. The fundamental difference between these approaches is whether the authors supported processes that lead to convergence or, conversely, focused on mechanisms that lead to increasing disparities (Blažek and Uhlíř 2002; Dawkins 2003; Čajka and Rýsová 2008; Buček et al. 2010; Kováč et al. 2011).

Proponents of convergence tendencies include authors based on the neoclassical theory of economic growth. Neoclassical concepts are based primarily on the conditions of an open economy in the long run. Convergence factors include perfect mobility of factors of production, capital spillovers from more developed to lagging countries, and migration flows (Abrahám 2011). The movement of people and factors of production contribute to the convergence of prices and the economic level of countries and regions. Neoclassical concepts of a closed economy do not work with absolute convergence. The neoclassical theory confirms conditional convergence and argues that economies converge to their steady-state (Holub and Čihák 2000).

On the contrary, demand-oriented models (core-periphery models, theories of differentiated and polarized growth, etc.) do not consider economic and social disparities to be short-term disorders. They see spatial development as an unbalanced process. In the long run, they assume differentiation tendencies. They define the causes of divergence in the area of demand factors (Martin 2006).

More modern theoretical approaches consider both convergent and divergent tendencies. The new theory of growth considers technical progress and the equipment of human capital and technology to be the main factors of economic growth and, consequently, of economic disparities. The inclusion of technological progress in technical progress models and higher preferences for knowledge and human capital makes it possible to abandon

the law of declining factor returns (Jones 2002). The new economic geography explains disparities in the long run through different specialization, competitiveness, industrial structure, and agglomeration processes (Venables 2005). Modern approaches mention the cost and demand link as the main causes of agglomeration processes in the world economy. The cost relationship is affected by the availability of inputs and supplier-customer links. Demand ties are related to the market presence (Baldwin and Wyplosz 2013). The concepts of the new economic geography define as factors of long-term competitive advantages of countries and regions the sectoral concentration of companies, the availability of skilled labor, the existence of regional clusters, and developed links between companies (Krugman 1995).

Reducing disparities between countries and regions is one of the European Union's long-term goals. The EU's economic and social cohesion policy primarily addresses differences in the GDP per capita and unemployment rate. Real convergence has long affected the development of the integration process and the EU's competitiveness in global markets (Durkalic et al. 2019).

Research on real and nominal convergence within the EU has been the subject of several studies in the past. The findings of individual authors were different depending on the applied methodology, analyzed period, and selected statistical indicators. Goecke and Hüther (2016) analyzed convergence within the original EU Member States (EU15) using beta convergence analysis. The historical period from 1950 to 2012 was examined. The authors claim that the economic level of the EU15 countries has been converging at the national level since 1950. Countries with relatively low GDP per capita in 1950 had higher average gross domestic product growth until 2012 than countries with relatively high GDP per capita in 1950. The study focused on the converging countries of the southern wing. The authors also found that Greece, Portugal, and Spain had similar economic levels at the beginning of the examined period (40–45% of EU average GDP). Gross domestic product per capita in these countries increased on average by more than 3% per year. The study in the period under review (1950–2012) confirmed the postulates of neoclassical growth theory. The theory predicts that countries with relatively lower GDP per capita at the beginning of the period will have higher growth rates compared to countries with higher GDP. However, the convergence process between the EU15 ended in 2012 (during the last financial crisis). The development of countries has reversed. Converging countries have turned divergent (Goecke and Hüther 2016).

Cavenaile and Dubois (2011) analyzed the process of convergence within the European Union (27 countries) between 1990 and 2007. The authors confirmed the convergence process. However, they also found that the European Union was showing significant heterogeneity. They have cited the differentiation of the European Union as a risk to the effective functioning of the European Union and the Eurozone (Cavenaile and Dubois 2011). Another study (Burian and Brčák 2014) focused on evaluating the convergence process of the EU membership base in the period 2002–2012. They applied the method of cluster analysis. They categorized the 27 Member Countries into four groups: the core of the EU, the old periphery, the new periphery, and a group of non-Member States. They found a reduction in differences between the core of the EU and the new periphery (Burian and Brčák 2014).

Forgó and Jevčák (2015) assessed the convergence of the ten new Member States to the twelve developed original EU countries. The study covered the ten Central and Eastern European countries that acceded in 2004 and 2007. The study period was 2004–2014. According to the authors, most of the monitored new Member States achieved significant real convergence with the core of the EU. This study identifies the effects of international trade and investment as the main convergence factors. The convergence process slowed down during the economic and financial crisis in the period 2008–2009 (Forgó and Jevčák 2015).

Other studies have found that there is no lasting nominal and real convergence in the European Union. However, they confirm convergence in the eastern wing of the EU

(Franks et al. 2018). They cite the slowdown in the EU's southern wing as a reason for slowing convergence. Thus, paradoxically, divergence occurs within the euro area itself. Conversely, some non-euro area countries in Central and Eastern Europe are converging (Diaz del Hoyo et al. 2017).

Grzelak and Kujaczyńska (2013) confirmed the occurrence of convergence within the enlarged European Union (EU27) in 2001–2010. In particular, they cite the faster growth of the new Member States compared to the original EU countries as convergence factors. They cite the increase in factor productivity and relatively intensive investment activity as reasons. Despite economic convergence, they still confirm the considerable heterogeneity of the membership base of the European Union. The differences are logically even higher at the level of smaller regional units. They assess the effects of economic integration and EU economic and social cohesion policy on real convergence as positive. Exact quantification is not estimated by Grzelak and Kujaczyńska (2013).

Durkalic et al. (2019) prepared a comprehensive analysis of convergence within the European Union. They included four economic indicators (1. GDP per capita (PPP-based) as a measure of the total economic activity of a country, 2. GDP per worker as an indicator of productivity, 3. the unemployment rate as an indicator of the labor market inequalities, and 4. gross capital formation). The data included the period 2004 to 2016. Unemployment convergence has been identified in the post-Eastern enlargement period. However, in the period after the financial crisis, an increase in disparities was confirmed. European Union Member States have been affected by the crisis to varying degrees and have applied different anti-crisis measures. The study confirmed that significant labor market imbalances persist, both in the new Member States and in some of the old ones. The study found that inequalities in GDP per capita in PPPs were higher than in the period under review, but generally noted convergence within the European Union. Regional integration is composed of heterogeneous entities with significant natural, economic, institutional, and political differences. Real convergence continues, especially when it comes to labor productivity and employment (Durkalic et al. 2019).

Ioan et al. (2020) analyzes the effects of international trade and foreign direct investment on sustainable economic growth. The study includes gross domestic product, gross domestic savings, and gross domestic capital. Methodologically, it is based on the analysis of the least squares panel. The research includes a group of ten Central and Eastern European (CEE) countries. The period 2005–2016 was monitored. The study demonstrated the importance of trade and investment for sustainable economic development. The results showed a strong convergence of Central and Eastern European countries led by Ioan (Ioan et al. 2020). The main factors in the continued economic growth of Central and Eastern Europe in all periods (before the crisis, during the global economic crisis, and after the crisis) were trade openness, relatively good financial and banking sectors, and large inflows of foreign direct investment as explained by Popescu et al. (2019). Thus, the economic growth of the countries of Central and Eastern Europe was demonstrated throughout the period under review until the onset of the pandemic, based on high input consumption.

The conclusions of these studies will certainly be influenced by the coming period of the COVID-19 pandemic, which fundamentally changes the functioning of the economy and economic policies. Undoubtedly, they are reflected in economic indicators that have a major impact on convergence processes. Some available studies have already addressed the implications. Gräbner et al. (2020) estimates the uneven effects of the epidemic crisis on euro area countries. It predicts more severe macroeconomic declines in the southern wing of the euro area. This demonstrates the increase in differences and implies a process of divergence. Similar estimates, but in the field of labor market, are presented by Georgiou (Georgiou 2021). He found that the COVID-19 pandemic in 2020 had worsened the situation on the EU labor market. The rise in unemployment was more pronounced in the southern eurozone countries (Georgiou 2021). The main objective of this study is to assess the consequences of the coronavirus pandemic 2019 (COVID-19) on the gross domestic



product (GDP) per capita in Organisation for Economic Co-operation and Development (OECD) countries.

[Martinho \(2021\)](#) deals with the impact of the pandemic on GDP per capita in OECD countries. The OECD group of countries is relevant concerning the European Union because most developed EU countries are also members of the OECD. According to the findings of this study, the pandemic in the first two quarters of 2020 halted the convergence process. Before the start of the pandemic, growth-successful countries included Bulgaria, the Czech Republic, Estonia, Denmark, Ireland, Lithuania, Latvia, Hungary, Romania, and Slovakia. In the first year of the COVID-19 pandemic (2020), the economic impacts were higher in countries with more positive cases. The exception in this regard was Greece, where both GDP per capita growth and the incidences of COVID-19 were low. The findings showed a poorer ability of weak economies to withstand extreme events. The long-standing efforts of some EU countries to achieve convergence have been hampered by the current situation. Among the policy proposals of this study are, in particular, support for the balanced economic development of the world economy. The aim is to prevent, in particular, socio-economic impacts. The European Union faces new challenges to creating effective and equitable instruments and policies ([Martinho 2021](#)).

The introduction of measures to limit the spread of the COVID-19 pandemic has affected GDP and employment. In 2020, the pandemic already caused a significant increase in unemployment. The effects on the youth unemployment indicator under 25 were particularly high. The impacts have been recorded in countries with traditionally high youth unemployment and also in non-problematic ones. Due to the persistent complicated situation, the governments of individual EU countries gradually introduced various support programs, which led to a slowdown in unemployment growth ([Lambovska et al. 2021](#)).

The effects of the COVID-19 pandemic vary across the Member States of the European Union. [Muggenthaler et al. \(2021\)](#) emphasize the EU's recovery plans in reducing disparities between states. Spain, Italy, Malta, Austria, and Portugal are cited as countries with significant declines. By contrast, a more modest decline was in Estonia and Lithuania. In Ireland, even GDP growth was evident. Household consumption recorded a decline in most European Union countries. The tourism sector also attaches particular importance to aggregate demand within the European Union. The effects of total investment and net exports varied from country to country. Traditionally export-oriented economies (Benelux countries and Germany) have not seen such a decline in export performance in comparison with other EU countries ([Muggenthaler et al. 2021](#)).

The results show a clear relationship between the length of the lockdown of the economy, GDP growth, and the number of deaths associated with the pandemic. Longer lockdowns have harmed GDP growth: the average decline in GDP from the second quarter of 2019 to the second quarter of 2020 in countries with longer lockdowns (several months) is about −21%, while in countries that use shorter lockdown periods (about 15 days) it is −13%. This finding clearly shows the negative impact of policies based on longer closures of the economy and society. Another finding was that countries that invested more in pandemic prevention and reduced mortality while shortening the lockdown period also reduced the negative effects on the economy ([Coccia 2021](#)).

### 3. Materials and Methods

The methodology is based primarily on the analysis of empirical statistical data and the assessment of the main features and trends of regional differentiation in the dimension of the states of the European Union. The resources of the European Statistical Office (Eurostat) are the main source. Socio-economic disparities were analyzed by selected economic indicators (GDP per capita in purchasing power parity and unemployment rate).

The indicator of GDP per capita in purchasing power parity is used to monitor the economic standard. This indicator is adjusted for the effects of price levels and exchange rates. The GDP per capita figures are calculated as a percentage of the European Union average. This study uses harmonized unemployment rate data published by Eurostat for

each Member State. The Eurostat database uses harmonized data sources for EU Member States. It defines the unemployed as the ratio of the unemployed to the total labor force. The labor force is defined as the total number of employed and unemployed inhabitants.

Convergence is understood in the economy as the convergence of economic variables. In the case of assessing disparities and converging the economic and social levels of the countries concerned, we are talking about real convergence. The concept of nominal convergence is used within the European Union in connection with the convergence of nominal macroeconomic variables. In this article, we assess the convergence process within the group of European Union countries. As a methodological procedure for testing the convergence (differences in socio-economic disparities) of the European Union, we chose to compare the results of the coefficient of variation of gross domestic product per capita in PPP and the unemployment rate. The coefficient of variation is given by the ratio of the standard deviation and the arithmetic mean. The coefficient of variation is usually given as a percentage (the value is multiplied by one hundred). The results of the coefficient of variation are that the higher the values, the greater the differences within the investigated set. When examining disparities we therefore assess whether there is an increase or decrease in the coefficient of variation over time. If the coefficient of variation decreases, there is convergence within the examined sample of European Union countries. We used statistical indicators from the database of the European Statistical Office for the years 2010–2021. The aim was to compare the situation at the beginning and end of the period. We will evaluate the effects of changes in the development of economic indicators on the development of socio-economic disparities. The longer time series of empirical values for 2010–2021 has a greater informative value. It is thus possible to record the effects of a pandemic in relation to long-term developments.

At the same time, we focused on finding out whether pandemic factors affected different groups of countries. We monitored disparities according to the following groups: European union, Eurozone countries, new EU Member States, old EU Member States, i.e., countries by geographical location. Our choice of four groups of countries reflects the different development and position of countries in the integration process. We analyze the European Union as the main group. The euro area includes 19 countries that have adopted the euro. The group of euro area countries makes it possible to assess the effects of the single currency on convergence. The groups of new and member countries represent different types of economies. These groups are defined according to the period when they joined the EU. The new Member States acceded in 2004, 2007, and 2013. These are mainly Central and Eastern European countries (except for Cyprus and Malta). The new Member States are former economies in transition with lower levels of GDP per capita, which have gradually integrated into EU structures. The analysis of these groups of countries makes it possible to distinguish the effects of the pandemic on the developed and converging EU economies.

#### 4. Results

The analysis of GDP per capita in PPP statistics showed that between 2019 and 2021 there was a real divergence between the group of euro area countries and all countries of the European Union by 5 percentage points. Furthermore, it was found that the EU Member States can be divided into two groups, which experienced higher or lower convergence, and the second group included divergent countries. Between 2019 and 2021, there was a convergence with the EU average (EU = 100) in the following countries: Bulgaria, Croatia, Estonia, Italy, Latvia, Lithuania, Hungary, Romania, and Slovenia. Other countries have seen a positive development, as their economic level has increased compared to the EU 100. These countries are Belgium, Denmark, Ireland, Luxembourg, the Netherlands, Finland, and Sweden. Despite the convergence of many new EU Member States to the EU average, there has been a divergence concerning the above-mentioned dynamic countries of Western Europe. In particular, Ireland recorded high growth compared to the EU by 31% points, Luxembourg by 23% points, and a relatively significant departure from the EU 100 average

occurred in Finland, Sweden, Denmark, Romania, and Poland (3–4% points). From the above findings, it can be concluded that real convergence and growth were recorded mainly by countries in the geographically northern half of the EU that were less dependent on the tourism and services segment. These are traditional industrialized states and states focused on industrial production with high added value and a very branched and developed tertiary sector.

Leaving aside the direct impact of the COVID-19 pandemic and monitoring the development of EU Member States' convergence to the EU average in the period 2010–2021, it can be stated that there has been rapid or slower convergence in many new EU Member States. As illustrated in Table 1, the fastest converging countries were Lithuania (+27% points), Romania (21), Estonia (21), Latvia (17), Poland (14), followed by Bulgaria, Czech Republic, Croatia, Malta, and Slovenia. However, many countries have also experienced divergent developments, not only in the new Member States (Cyprus and Slovakia), but also in the old Member States (Greece, Spain, Italy, and Portugal). Greece recorded the largest decrease compared to the EU average in the period under review by 20% points.

**Table 1.** HDP per capita PPP EU27 (2010–2021).

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
EU27	100	100	100	100	100	100	100	100	100	100	100	100
EURO19	109	109	108	108	108	108	107	107	107	106	105	105
BEL	121	119	121	121	121	121	120	118	118	118	119	119
BUL	45	46	47	46	47	48	49	50	52	53	55	55
CZE	84	84	84	85	88	89	89	91	92	93	93	92
DEN	131	129	128	130	129	128	128	130	129	127	130	133
GER	121	124	124	125	127	124	125	124	121	121	123	119
EST	66	71	74	76	78	76	77	79	81	82	84	87
IRL	131	131	133	133	138	181	176	182	190	190	209	221
GRE	85	75	71	72	72	70	68	67	66	66	62	65
SPA	96	93	91	92	90	91	92	93	91	91	84	84
FRA	109	109	108	110	108	107	106	104	104	106	104	104
CRO	61	61	61	61	60	61	62	64	65	66	64	70
ITA	106	105	104	101	98	97	99	98	97	96	94	95
CYP	102	97	91	84	81	83	88	90	91	92	88	88
LAT	54	56	61	63	64	65	66	67	69	69	70	71
LIT	61	67	71	74	76	75	76	79	81	84	87	88
LUX	274	274	277	279	283	282	278	269	262	254	263	277
HUN	66	67	67	68	69	70	69	69	71	73	74	76
MLT	87	84	87	90	92	98	97	102	102	103	97	98
NED	137	135	136	137	133	131	129	129	129	128	132	132
AUS	128	129	133	133	132	131	130	127	128	126	124	121
POL	63	66	67	67	68	69	69	70	71	73	76	77
POR	83	78	76	77	77	78	78	77	78	79	76	74
ROM	52	52	54	55	56	56	60	64	66	69	72	73
SLO	85	84	83	83	83	83	84	86	87	88	89	90
SVK	76	76	77	77	78	78	73	70	70	69	70	68
FIN	118	119	117	115	113	111	111	111	111	109	113	113
SWE	128	130	130	128	127	128	124	122	120	119	123	123

Source: (Eurostat 2022a).

In the previous text, we stated that the achieved economic levels in the countries of the European Union are differentiated. In the following text, we will analyze whether developments in 2010–2021 have contributed to increasing or decreasing economic disparities between the countries of the European Union (EU27). As a methodological procedure, we chose to compare the results of the coefficient of variation of the values of gross domestic product per capita in PPP.

We will analyze four groups of countries: the European Union as a whole, Eurozone countries, Old EU Member States, and New EU Member States. In the period before the start



of the COVID-19 pandemic (2010–2019), we can see the convergence of the membership base of the European Union. However, the pace of approach was not fast. Only in 2016–2019 can we see faster convergence. The convergence processes were mainly affected by the higher growth of the new Member States of the European Union with below-average levels of GDP per capita (Romania, Lithuania, Latvia, Estonia, Poland, and the Czech Republic). Convergence within the European Union has been affected by the decrease of disparities between the new and old EU Member States. There was also a reduction in differences between the new Member States themselves. Convergence within euro area Member States has been slower. On the contrary, the differences between the original EU Member States increased between 2010 and 2019. The development of disparities influences the divergence of southern European countries (Greece, Portugal, Spain, and Italy), whose economic level decreased in comparison with the European Union average in the period 2010–2019. These are economies affected by the past financial and debt crisis that are unable to benefit from their membership in the euro area. This is mainly due to lower international competitiveness in European markets and indiscipline in fiscal policy. The growing economic level of Ireland also has a very significant effect on statistical indicators of divergence. Ireland's GDP per capita increased from 131 to 190% of the European Union average between 2010 and 2019. The results are shown in Table 2.

**Table 2.** Variation coefficient of per capita GDP in PPP (2010–2021).

Year	Variation Coefficient (in %)			
	European Union (EU27)	Eurozone (EU19)	Old EU Member States (EU14)	New EU Member States (EU13)
2010	45.3	43.9	36.2	23.5
2011	45.2	44.2	37.7	20.8
2012	45.3	44.4	38.9	18.7
2013	45.3	44.5	39.2	18.0
2014	45.5	45.1	40.2	18.1
2015	46.4	46.1	41.1	18.8
2016	45.3	45.2	40.5	18.1
2017	43.8	43.8	39.8	18.7
2018	42.7	43.0	39.4	17.8
2019	41.1	41.6	38.3	17.6
2020	45.1	45.0	41.8	15.8
2021	46.2	47.7	45.1	15.4

Source: (Eurostat 2022a; own calculations).

The trends of the last decade do not confirm the goals of the single currency project. The common currency was to contribute to the intensification of trade and investment flows between member countries to support the growth and convergence of less developed countries. However, euro area Member States are still differentiated. Euro area countries still have different economic structures, react asymmetrically to economic shocks, are differently competitive in the international environment, and have different fiscal policies. The indebted countries of Southern Europe have shown lower growth of GDP over the last decade than the euro area average. Meanwhile, convergence has been evident in the other less developed euro area Member States (the Baltic States and Malta). However, the cases of Cyprus and Slovakia show that euro area membership is certainly not always linked to above-average economic growth.

If we compare the data for 2019 and 2020, we can analyze the effects of the COVID-19 pandemic on the economic differentiation of the European Union. The COVID-19 pandemic in 2020 was associated with an increase in disparities between the EU Member States. Unlike in the previous decade, differences have increased significantly. The value of the coefficient of variation increased from 41.1% to 45.1%. The divergence was caused by a more favorable development of GDP per capita in the developed countries of the European Union compared to countries with below-average economic levels. Ireland, Luxembourg,

the Netherlands, Sweden, Finland, Denmark, and Germany saw an increase in GDP per capita relative to the EU average. Many countries with below-average GDP per capita have diverged away from the EU average (Spain, Portugal, Greece, Cyprus, Croatia, Italy, etc.). The COVID-19 pandemic has caused an increase in the differentiation of the economic level (GDP per capita) within the European Union. The only exception was the group of new Member States, where even the Baltic countries group in particular converged.

If we compare the data for 2019, 2020, and 2021, we can analyze the effects of the COVID-19 pandemic on the economic differentiation of the European Union. The COVID-19 pandemic in 2020 was associated with an increase in disparities among the EU Member States. Similar convergence trends in 2020 can be observed in 2021. The divergence of the European Union is mainly affected by the widening gap between the old Member States.

A detailed analysis of the total unemployment rate for the period 2010–2021 showed that this rate decreased from 10% in 2010 to 7% in 2021. However, between 2019 and 2021 there was a year-on-year increase of 0.2 percentage points. The unemployment rate in the group of 19 euro area countries recorded a completely identical trend. The specific value of 10.2% from 2010 decreased to 7% in 2021. Between 2019 and 2021, a growth of 0.2 percentage points was recorded. Most EU countries have seen an increase in the unemployment rate. Unemployment has risen in the 21 EU Member States, and only six Member States have seen a decline in unemployment. The highest increase was recorded in Estonia (by 1.7%), Ireland (1.2%), Austria (1.2%), and Sweden (2.0%). On the contrary, the highest decline in the unemployment rate was recorded in Greece and France. The development of the unemployment rate is detailed in Table 3.

**Table 3.** Total unemployment rate EU27 2010–2021 (%).

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
EU27	10.0	10.0	11.0	11.6	11.0	10.1	9.2	8.2	7.4	6.8	7.2	7.0
EURO19	10.2	10.2	11.4	12.1	11.6	10.9	10.0	9.1	8.2	7.6	7.9	7.7
BEL	8.4	7.2	7.6	8.6	8.7	8.7	7.9	7.2	6.0	5.5	5.8	6.3
BUL	11.3	12.3	13.3	13.9	12.4	10.1	8.6	7.2	6.2	5.2	6.1	5.3
CZE	7.3	6.7	7.0	7.0	6.1	5.1	4.0	2.9	2.2	2.0	2.6	2.8
DEN	7.7	7.8	7.8	7.4	6.9	6.3	6.0	5.8	5.1	5.0	5.6	5.1
GER	6.6	5.5	5.1	5.0	4.7	4.4	3.9	3.6	3.2	3.0	3.7	3.6
EST	16.6	12.3	9.9	8.6	7.3	6.4	6.8	5.8	5.4	4.5	6.9	6.2
IRL	14.6	15.4	15.5	13.8	11.9	9.9	8.4	6.7	5.8	5.0	5.9	6.2
GRE	12.9	18.1	24.8	27.8	26.6	25.0	23.9	21.8	19.7	17.9	17.6	14.7
SPA	19.9	21.4	24.8	26.1	24.5	22.1	19.6	17.2	15.3	14.1	15.5	14.8
FRA	9.3	9.2	9.8	10.3	10.3	10.3	10.1	9.4	9.0	8.4	8.0	7.9
CRO	11.7	13.7	16.0	17.3	17.3	16.2	13.1	11.2	8.5	6.6	7.5	7.6
ITA	8.5	8.5	10.9	12.4	12.9	12.0	11.7	11.3	10.6	9.9	9.3	9.5
CYP	6.3	7.9	11.9	15.9	16.1	15.0	13.0	11.1	8.4	7.1	7.6	7.5
LAT	19.7	16.3	15.1	11.9	10.9	9.9	9.7	8.7	7.4	6.3	8.1	7.6
LIT	17.8	15.4	13.4	11.8	10.7	9.1	7.9	7.1	6.2	6.3	8.5	7.1
LUX	4.4	4.9	5.1	5.9	5.9	6.7	6.3	5.5	5.6	5.6	6.8	5.3
HUN	10.8	10.7	10.7	9.8	7.5	6.6	5.0	4.0	3.6	3.3	4.1	4.1
MLT	6.9	6.4	6.2	6.1	5.7	5.4	4.7	4.0	3.7	3.6	4.4	3.5
NED	5.0	5.0	5.8	7.3	7.4	6.9	6.0	4.9	3.8	3.4	3.8	4.2
AUS	5.2	4.9	5.2	5.7	6.0	6.1	6.5	5.9	5.2	4.8	6.0	6.2
POL	10.0	10.0	10.4	10.6	9.2	7.7	6.3	5.0	3.9	3.3	3.2	3.4
POR	12.6	13.5	16.6	17.2	14.6	13.0	11.5	9.2	7.2	6.7	7.0	6.6
ROM	9.0	9.1	8.7	9.0	8.6	8.4	7.2	6.1	5.3	4.9	6.1	5.6
SLO	7.3	8.2	8.9	10.1	9.7	9.0	8.0	6.6	5.1	4.4	5.0	4.8
SVK	14.3	13.5	13.9	14.1	13.1	11.5	9.6	8.1	6.5	5.7	6.7	6.8
FIN	8.6	8.0	7.9	8.3	8.7	9.4	8.9	8.7	7.5	6.8	7.7	7.7
SWE	8.6	7.8	8.0	8.1	8.0	7.4	7.0	6.7	6.4	6.8	8.3	8.8

Source: (Eurostat 2022b).

We analyzed the differences in the unemployment rate as in the case of GDP per capita for the period 2010–2021. Table 4 shows that the tendencies of social disparities in the unemployment rate were different in the same period from the development of the coefficient of variation of GDP per capita. In the period 2010–2021, differences increased in all monitored groups of countries (European Union, the Eurozone, old EU Member States, and new EU Member States). By contrast, the first year of the COVID-19 pandemic (comparing the coefficients of variation for 2019 and 2020) marked a decline in disparities between the countries of the European Union and the euro area. This, in contrast to the GDP per capita indicator, can be interpreted as a convergence in the unemployment rate. Similar tendencies continued in 2021. The values of the coefficient of variation decreased within the European Union, the euro area, and the new EU member states. The COVID-19 pandemic did not influence a significant increase in unemployment in EU countries and is also characterized by a decrease in differences between countries. Convergence was mainly caused by the decline in the countries with the highest unemployment rates. Surprisingly, unemployment fell the most in Greece and Spain.

**Table 4.** Variation coefficient of unemployment rate (2010–2021).

Year	Variation Coefficient (in %)			
	European Union (EU27)	Eurozone (EU19)	Old EU Member States (EU14)	New EU Member States (EU13)
2010	41.9	45.3	36.3	23.6
2011	42.0	51.2	37.7	20.9
2012	47.2	59.9	38.9	27.3
2013	49.1	61.5	39.2	29.8
2014	49.5	59.6	40.2	34.8
2015	49.1	57.1	41.1	36.6
2016	50.1	56.2	40.5	35.7
2017	52.3	56.7	39.8	37.9
2018	54.4	57.8	39.4	34.1
2019	54.6	56.8	38.3	31.4
2020	47.1	49.1	41.8	32.2
2021	43.7	39.3	44.9	30.7

Source: (Eurostat 2022b; own calculations).

The development was not characterized by a significant increase in unemployment as in the case of the previous financial crisis. The crisis impact of states and instruments was addressed by a number of subsidy programs that supported maintaining employment. The aid was aimed primarily at supporting sectors affected by the COVID-19 pandemic. The increase in unemployment was therefore not noticeable in the countries most affected by the economic downturn. In 2021, there was no increase in the countries with the highest unemployment rates. Paradoxically, the crisis has recorded an increase in the unemployment rate in countries that had lower GDP decline than the European Union average. Even Ireland, the only European Union country to have GDP growth in 2020, has seen a slight increase in unemployment. In addition to Ireland, convergence with the average unemployment rate in Austria, Portugal, Slovakia, Estonia, Hungary, Malta, the Netherlands, and other countries has also contributed to convergence and reducing social disparities.

## 5. Discussion and Conclusions

Based on the analysis and calculations of the coefficient of variation, it was found that the Member States of the European Union continued to converge in the period 2010–2019. The convergence process varied according to the group of countries. The fastest pace of convergence was seen in most of the new Member States of the European Union. These findings confirm the continuation of long-term convergence trends, which were confirmed by previously published studies (Burian and Brčák 2014; Cavenaile and Dubois 2011; Forgó

and Jevčák 2015; Grzelak and Kujaczyńska 2013). On the contrary, the membership base of the euro area and many old Member States of the European Union experienced divergent tendencies. The countries of the southern wing of the European Union (Greece, Italy, Portugal, Spain, and Cyprus), the Scandinavian countries, and some Western European countries showed the most significant divergence tendencies. Other authors also point to the divergence of Southern European countries (Franks et al. 2018; Diaz del Hoyo et al. 2017).

The research follows on from and expands the conclusions of studies published so far. The findings of this study confirm the predicted development trends. The effects of the first year of the pandemic on the economic differentiation of the European Union countries were quantified. The COVID-19 pandemic has reversed major convergence trends. The more favorable development was mainly due to the structure of the economy focused on sophisticated sectors of the high-tech industry (information technology, pharmaceutical industry) and modern service segments. By contrast, Southern European countries have experienced the largest decline in economic levels and have logically fallen even further below the European Union average. These were mainly countries heavily dependent on the tourism sector and related services (Spain, Portugal, Greece, Cyprus, Croatia, Italy, etc.). These trends correspond to the findings of the Muggenthaler, Schroth and Sun (Muggenthaler et al. 2021) study, which emphasized the particular importance of the tourism sector for aggregate demand in the EU's southern wing. Georgiou (Georgiou 2021) also estimated significant macroeconomic declines in southern European countries. Data is available for 2021, but these findings negate. Southern European economies have all returned to growth. On the contrary, their growth has exceeded most EU countries.

The COVID-19 crisis has had an impact on structural change. Tourism and transport are sectors that have been affected hard. In 2019, tourism in Europe recorded strong growth. During the pandemic, international tourism in the European Union declined by 67%. The states of Northwestern and Southern Europe were most affected, which jeopardized direct and indirect employment in tourism (UNWTO 2021).

Another sector that has undergone several changes in the recent period is road freight transport. These were restrictions against the spread of the possibility of stopping and delaying deliveries. The decline was particularly noticeable in the second quarter of 2020. In the second half of the year, the sector adapted to the new conditions. In 2020, the performance of road truck transport was only 0.9% lower than in 2019, while the volume of transported goods decreased by 3.9%. The decline in road transport performance in 2020 was recorded in most EU countries. In some countries, there was even a slight increase in the volume of road transport (Bulgaria, Lithuania, Sweden, Czechia, Poland, Finland, Denmark, Latvia, and Romania). The first effects of the COVID-19 crisis on the automotive sector can be well observed in the manufacturing industry.

Car production in Europe has slowed since September 2020 after recovering from the slump of April 2020. In addition, the industry was hit by a global shortage of microchips and other components (in response to the pandemic, Volkswagen temporarily closed its European production plants for several months). In 2019–2020, car production in the EU decreased by 23.5%, the most significant decline in production was recorded in France (−40%), car production decreased in the new EU Member States by 18.2%, and the biggest decline was in Poland (−30%) and the Czech Republic (−19%) (OICA 2022). These changes were associated with changes in labor markets and rising unemployment.

New challenges stem from the relationship between energy transformation and job creation and health improvement. There are clear synergies. For example, pollution associated with burning fossils affects the health of the population and increases the respiratory risk associated with diseases such as COVID-19. Investments in renewable energies can create new jobs, improve the energy efficiency of buildings, networks, renewables, the energy efficiency of production, food, agriculture, textiles, low-carbon infrastructure, and more efficient vehicles. In the business area, technology, distribution, food, and pharmaceutical companies have become the winners of the COVID-19 crisis (Cazcarro et al. 2022).

Empirical indicators of the unemployment rate in the EU countries in 2010–2019 showed a long-term improvement in labor market conditions in the individual countries of the European Union. The overall unemployment rate in the EU has fallen, as has most in the EUEU27. Exceptions in this respect were Greece, Italy, and Cyprus. The decline was not associated with convergence processes. The divergence was mainly supported by a significant increase in unemployment in Greece and a decrease in the countries with the lowest unemployment rates. Good labor market conditions changed sharply during 2020.

The COVID-19 pandemic worsened the labor market in 2020. The negative effects of the pandemic on the labor market were also presented by Georgiou (2021). He estimated the increase in differences and implied a process of divergence. As in the previous financial crisis, he estimated a more pronounced rise in unemployment in the southern euro area (Georgiou 2021). The analysis of the differentiation of the unemployment rate in this article did not confirm all the above conclusions. In the year-on-year comparison of 2019 and 2020, there was no deterioration in the unemployment rate in all Member States. The rise in unemployment was not evident in 2020 in the countries most affected by the economic decline (Greece and Spain). On the other hand, the increase in the unemployment rate was reported in countries that showed a lower decline in GDP than the European Union average (Estonia, Lithuania, and Latvia). Ireland, which achieved GDP per capita growth in 2020, has seen a slight increase in unemployment.

The elaborated study confirms the findings of published studies on convergence trends before the beginning of the COVID-19 pandemic. Our paper aims at trend changes during the pandemic (in 2020–2021). Based on the analysis of our analysis, it was found that there was a change in the convergence trends. Differences in GDP per capita decreased in the period 2010–2019. In contrast, they grew in 2019–2021. These trends were influenced by a complicated health and economic situation. Unemployment showed a different development. Before the pandemic, differences between member states widened. Development trends are characterized in detail in the results section. On the contrary, they decreased in the first two years of the pandemic (2020 and 2021).

The major limitation of the research is the short period of action of the negative factors of the COVID-19 pandemic and the limited availability of data. The paper used data for 2020 and 2021. The analyzed issues create space for further research that will consider the medium and long-term impact of the COVID-19 pandemic on the EU and national economies. The effects of the pandemic and restrictions have been addressed through support instruments that have increased the indebtedness of European economies and deepened external and internal imbalances. At a time of recovery, European economies are likely to grow. The pace of GDP growth will depend on the optimal setting of fiscal and monetary policy in individual countries. The economic recovery and the development of convergence will be affected by the specific conditions that differ from one Member State to another. The short period allows only limited conclusions. We anticipate further research that shows us the more complex effects of pandemics over time.

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