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Background of the Unemployment in the Euro Area[1]

Abstract. Unemployment has been a macroeconomic problem of every economy for decades, requiring a detailed analysis. The paper focuses on the sources of unemployment in the Euro Area during 2000-2021. The article aims to identify the essential cause as well as sources of unemployment during the two decades of the 21st century and whether it should be sought in the financial crisis during 2008-2014, in the short period of recovery until 2018, or during the COVID-19 period from 2019 to 2021. The analysis of unemployment in the countries of the Eurozone is conducted using the fundamental macroeconomic indicators of balance in the economy: gross domestic product (GDP), inflation, and unemployment. The methodological concept is based on usual macroeconomic relationships, and panel regression model estimates are presented in the STATA software package. The analysis results indicate the nonlinearity of the Phillips curve and Okun's law during the analysed period. Deviations from theoretical concepts are significantly expressed in some sub-periods. External effects distort market mechanisms, causing large and significant differences between individual countries of the Eurozone. However, common to all sub-periods is a deflationary output gap. The gap between the current and the optimal output deepened the unemployment problems. The long-term deflationary output gap hurt the inflation rate, showing the gap between those economic theory developers and policy makers. These results can be the basis for further analysis by including more macroeconomic determinants of the economy.

Keywords: macroeconomic balance, unemployment, inflation, output gap, Eurozone, Phillips curve, Okun's law

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Экономические предпосылки безработицы в еврозоне

Аннотация. В течение нескольких десятилетий безработица является важной макроэкономической проблемой, которая требует детального анализа. Цель исследования — выявить основную причину и источники безработицы в еврозоне в период 2000-2021 гг. В частности, рассмотрено несколько важных этапов: финансовый кризис 2008-2014 гг., короткий период восстановления экономики до 2018 г., пандемия COVID-19 с 2019 г. по 2021 г. Для анализа безработицы в странах еврозоны были использованы базовые макроэкономические показатели сбалансированности экономики: валовой внутренний продукт (ВВП), инфляция и уровень безработицы. Методология основана на макроэкономических зависимостях, регрессионный анализ панельных данных произведен в программе STATA. Согласно полученным результатам, кривая Филлипса и закон Оукена показывают нелинейную взаимосвязь между переменными в течение всего анализируемого периода. В некоторых подпериодах заметны значительные отклонения от теоретических предположений. Искажение рыночных механизмов под влиянием внешних воздействий привело к возникновению существенных различий между отдельными странами еврозоны. Однако общим для всех периодов является дефляционный разрыв — разница между реальным и потенциальным объемом производства, что приводит к увеличению безработицы. Долгосрочный дефляционный разрыв повлиял на уровень инфляции, демонстрируя расхождения между теоретиками экономических изменений и политиками, принимающими практические решения. Содержащиеся в работе выводы могут стать основой исследований, включающих большее количество макроэкономических показателей.

Ключевые слова: макроэкономический баланс, безработица, инфляция, дефляционный разрыв, еврозона, кривая Филлипса, закон Оукена

Introduction

The unemployment issue is traditionally the most important issue for every country. This is a complex problem with major consequences for a society as a whole, especially if the issue lasts for decades, as it has been the case with European economies. Moreover, it is vital since there are not only economic consequences, but also social, sociological, cultural, and even psychological. The unemployment issue has sparked social protests in majority of countries due to people's dissatisfaction and ever-increasing layoffs, insufficient number of new jobs, and the rigorous regulations denying workers' rights, all in favour of employers (Spain, France). The decades-long problem for all economies and regional integration is the problem of unemployment, along with economic growth and inflation. It has also become a chronic problem, mainly due to the transformation of former socialist economies, more and more advanced modern technologies, innovations, and digitalisation, which all together lead to less need for manual labour, and greater need for human capital which is significantly limited.

The creation of the single market in Europe did not solve the unemployment issue for the EU countries. The convergence criteria[1] could not be fulfilled by almost all countries (except for Luxembourg in 1999), because the priority was to meet and reach the set numerical margins by the certain date, and not to achieve the quality and structure of the economies that should make the regional integration. The criteria set in this way created the union which would continue to exist on those agreements and directives, far from the Mundell's concept of an optimum currency area (Mundell, 1961). To put it differently, the original criteria of the optimum currency area were replaced by the convergence criteria. The worst result of the regional integration was in the area of labour mobility, and that is why the whole Europe is now suffering. Insufficient labour mobility disrupts the normal operation of the labour market and prevents the harmonisation of economic policy measures. Moreover, the problem is getting even more complex[2], because the wages are

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[1] European Commission. (1998). European Economy (65). Luxembourg: Directorate-General for Economic and Financial Affairs, 419. Retrieved from: https://ec.europa.eu/economy_finance/publications/pages/publication8013_en.pdf (date of access: 29.05.2022).

[2] ECB. (2016). New evidence on wage adjustment in Europe during the period 2010-13. Economic Bulletin, Issue 5,

rigid downwards (Forbs et al., 2021; Branten et al., 2018).

The European economies have been facing the problem of unemployment since the mid-1970s. In the following decades during the 1980s and 1990s, the unemployment rate exceeded 8 %. According to the Eurostat data, for the period 1987–2007, the unemployment rate in Germany accounted for 8.6 %, in Italy 9.3 %, and in Spain 9.7 %. An additional obstacle was the fact that the source of such high unemployment rates was beyond the theoretical limits, taking into account the above-average annual economic growth rates of the developed European countries. The unemployment rate rose during the financial crisis, but also during the COVID-19 pandemic. The chronic problem of unemployment, which the European countries are facing within the monetary union, presents a challenge, so the problem of unemployment should be analysed thoroughly using the conventional theoretical approach.

Specifically, in this paper, the analysis will be focused on the economic problems and the unemployment issue from a macroeconomic point of view. Firstly, the impact of the output gap on increasing the unemployment rate in the Euro Area will be examined. Afterwards, the impact of inflation on unemployment during the slowdown in economic activities will be presented. The econometric analysis will involve the multidimensional analysis of the macroeconomic relations of EA-19 to study the relations between gross domestic product, output gap, unemployment, and inflation. In the initial phase, statistical analysis will be used to find and evaluate the relationship between the dependent variable and one or more independent variables (explanatory variables). The formation of regression equations will be based on the basic macroeconomic relations — the Phillips curve and Okun's law. Being aware of the fact that these two models analyse the cause-and-effect relation in its basic form, their application will be enough to notice and understand certain relations. In the following parts of the paper, a panel regression analysis is conducted, i. e. the analysis of the simultaneous observation of both over time and cross-sectional data. The methodological concept of the panel regression model will provide the estimates of the macroeconomic relations and confirm or refute the hypothesis that the conventional theoretical concepts do not provide the expected results during extraordinary, crisis periods (global crises, pandemics). Furthermore, this is an

opportunity to see if there are any deviations of the estimated connections and relations from the theoretical expectations, and if there are, whether they are caused by some external effects. The conclusion, which presents the results and proposals to economic policy makers in solving the problem of the unemployment in the labour market, is the final chapter of the paper.

Theory and Preliminary Data

The economic problems which troubled the Euro Area countries in the first two decades of the 21st century are evident in the Eurostat database for basic macroeconomic determinants, and the authors' calculations show the following results: low average annual economic growth rate (1.16 %), high average annual unemployment rate (9.1 %), and low average annual inflation rate (1.7 %). Deflationary output gap (negative deviation of the current output from the potential one) in that period indicates a slowdown in economic activities and rising unemployment. Until 2007, there were relatively good macroeconomic results within the Euro Area, as growing economic activity was observed (gross domestic product growth of 2.2 %, inflation rate of 2.2 %, along with unemployment at the rate of 8.5 %). The decline in economic activities began with the global economic and financial crisis in 2008. The widened output gap with low inflation target further slowed down the economic activity, which led to an increase in the unemployment rate (9.7 %), far above the natural unemployment rate (3.4 %). This situation makes the deflationary output gap even bigger, further aggravated by the slower growth in aggregate demand compared to the growth in aggregate supply, which slowed the inflation (1.4 %) and increased the deflationary pressure in certain countries. The low real interest rate, along with low inflation, brought the nominal reference interest rate close to zero, so the monetary policy measures could not easily stabilise the economies within the zone. Consequently, the recession and low inflation continued until 2021, when there were pressures of low external demand. The prominent economists (Ball, 2014; Blanchard et al., 2010) tried to protect the economies by strongly advocating for raising inflation targets.[1] Higher inflation targets were necessary to stabilise the monetary measures due to inflationary

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European Central Bank. Retrieved from: https://www.ecb.europa.eu/pub/pdf/other/eb201605_article02.en.pdf (date of access: 29.05.2022).

[1] See also Williams, J. C. (2016). Monetary Policy in a Low R-Star World. Economic Letter 2016–23. Federal Reserve Bank of San Francisco. Retrieved from: https://www.frbsf.org/economic-research/publications/economic-letter/2016/august/monetary-policy-and-low-r-star-natural-rate-of-interest/ (date of access: 30.05.2022).
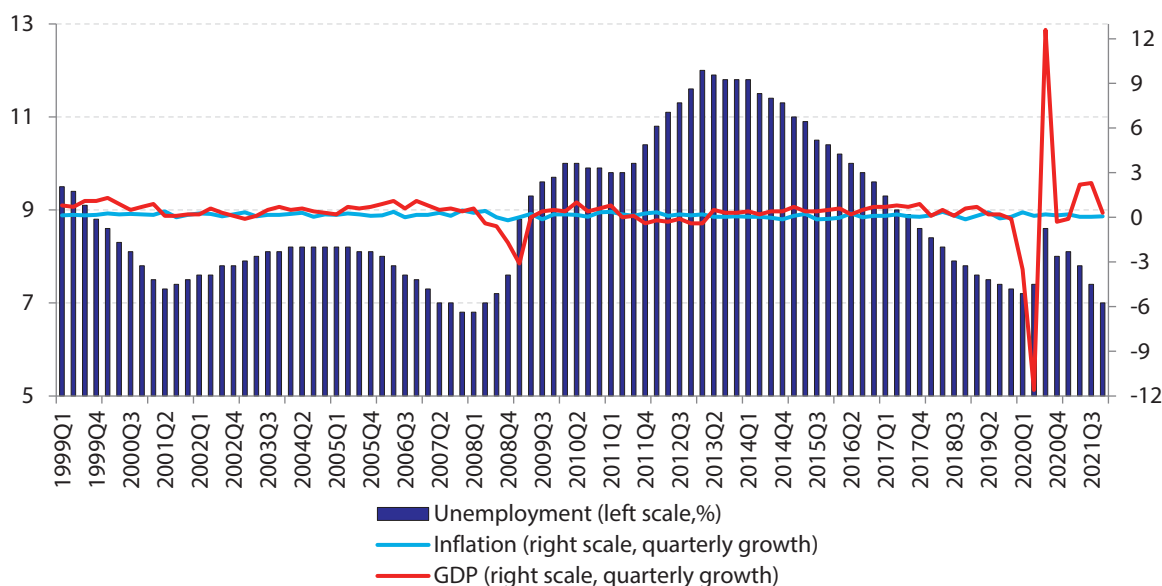
Fig. 1. *Basic macroeconomic determinants in EA-19, quarterly data (source: Authors' calculations, based on the EUROSTAT data)*

expectations, as well as to stabilise the interest rates and economic activity. There were also those who expressed concern about raising inflation targets, especially because of the zero interest rate. For example, Bernarke[1] believed that increasing inflation targets would change the expectations of market participants, finding an alternative in monetary policy measures, specifically quantitative easing policies (Bernarke et al., 2019; Kiley, 2018). The problem of the real sector due to mis-calculated inflation (Redding & Weinstein, 2016) made it difficult to adequately reallocate within the economies. Stock accumulation, the growth of production costs, the outflow of capital and highly qualified staff to the east contributed to the slow-down in the growth of the developed economies of the Euro Area. The COVID-19 pandemic further led to the decline in economic activity to this day; however, there was a slowdown in the unemployment rate due to numerous packages of government measures during the pandemic which aimed to maintain the employment level and protect employees (see Fig. 1).

The economies that were firmly focused on controlling the inflation responded to the restrictive monetary policy measures, with the aim of maintaining the stable economic growth in the medium term (especially before the 2008 crisis). However, such growth did not contribute to

the decrease in unemployment (it was still above the natural unemployment rate). Tight monetary policy and inflation targeting ensured long-term price stability, with relatively high unemployment (Lundborg & Sacklén, 2006; Holden, 2004). According to Ristanović (2017; 2014), there was almost equality between the inflation expectation and the current inflation rate, which, according to the Phillips curve, would lead to the equalisation of the current unemployment rate and the natural unemployment rate. However, the real trends deviated significantly from the theoretical concepts, especially in times of crisis. With the decline in economic activity at the beginning of the global economic crisis (2008 and 2009), GDP fell significantly, the economies experienced falling prices, i. e. the decrease in inflation rate and the increase in the unemployment rate (Fig. 2). In addition to stagnation and a slight decline in prices in the tertiary sector, the largest decrease in prices was recorded for the products from the secondary and primary sectors. The latter two sectors pulled the general price level down and the inflation rate declined, threatening to turn into deflation and cause financial instability and severe economic contraction[2]. Indirectly, this also had a negative impact on employment (Fabiani et al., 2015).

The deviations of the current GDP from the potential output in the Euro Area with low inflation targeting resulted in a significant slowdown in

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[1] Bernanke, B. S. (2016). Modifying the Fed's Policy Framework: Does a Higher Inflation Target Beat Negative Interest Rates? Blog post, September 13, Brookings Institution. Retrieved from: https://www.brookings.edu/blog/ben-bernanke/2016/09/13/modifying-the-feds-policy-framework-does-a-higher-inflation-target-beat-negative-interest-rates/ (date of access: 30.05.2022).

[2] Altissimo, F., Ehrmann, M., & Smets, F. (2006). Inflation Persistence and Price-Setting Behaviour in the Euro Area a Summary of the IPN evidence, Occasional Paper Series No. 46. Retrieved from: https://www.ecb.europa.eu/pub/pdf/scpops/ecbocp46.pdf (date of access: 25.05.2022).
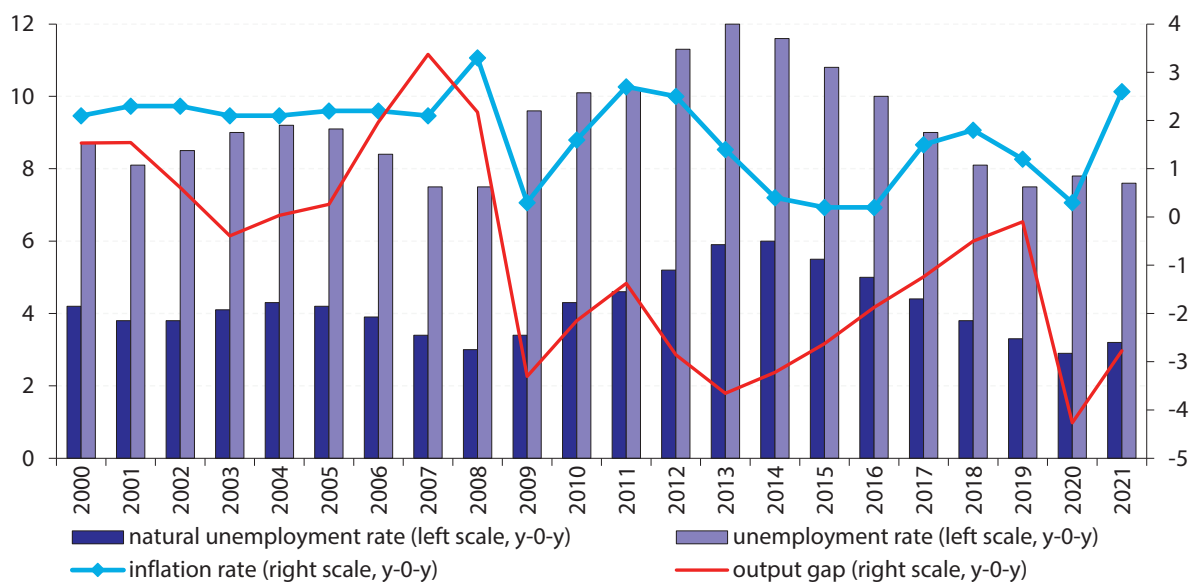
Fig. 2. *Output gap, unemployment and inflation rate in EA (source: Authors' calculations, based on the EUROSTAT data)*

economic growth, and, consequently, an increase in the unemployment rate, far above the natural unemployment rate. Such a situation led to the deflationary output gap[1], [2], which could be noticed in slower growth in aggregate demand compared to the growth in aggregate supply, leading to a slowdown in inflation and further pressure on deflation. As the economies of the Euro Area had been facing the deflationary output gap continuously since 2009 (especially in 2009, 2013, 2020), the views of the aforementioned scientists that it was necessary to resort to a change in monetary policy proved to be justified. Maintaining the status quo situation in times of crisis (global crisis or pandemic), i. e. inflation targeting at the current level of about 2 %, led to a lower inflation rate as the market expectations were formed in the direction of further inflation decrease (as long as the output gap is negative, the inflation rate will tend to fall), and not to the targeted level. As Mishkin (2004) explains, monetary authorities increase the flexibility of monetary policy by inflation targeting, responding to aggregate demand and aggregate supply to mitigate the negative external effects of crises.

Within the Euro Area, unequal unemployment problems also arise from different levels of the protection of employees (for example, employees

have a higher level of protection in terms of employment in Germany — see Cazes et al. (2011)). According to Okun's law, preventing the growth of unemployment (by excluding institutional interventions in the labour market) is only possible if the current output grows as fast as the potential. However, in times of crisis and negative external effects, there were significant deviations. The degree of correlation in crisis periods is low (almost equal to zero) and shows an insufficiently strong link between output and unemployment. The deflationary gap, which continuously affected the Euro Area for more than ten years, kept the unemployment rate high, despite the fact that some Euro Area countries recorded certain growth. Obviously, in other economies, the optimal output recorded a decline that did not allow the current output to stimulate employment growth.

The problem of unemployment will last as long as there is a deflationary output gap, i. e. while there is a big difference between real GDP (current output) and potential output. The deviation from the optimal output in developed economies in the Euro Area slows down the recovery and keeps the unemployment rate high. Even some Euro Area countries, such as Italy, Ireland, Spain and Greece as developed economies, in the middle of the analysed period faced a reduction in the optimal output, which only deepened the economic crisis. The greatest pressure on the further slowdown in the economy resulted from low inflation and even deflation in some member states until the end of the analysed period. Where are the causes of the problem? Continuous deflationary output gap in the period 2009–2021 shows that the views of

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[1] IMF (2013). World Economic Outlook: Transitions and Tensions. October 2013, International Monetary Fund. Retrieved from: https://www.imf.org/en/Publications/WEO/Issues/2016/12/31/World-Economic-Outlook-October-2013-Transition-and-Tensions-40432 (Date of access: 25.05.2022).

[2] Stein Brothers. (2013). Retrieved from: http://steinbrothers.co.uk/wp-content/uploads/2017/09/sb5423112qrHzD6Nc.pdf (date of access: 30.04.2022).

Correlation coefficients in the Euro Area

	2000-2021	2000-2007	2008-2013	2014-2018	2019-2021
Phillips Curve: Unemployment-Inflation	-0.32	-0.60	-0.35	-0.86	0.26
Okun's Law: Unemployment-GDP	-0.11	-0.15	0.01	-0.52	0.03

Source: Author's calculations.

numerous analysts that it is necessary to change the level of inflation targeting prove to be justified. According to Ristanović (2017), in the short term the restrictive fiscal policy affected the reduction of aggregate demand in the commodity market. At that time, by the process of multiplication, output decreased (the decrease in GDP) and unemployment rose, with lower inflation. Simultaneously, in the money market, the interest rate fell. In the medium term, due to falling output and lower price level, labour market participants expected price reduction. At the same time, the high pressure of increasing the unemployment rate put the employers in a more favourable position to exert pressure and further reduce wages. Thus, production costs were reduced and the employers became competitive in the market. On the other hand, there was still a surplus of liquidity in the money market, which implied a new reduction in interest rates in order to neutralise the imbalance in the money market. Theoretically speaking, the reduction in interest rates, via indirect effects, in the commodity market should lead to an increase in investment and consumption, and an increase in aggregate demand and finally, through multipliers to output growth (GDP). However, mistrust, uncertainty and the effects of the long-lasting crises distracted the investors from investing and the employees from spending. There was no growth in aggregate demand and GDP growth, along with still high unemployment and low prices and wages. The capital that remained in the economies of the centre during the crisis did not allow these mechanisms to ensure the balance in commodity, money and labour markets. This additionally caused long, negative economic consequences for the Euro Area.

According to the OECD analysis[1], the recovery of the Euro Area has been visible since 2014. The economies recorded slight growth. Due to the impact of the fiscal policy on demand, systemic risks were reduced, while external and internal imbalances were somewhat eliminated. However, the economic activity still remained uneven, with a low level of trust, while the private sector's balance remained weak. Some economies remained over-indebted, the unemployment rate shot up to a double-digit level in several countries, and the investment was still insufficient. The loans did not increase, and inflation remained low. The period up to 2018 was presented as a slight recovery of the Euro Area economies[2] (Gonzalez-Astudillo, 2018; De Waziers, 2018), and again the Phillips curve occurred — a high negative correlation between inflation and unemployment (Table 1).

The expectation of further economic recovery was interrupted by the COVID-19 pandemic (Garcia et al., 2021; Begum, 2021; Bartocci, 2020). All valid theoretical postulates were violated, and the economic determinants again deviated from the regular theoretical concepts. In all economic determinants there was a decline in economic activity, the unfavourable market trends, the problems with investment and capital, while the countries were coping with the problem of unemployment by implementing certain incentive measures. In the following years, Europe will also face the negative economic implications because of the conflict in Ukraine.

Methodology

The application of the panel model in the regression analysis gives efficient estimates, because the number of observations in the model increases. The evaluation is conducted simultaneously using both cross-sectional data and time series data. The data from 19 Euro Area economies in the period 1999–2021 are analysed and taken from the EUROSTAT database[3]. Firstly, an analysis of a simple regression model for the Phillips curve and a simple regression model for Okun's law will be presented. The next step of the analysis relies on the second version of Okun's law, where instead of production growth (expressed through GDP), the output gap is used. Finally, the analysis will be extended on the analysis of the Phillips-

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[1] OECD. (2016). OECD Economic Surveys: Euro Area. OECD Publishing. Retrieved from: https://www.oecd.org/economy/surveys/euro-area-2021-OECD-economic-survey-overview.pdf (date of access: 22.05.2022).

[2] European Commission. (2018). European Economic Forecast. Autumn 2018. Institutional Paper 089. Economic and Financial Affairs, November 2018, Brussels, 220. Retrieved from: https://economy-finance.ec.europa.eu/publications/european-economic-forecast-autumn-2018_en (date of access: 24.05.2022).

[3] European Commission. (2022). Retrieved from: https://ec.europa.eu/eurostat/data/database (date of access: 20.05.2022).

Okun model, as a mix of the analysis that will estimate the impact of output gap and inflation rate.

The original Phillips curve (Phillips, 1958), which reflects the negative relationship between the inflation rate and the unemployment rate, is nonlinear. It was created in a period of low inflation. Nonlinearity has been particularly pronounced due to the constant and low economic growth over the last two decades (Gagnon & Collins, 2019). The Phillips curve has been applied for decades and gives significant results when assessing the relationship between two important macroeconomic determinants: unemployment rate and inflation. It is usually presented by the following equation:

$$\Delta\pi_{it} = \alpha + \beta\Delta U_{it} + \varepsilon_{it}, \tag{1}$$

where π is the inflation rate, ΔU is the change in the unemployment rate (a vector of time varying explanatory variables), while α is the intercept and β is the coefficient that measures the response of the change in the unemployment rate and inflation, and ε is the random disturbance term with a normal distribution. This shape of the Phillips curve is typical when cross-country variations are used.

In Okun's law, there is also a negative link between the unemployment rate and output growth, which is stable in the long run and among economies, but usually varies in the short run. The deviations due to economic crises occur frequently[1]. Its decades-long application is significant because of its simplicity in assessing the relationship between two important macroeconomic determinants: unemployment rate and GDP. The final version of the model is:

$$\Delta U_{it} = \alpha + \beta\Delta Y_{it} + \varepsilon_{it}, \tag{2}$$

showing the simultaneous change in entity i and time t in the unemployment rate (U) with the change in output (Y). For the purpose of evaluating the model, the year-on-year change in percentage points in the unemployment rate ΔU and the annual change in gross domestic product (ΔY) are used. The coefficient α is the intercept and in-

dicates a long-term trend of growth in the unemployment rate (basic structural and institutional characteristics of the labour market). The coefficient β is a so-called Okun's coefficient, which measures the state of the unemployment rate in relation to the changes in production (GDP). If the structural and institutional effects in the labour market are left out, the Okun's coefficient is negative, because it shows that a higher growth rate of production is associated with a decrease in the unemployment rate, and vice versa. The model error is ε.

In the second version of Okun's law, instead of the impact of GDP growth, the impact of the output gap on the unemployment rate is used. This relationship is represented by the following equation:

$$\Delta U_{it} = \alpha + \beta Ygap_{it} + \varepsilon_{it}, \tag{3}$$

where the output gap ($Ygap$) is presented as the deviation of the current output and the potential output of each country in the Euro Area (i) during the analysed period (t).

Results

The theoretical interpretations of the relations between certain economic determinants presented above are confirmed in this part of the paper. In fact, the relationships between the unemployment rate and the inflation rate (Phillips curve) and GDP growth and the unemployment rate (Okun's law) are confirmed. Based on the Eurostat data for the period 1999–2021 in a simple panel regression model, with the help of the software package STATA, the estimates of the parameters confirm the negative relationship between unemployment and inflation, as well as unemployment and GDP growth, i. e. output gap. The descriptive statistics of all model variables in Euro Area for the analysed period display that there is a statistically significant correlation (Table 2). The results of the analysis unequivocally indicate the nonlinearity of the Phillips curve and Okun's law during the analysed period. The external effects disrupt market mechanisms and the conventional models cannot give valid results. There are even large and significant differences between some Euro Area countries.

A more detailed analysis, through several "windows" within the analysed period, shows similar conclusions about the relations between the economic determinants. The degree of correlation in time of crisis is low and shows an insufficiently strong connection. From the beginning of the analysed period, the correlation between the inflation rate and the unemployment rate is neg-

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[1] IMF (2010). Unemployment Dynamics during Recessions and Recoveries: Okun's Law and Beyond. In: World Economic Outlook. Retrieved from: https://www.imf.org/en/Publications/WEO/Issues/2016/12/31/Rebalancing-Growth (date of access: 02.06.2022); McKinsey Global Institute (2011). An Economy That Works: Job Creation and America's Future. Retrieved from: https://www.mckinsey.com/~/media/mckinsey/featured%20insights/employment%20and%20growth/an%20economy%20that%20works%20for%20us%20job%20creation/mgi_us_job_creation_full_report.pdf (date of access: 02.06.2022).

Descriptive statistics in the Euro Area, 2000–2021

Panel A Descriptive statistics					
	gdp	*hcpi*	*u*	*Ygap*	*ugap*
Mean	102.2232	102.118	108.8596	99.34143	104.9409
Max	125.177	115.253	127.475	111.841	113.888
Min	85.161	98.316	102.217	84.221	101.942
Sd	4.057371	1.958375	4.479599	3.319448	2.118783
N	417	418	418	374	391
Panel B: Correlation					
	gdp	*hcpi*	*u*	*ogap*	*ugap*
gdp	1.0000				
hcpi	0.1958	1.0000			
	0.0001				
u	−0.1685	−0.1396	1.0000		
	0.0005	0.0042			
Ygap	0.4929	0.3861	−0.6229	1.0000	
	0.0000	0.0000	0.0000		
ugap	−0.3057	−0.1206	0.8139	−0.5136	1.0000
	0.0000	0.0170	0.0000	0.0000	

Note: *gdp* — Gross Domestic Product, growth rate; *hcpi* — Harmonised Consumer Price Index; *u* — Unemployment rate; *ogap* — Output Gap (*Ygap*); *ugap* — Unemployment Gap.

ative and moderately strong, with the deepening of the crisis it decreases and becomes relatively weak, while with the recovery the correlation gets stronger. The correlation between the unemployment rate and the change in GDP is mostly insignificant (due to a significant decline in economic activity for a long time), except in the post-crisis period and before the pandemic when it is moderately strong (Table 1). The results of regression analysis, i. e. estimates of model parameters (Table 3) show that the parameters of the Phillips curve and Okun's law for the entire period 2000–2021 are statistically significant. Also, the negative sign of the coefficient is in line with theoretical expectations. In general, in all estimated regression equations during the period there was no significant relative impact between the parameters of both models (1 % unemployment change contributes to inflation growth of 0.12 %, GDP growth of 1 % contributes to unemployment decrease of 0.15 %).

In the period 2000–2007, when the euro area economies achieved continuous average annual economic growth of 2.2 %, there was a high level of inflation output gap, which led to inflation rates above the target level of 2 % (average annual inflation growth was 2.2 %). This was obviously the moment to change monetary policy and raise the target level above 2 %. As a result, the Euro Area faced a slightly lower but still high unemployment rate (8.6 % in that period). In other sub-periods, a low influence between parameters was main-

Estimated parameters in panel regression models

		2000-2021	2000-2007	2008-2013	2014-2018	2019-2021
Phillips Curve: Inflation — Unemployment	*hcpi*	Dependent variable				
	u	−0.12***	−0.06	−0.14***	−0.13***	−0.12***
Okun's Law: Unemployment — GDP	*u*	Dependent variable				
	gdp	−0.15***	−0.32***	−0.12*	−0.13	−0.01
Okun's Law: Unemployment — GDPgap	*u*	Dependent variable				
	ogap	−0.60***	−0.47***	−0.67***	−0.73***	−0.11***
Phillips-Okun's Model: Inflation — GDP	*hcpi*	Dependent variable				
	gdp	0.08***	0.05	0.07	0.03	0.13***
Phillips-Okun's Model: Inflation — GDPgap	*hcpi*	Dependent variable				
	Ygap	0.20***	−0.08	0.21***	0.18***	0.18***

Source: Author's calculations.
Note: ***; **; * are statistically significant at the level of 1 %; 5 %; 10 %.

tained, with a theoretically expected negative sign. Under Okun's law, even during the period of economic recovery in 2014–2018, there was no statistical significance between the parameters of GDP and unemployment, with low inflation rates (average annual growth of 0.82 %).

The obtained parameter estimates only partially explain the relationship between the inflation rate and unemployment, as well as unemployment and GDP. Additional analysis involved the mix of these two models. The conducted additional analysis is based on the assessment of the combined impact of the inflation rate and GDP growth, on the so-called Phillips-Okun model. However, this model also only partially explains the impact of GDP growth on inflation. The estimated parameters showed a small impact of changes in GDP on the inflation rate.

The best estimates of the regression parameters and the presentation of the descriptive statistics come from the model in which the impact of output gap on the unemployment rate and inflation rate are analysed. The data from Figure 2 can serve as an illustrative presentation of the relationship between these two determinants. The results of the analysis imply that the impact on prices is far greater when the current production deviates from the optimal output. In fact, behind these estimates of parameters lies the real background of the problem of unemployment, and indirectly inflation. Namely, any reduction in current economic growth in the Euro Area economies is a consequence of the decline in potential production.

Interpretation of the estimation of parameters from the period of the COVID-19 pandemic, from 2019 to 2021, requires additional clarification. Although the estimates in this period are statistically significant with a theoretically acceptable sign, the impact is negligible. Namely, this period is characterised by numerous restrictions, but also state incentives for maintaining economic activity and employment levels. During this period, the economic growth rate was negative (-0.81 %), the unemployment rate was the lowest (7.7 %), the inflation rate (1.44 %) was in the target zone, while the deflationary output gap was high (-3.5 %). According to the theory, the deflationary output gap, which has been present continuously for years, should increase the unemployment rate and affect the growth of prices. However, world market prices began to rise significantly in the following years. Inflationary expectations, speculative impact, high levels of uncertainty and government incentives to mitigate, as well as supply-side problems, have fuelled inflationary pressures. While some predicted high inflation rates[1], others were optimistic in their forecasts[2].

Conclusion

Although there are many other more complex models that could be used to consider the relationships and cause-and-effect relationships of the basic macroeconomic determinants, the further application of basic models, taught at all universities in the world, is still used for scientific analysis/discussion.

This paper presents the fundamental problem of the Euro Area, unemployment by using the basic economic concepts. Economic policy makers, despite the influx of unconventional measures, need to rely on the conventional theoretical concepts, with certain adequate innovative approaches and models. Nowadays, misplaced theoretical concepts, and even economic policy measures, can often lead to controversial results and unreliable forecasts.

The results of the panel regression model showed that the influence between the main macroeconomic determinants is not very pronounced, despite the fact that it is statistically significant. Deviations from theoretical concepts are significantly expressed in some sub-periods. However, the presence of a deflationary output gap is common to all sub-periods. That is why the inclusion of the derived determinant of the output gap in the model gave a clearer picture of the relations within

[1] Blanchard, O. (2021). US inflation is running high. What should we worry about now? Realtime Economic Issues, PIIE, 11 November. Retrieved from: https://www.piie.com/blogs/realtime-economic-issues-watch/us-inflation-running-high-what-should-we-worry-about-now (date of access: 25.06.2022); Gagnon, J. (2021). Inflation fears and the Biden stimulus: Look to the Korean War, not Vietnam. Realtime Economic Issues, PIIE, 25 February. Retrieved from: https://www.piie.com/blogs/realtime-economic-issues-watch/inflation-fears-and-biden-stimulus-look-korean-war-not-vietnam (date of access: 25.06.2022); Goodhart, C., & Pradhan, M. (2021). What may happen when central banks wake up to more persistent inflation? VoxEU.org, 25 October. Retrieved from: https://voxeu.org/article/what-may-happen-when-central-banks-wake-more-persistent-inflation (date of access: 30.04.2022).

[2] Ball, L., Gopinath, G., Leigh, D., Mitra, P., & Spilimbergo, A. (2021). US Inflation: Set for Takeoff? VoxEU.org, 7 May. Retrieved from: https://voxeu.org/article/us-inflation-set-take (date of access: 30.04.2022); Brignone, D., Dieppe, A., & Ricci, M. (2021). Quantifying the risks of persistently higher US inflation, VoxEU.org, 1 November. Retrieved from: https://voxeu.org/article/quantifying-risks-persistently-higher-us-inflation (date of access: 30.04.2022); Ha, J., Kose, M. A., & Ohnsorge, F. (2021). Inflationary pressures: Likely temporary but challenging for policy design. VoxEU.org, 14 July. Retrieved from: https://voxeu.org/article/inflationary-pressures-likely-temporary-challenging-policy-design (date of access: 30.04.2022).

the Euro Area economies: moving the current output away from the optimal output deepened the problems of unemployment. The long-term deflationary output gap had a negative impact on the inflation rate, primarily due to the fact that before the financial crisis there were reasons to raise the target level above 2 %, which would certainly relax economic activity. During the crisis years, and the application of numerous non-standard and unconventional state interventions directly implemented on the market, conventional measures became unpopular. The reduction of reference interest rates to zero did not have positive effects on

economies during the crisis years, just as today's increase in interest rates will not encourage real economic activity. This can be useful for financial magnates, but economies need incentives (supply) in the real sector of the economy.

The obtained results can be used in future research in analyses with modified models, with the inclusion of other economic determinants. They are also a sufficient indicator for economic policy makers of the way in which individual economic indicators can be applied and evaluate the relationships of economic determinants through customised models.

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