

# MACROECONOMIC STABILITY AND EUROPEAN UNION INVESTMENTS

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## ABSTRACT

The quantity and quality of investments represent a condition for sustainable and long-term economic growth. Therefore, in economic theory, the rate of economic growth is a function of investment. This research includes an analysis of the impact of selected key macroeconomic indicators (independent variables) on the state and trend of investments in the European Union as a dependent variable. The research covers the period from 2012 to 2021. The following independent variables are chosen: GDP growth rate, interest rate, inflation, unemployment, income from indirect and direct taxes, public debt and budget deficit. The research shows the impact of these variables on the investments of the European Union, the dependent variable. The results of the regression analysis show that interest rates, unemployment, revenues from indirect taxes, as well as the public deficit and public debt have a negative and statistically significant direction in relation to investments. The GDP growth rates as well as direct tax revenues are statistically insignificant, but they have a positive regression coefficient on investments. Inflation rate is also an insignificant variable, but with negative impact on investments. The chosen model in the context of the joint action of all independent variables is statistically significant given that the coefficient of determination is 0.99. The results of the F test indicate statistical significance below 5%, so the model offers enough degrees of freedom (df) to vary the variables and statistically acceptable rating. Finally, the obtained results are significantly consistent with previous research and theoretical assumptions.

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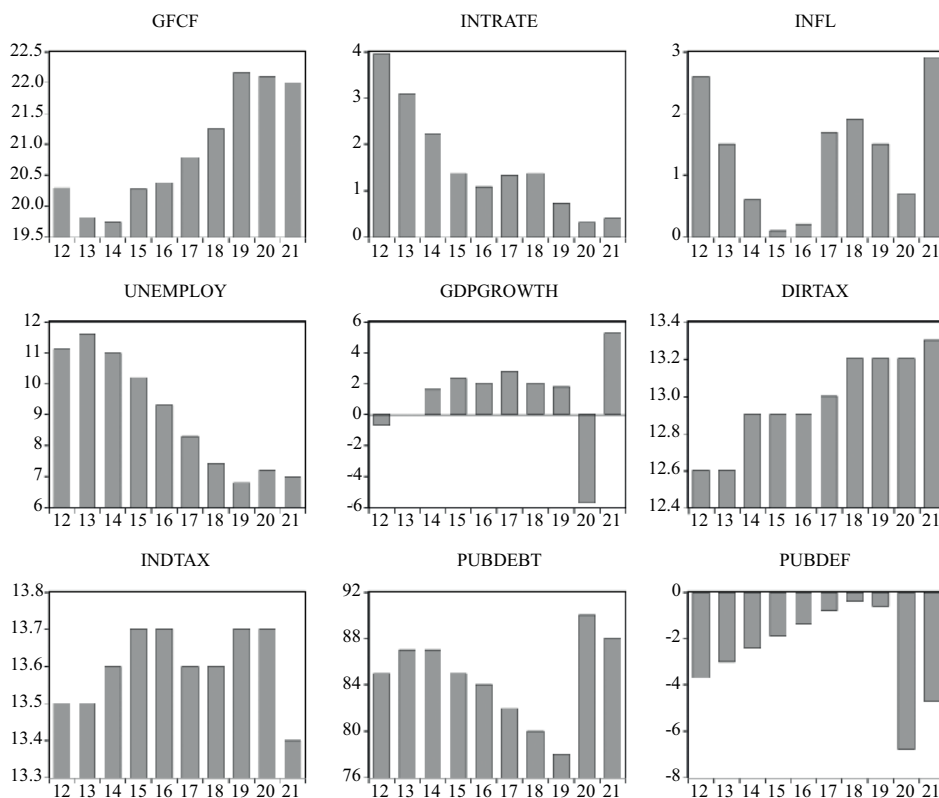
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## 1. INTRODUCTION

Investments affect economic growth and physical capacities (aggregate supply). As part of investments, macroeconomics explores the so-called optimal stock of capital, without which the optimal ratio of output and capital cannot be determined, and thus the volume of investments. It is not possible to ensure the desired level of growth and development without continuous investment. Other economic variables should be included for the macroeconomic overview of investments. Therefore, this research is focused on the analysis of gross investments and other economic indicators with the aim of determining their interdependence. In addition to investments, the economic indicators analysed in this paper are: interest rates, inflation, unemployment, GDP growth, tax revenues, budget deficit and public debt. The subject of the research is the analysis of investments and the aforementioned macroeconomic variables on the example of the EU-27, for the period 2012-2021.

The European Union has been recording a uniform share of investments in GDP for a long time. Total investments in the EU amount to about 20% of GDP. This shows that the most developed European national economies are already in a mature development stage (Popović & Erić, 2021).

The following diagram (Diagram 1) shows data on investments and other economic indicators in the EU. Stable investments are observed, which is expected for this stage of development of the European economy. The diagram shows a downward trend in long-term interest rates and unemployment over a ten-year period, while the general price level fluctuated between 1.5 and 3%. GDP growth averaged around 2% annually, with minor fluctuations. A more significant deviation was recorded in 2020, when the drop in economic activity amounted to 5.7% due to the pandemic shock. The recovery of economic activity was already recorded in 2021, when GDP was recorded higher by 5.3% compared to the previous year. Economic recovery was a prelude to inflation, which in 2021 amounted to almost 3%. Due to difficulties with the growth in energy prices in the EU, inflation escalated during 2022 and amounted to about 12%. Price stability was maintained in the analysed period (2012-2021) through less expansive monetary measures. However, price stability implied weaker results of other economic indicators, primarily investments and GDP growth. The stability of fiscal revenues (based on direct and indirect taxation) was recorded in the analysed period. The growth of the budget deficit (over 4%) and public debt (over 85%) was noticeable, especially in the year of the pandemic and the first year after the pandemic, which indicates a significant average deviation from the convergence criteria at the Union level.



\*Definition of coefficients: GFCF- Gross investments in fixed capital (% GDP), INTRATE - interest rate, INFL - inflation, UNEMPLOY - unemployment, GDPGROWTH - GDP growth, IND TAX - revenues from indirect taxes (% GDP), DIRTAX - revenues from direct taxes (%GDP), PUBDEBT - public debt (% GDP), PUBDEF. -budget deficit (% GDP)

**Diagram 1:** Analysed economic indicators\*, 2012-2021, in %

Source: Eurostat, 2022; prepared by the authors in the Eviews software package.

The results in this paper are compared with theoretical assumptions and relevant research of economies with similar characteristics as the EU. In the following, the relevant previous research works in the field that is the subject of this paper are analysed.

*Previous research.* The recession after 2009 was characterized by non-expansionary measures that hindered development in most countries. Therefore, the data on growth and development were already unsatisfying in the years before the onset of the pandemic. Due to the lack of strong investment patterns, European countries were not fully prepared for the shock caused by COVID-19. [Mazzanti et al. \(2020\)](#) believe that convergence and sustainability policies should

have been given a greater role within the EU agenda, and their symbiosis would have effected macroeconomic stability and overall development. [Marinescu et al. \(2019\)](#) investigate the determinants of public investments in the countries of the European Union to evaluate the sufficiency of investments in EU. The authors state that EU investments have recorded a serious downward trend in the last three decades. The downward trend became more pronounced after the economic crisis at the end of the first decade of this century. They analyse the main determinants of public investment in the EU to find out which variables have a significant impact. They use panel data for EU countries in the period from 1995 to 2017, and regression models to study the impact of economic and fiscal factors on public investment. The result of the work shows that public investments are positively affected by the production gap, income of the population and the number of inhabitants, while GDP growth, net lending, expenditures, total debt, interest rate and active population have a negative impact. These authors finally conclude that fiscal policy decisions also play an important role in the commitment of public investment expenditures.

Research studies on the impact of interest rates on investments contribute to a proper understanding of these variables. Paradoxically, there are very few works and studies that link investments and interest rates of central banks in the Eurozone. Nevertheless, it is a significant macroeconomic relationship, especially in the context of the implementation of the monetary policy of the entire European Union. Thus, in a detailed macroeconomic research, [Reichel \(2022\)](#) investigates the relationship between interest rates and aggregate investments in the Eurozone. More precisely, he investigates the response of total investments to changes in interest rates. OLS, TSLS and GMM econometric methods were used in the research. The study did not confirm a significant impact of interest rates on investments in the Eurozone, although macroeconomic theory assumes an inverse relationship between these variables. However, some papers have confirmed the macroeconomic theory and the inverse relationship between interest rates and investments. The relationship between these variables in the Eurozone is investigated by [Stawska and Miszczyńska \(2017\)](#). They proved that in the period 1999-2016, the main interest rate of the ECB had a statistically significant and inversely proportional influence on investments in the Eurozone. Consequently, the authors believe that ECB had an impact on investments through the interest rate of the central bank. Thus, the hypothesis that lower interest rates encourage investments was confirmed, but also that there is an influence of the ECB on the investment sphere. In addition to these studies, some authors like [Dufrénot and Khayat \(2017\)](#), analyse the monetary policy of the Eurozone in the context of the lower limit of the nominal interest rate and liquidity.

Some former studies deal with the analysis of the relationship between interest, savings and investments. Thus, a study at the OECD level by [Tease et al. \(1991\)](#) showed the relationship between real interest rates and investment, as well as the context of the relationship in the area of savings at the global level. Nevertheless, the emphasis of this research study is on the real interest rate as a multivalent variable that has an impact on numerous economic variables. Earlier research conducted by [Hubbard \(2001\)](#) deals with analysis of capital market imperfections. Hubbard is one of the first authors to explore broader aspects of investing in relation to conventional theories. It is distinguished by the inclusion of financial restrictions when deciding on investments.

[Khurshid \(2015\)](#) investigated the effects of interest rates on investments on the example of Jiangsu province. The author studied the impact of interest rate on investments in that Chinese province. At the same time, Jiangsu had the largest investments in China. Using econometric methods in the period 2003-2012, the author proved that in the long term there is a statistically significant inverse relationship between interest and investments. In the short term, this relationship is positive. This confirmed the macroeconomic theory hypothesis that lower interest rates encourage investment growth (and vice versa). The author also gave recommendations as to how interest rate policy can influence economic growth in this province.

Some studies deepen the role of interest rates, like [Belke and Klose \(2018\)](#). The authors estimate real interest rates for the entire Eurozone as well as for its 9 members. Estimated real interest rates are slightly lower, but still higher than real interest rates. They conclude that real interest rates are set below (or not much above) the natural real rate. [Ferrero, Gross, and Neri \(2017\)](#) conducted research on interest rates for the ECB. They found a decline in nominal and real interest rates since the mid-1980s. For the past decade, panel analysis has shown a decline in real interest rates in the Eurozone. The authors predict slow economic growth and pressure to reduce real interest rates by 2025. [Demertzis and Viegi \(2021\)](#) also note the decline in long-term interest rates. They investigate interest rate trends in Europe and the USA. US interest rates have been falling for more than 15 years, with real interest rates being negative for most of that period. In Europe, the pressure to reduce interest rates is more pronounced. The authors see the lack of adequate capital for financing as an important factor in the pressure on interest rates in Europe. In his paper, [Summers \(2015\)](#) indicates stabilization of global financial indicators after the financial crisis of 2008-2009, although he believes that some segments in the industrial world are still lagging behind, which opens up space for different interest policies and their impact on investment. According to a research study by [Sajedi and Thwaites \(2016\)](#), real interest rates fell in the

industrialized world. Nominal investment rates also recorded a decline. At the same time, a decline in the relative prices of investment goods is observed. The model explains a small but economically important drop in interest rates, as well as the rise in real estate prices and household debt. Greater investment decline rate is particularly significant. Research on the example of OECD countries was conducted by [Gruber & Kamin \(2016\)](#). They see growth in net lending to non-financial corporations. They prove that this growth encourages the growth in savings and decline in investments. Panel analysis showed that investments in OECD members were aligned with GDP growth, interest rates and profits. The authors conclude that companies did not reduce investments, regardless of the problems.

[Pinto and Tevlin \(2014\)](#) investigated the perspectives and weaknesses of investing after the economic crisis of 2008-2009. They note that in 2012 and 2013, business fixed investments move at a modest average rate of about 4%, which, according to the authors, is an insufficient pace in the course of expansion. In a study done for the IMF, a group of authors investigate investments in the Eurozone. [Barkbu et al. \(2015\)](#) prove that investments in the Eurozone are below pre-crisis levels. They see part of the explanation in high capital costs (interest rates) but also in other financial limits. A study by [Marx et al. \(2021\)](#) indicates a decline in the labour force and growth in productivity with a limited decline in real interest rates.

[Gootjes and De Haan \(2022\)](#) examine whether the previous fiscal policy was pro or anti-cyclical. In doing so, they use a panel of 27 member states of the European Union (EU) in the period from 2000 to 2015. Additionally, they investigate whether governments improve fiscal rules and efficiency in the cyclical response of fiscal policy. The results suggest that EU member budgets have a pro-cyclical character. The results also show that fiscal rules reduce fiscal procyclicality. Further analysis reveals that fiscal policy tends to be more procyclical in countries outside the Eurozone, and in periods of prosperity for all member countries.

[Alesina \(2018\)](#) emphasizes how the development of political economy contributes to the success of stabilization achieved through monetary and fiscal reforms. He discusses the role of rationality in political-economic models and related methodological issues. This paper generally deals with the timing of macroeconomic policy, and especially fiscal reforms, in relation to the time of elections. It focuses on how ideological and opportunistic considerations influence the choice of timing of policy implementation. In his paper, he emphasizes why suboptimal economic outcomes (e.g. hyperinflation and budget

deficits) are out of control and not corrected over a long period of time. [Alesina et al. \(2017\)](#) investigated the macroeconomic effects of fiscal consolidation based on reductions in government spending, reductions in transfers, and increases in taxes. In this paper, they extend the narrative dataset on fiscal consolidations, detailing more than 3,500 measures for 16 OECD countries. They argue and prove that cuts in government spending and cuts in transfers are much less harmful than tax increases, even though non-distortionary transfers are not classified as spending. They find that standard New Keynesian models are fully consistent with their results when fiscal shocks are permanent. The effects of wealth on aggregate demand moderate the effect of persistent reduction in consumption. Static distortions caused by tax increases cause larger shifts in aggregate supply under unstable prices.

[Bonam, De Haan, & Soederhuizen \(2022\)](#) estimate the effects of government spending shocks during long episodes of low interest rates, which they consider a proxy for the effective lower bound (ELB). Using a panel VAR model for 17 developed countries, they find that government spending and investment multipliers are significantly higher, and exceed the value of one, when interest rates are persistently low. While differentiating government investment in construction and equipment, they find that only the former increases output significantly more when the ELB is lower. They explain this result by existing New Keynesian models that include construction time constraints for government investment.

[Bonatti et al. \(2020\)](#) in their prediction that after the COVID-19 pandemic the ECB could face many additional risks that would be attached to the basic one, and that would undermine the stability of the prices of the euro area, they believe that most of these risks could be reduced by revising the framework management in the euro area, by creating a new mechanism for providing financial assistance and implementing a one-time intervention to reduce the Eurosystem's exposure to euro area sovereign debts.

In his work, [Dumičić \(2019\)](#) identifies the main channels through which fiscal policy is connected with financial stability. It investigates several characteristics of public debt related to financial stability (public debt management and sustainability, state financing costs and their impact on private sector financing costs, exposure of financial institutions to the state, etc.). Along with the tax policy, it elaborates its countercyclical capacity, the role of automatic stabilizers, tax incentives, and tax reliefs for systemic risks. This author analyzes the role of fiscal policy in periods of strong capital inflows from the perspective of financial stability, followed by an overview of fiscal and quasi-fiscal costs of financial

instability. He also points out that the different time horizon is a particular problem for economic policy makers. In this context, the problem of fiscal policy is associated with election cycles that negatively affect its countercyclical capacity. Considering the relevance of the identified channels for financial stability, the author assumes that the macro prudential capacity of fiscal policy will receive much more attention in future research.

Miao & Su (2021) present a New Keynesian model in which entrepreneurs face uninsured idiosyncratic investment risk and credit constraints. Government bonds provide liquidity services and increase net worth. Multiple steady states with positive values of public debt can be supported for a certain permanent ratio of deficit to output. They believe that interest rates in a stable state are lower than the rate of economic growth, and public debt contains a component of the so-called balloon payment. They find that a large set of monetary and fiscal policy parameters can achieve debt and inflation stability, with the condition of non-increasing fiscal deficits and zero interest rates.

## 2. MATERIALS AND METHODS

*Regression analysis - methodological approach.* The research is based on the interdependence of one variable with another, or several other variables. The dependent variable is the primary one, the variations thereof can be explained by changes in other independent (regressor) variables. A model of the stochastic relationship between the dependent and independent variables is a regression model. It is expressed by an equation in which the dependent variable  $Y$  is represented as a linear or non-linear function of the independent variables  $(x_1, x_2, \dots, x_k)$ . The stochastic relationship  $Y$  and  $(x_1, x_2, \dots, x_k)$  is characterized by the fact that each vector of independent variables  $(x_1, x_2, \dots, x_k)$  has a distribution of the value of the dependent variable. By introducing a random variable into the model, we get:

$$Y = f(x_1, x_2, \dots, x_k) + \varepsilon$$

(dependent variable  $Y$  can also be called regressand, endogenous or output variable, and independent variables can be called regressor, exogenous or input variables).

The formula for the estimated simple linear regression function reads:

$$\hat{Y}_i = b_0 + b_1 x_i$$



where:  $\hat{Y}_i$  – is the value of the dependent variable (on the best-fit regression line);  $b_0$  and  $b_1$  – are unknown regression parameters (to be estimated).

Finally, the stochastic nature of the linear relationship between the dependent ( $Y$ ) and the independent variable ( $x$ ) is introduced into the simple linear regression model, so we get:

$$Y_i = \beta_0 + \beta_1 \cdot x_i + \varepsilon_i \quad (i = 1, \dots, n)$$

where:  $Y_i$  –  $i$ -th dependent variable;  $x_i$  –  $i$ -th independent variable;  $\beta_0, \beta_1$  – regression parameters;  $\varepsilon_i$  – stochastic term;  $n$  – the size of the basic set.

*Definition of variables and statistical basis.* The following variables are used in this work: European Union investments as a dependent variable, and interest rates, inflation, unemployment (%), economic growth, revenues from indirect and direct taxes, public debt and budget deficit as independent variables. The statistical basis consists of the relevant Eurostat source, which can be seen in the following table, while the definition of variables, the method of their collection and calculation is described in the rest of this chapter.

**Table 1:** Description and explanation of the variables in the model

	Denotation in model	Data source
A) Dependent variable		
1. EU Investment (%gdp)	GFCF	Eurostat, 2022
B) Explanatory variables		
2. Indirect tax revenue (%gdp)	Ind.tax	Eurostat, 2022
Direct tax revenue (%gdp)	Dir.tax	Eurostat, 2022
3. Public debt (%gdp)	Pub.debt	Eurostat, 2022
4. Budget deficit (%gdp)	Budg.def.	Eurostat, 2022
6. Interest rates	Int.rate	Eurostat, 2022
7. GDP growth (%)	gdpgrowth	Eurostat, 2022
8. Inflation (%)	Inf.	Eurostat, 2022
9. Unemployment	Unemp.	Eurostat, 2022

Source: Eurostat, 2022

*Investments.* Gross fixed capital formation (GFCF) is a macroeconomic concept used in official national accounts such as the United Nations System of National Accounts (UNSNA), National Income and Product Accounts (NIPA) and the European System of Accounts (ESA). The concept originates from the National Bureau of Economic Research (NBER) capital formation studies of Simon

Kuznets in the 1930s, and standard measures for it were adopted in the 1950s. Statistically, this indicator measures the value of acquisitions of new or existing fixed assets by the business sector, governments and households (excluding their non-corporate enterprises) minus the disposal of fixed assets. GFCF is a component of gross domestic product (GDP) expenditure and therefore shows something about how much new value added in the economy has been invested rather than consumed (Eurostat, 2022).

*Tax revenues.* They refer to detailed receipts from taxes and social contributions by type of tax or social contributions and by sub-sector of the general government, published by national authorities in accordance with table 0900 of the ESA transfer program 2010. The data are presented in two variants: euros/eki, units national currency (fixed to the euro if necessary) and as a % of GDP. Geographic coverage: EU and Eurozone, Iceland, Norway, Switzerland. Main data sources: National bodies (Eurostat, 2022).

*Budget deficit (% GDP) and public debt (% GDP).* When it comes to these data, the Government Financial Statistics (GFS) provide the basis for fiscal monitoring in the EU, especially for statistics related to the Excessive Deficit Procedure (EDP). The EDP was established in the Treaty on the Functioning of the European Union (TFEU) and referred to in the Stability and Growth Pact. Member States report data related to the EDP to the Commission (Eurostat), which in turn is responsible for providing the data to the Council of the EU. The EU GFS, including EDP statistics, is implemented in accordance with Regulation (EU) 549/2013 of the European Parliament and the Council on the European System of National and Regional Accounts (ESA 2010), the EU Manual of National Accounts, which replaced the previous version of the National Accounts of the ESA 95 framework from September 2014. It was supplemented by further interpretation and guidelines of Eurostat, especially the Handbook on Government Deficit and Debt.

Council Regulation (EC) no. 479/2009, as amended, requires Member States to report data on state deficit/surplus and debt related to the EDP twice a year: by April 1 and October 1 for the previous four calendar years and the forecast for the current year. Data are presented in harmonized tables. These tables are designed specifically to provide a consistent framework, with links to national budget aggregates and between deficit and debt changes. They should be fully consistent with the GFS data provided to Eurostat under the ESA 2010 transfer program (Eurostat, 2022).

*Interest rates.* One of the convergence criteria of the Maastricht EMU Treaty refers to interest rates for long-term government bonds denominated in national

currencies. The selection guidelines require the data to be based on secondary market yields of central government bonds, net of taxes, with remaining maturities of around 10 years. The bond or bonds in the basket must be changed regularly to avoid maturity drift. The legal basis is Article 121 of the Treaty establishing the European Union and the Protocol on Convergence Criteria. Currently, harmonized long-term interest rates are available for all member states. Since January 1999, the weights for the euro area have been based on the nominal balance of each country's government bonds with maturities of about 10 years. For EU aggregates and before 1999 for the euro area, the weights used are national GDP at current prices and purchasing power standards. The ECB calculates the EU aggregate series based on data from national central banks. In addition, for the euro area aggregates, the ECB collects daily data on representative long-term government bonds in the markets, used to calculate that aggregate. (Eurostat, 2022).

*GDP growth.* Gross domestic product (GDP) is a measure of economic activity, defined as the value of all goods and services produced minus the value of any goods or services used in their creation. The calculation of the annual GDP growth rate aims to enable a comparison of the dynamics of economic development over time, but between different economies. To measure the growth rate, GDP in current prices is evaluated in the prices of the previous year, and the changes calculated in this way are imposed at the level of the reference year, that is, the so-called chain linking. (Eurostat, 2022)

*Inflation.* Harmonized indices of consumer prices (HIPC) are intended for international comparisons of consumer price inflation. The European Central Bank, e.g. uses HIPC to monitor inflation in the Economic and Monetary Union and to assess inflation convergence in accordance with Article 121 of the Treaty of Amsterdam, while for the USA and Japan national consumer price indices are used (Eurostat, 2022)

*Unemployment.* The number of people unemployed as a percentage of the labour force. The labour force is the total number of employed and unemployed persons. Unemployed persons are persons aged 15 to 74 who are: a. not employed during the reference week, b. currently available for work, i.e. were available for paid employment or self-employment before the end of the two weeks following the reference week, c. actively seeking job, i.e. had either carried out activities in the four-week period ending with the reference week to seek for paid employment or self-employment or found a job to start later, i.e. within a period of three months from the end of the reference week (Eurostat, 2022).

### 3. RESULTS

Below are the results of the regression analysis, presented in three tables (sections). The analysed period is 2012-2021 for all observed variables. The first table of the regression model (Model Summary) shows a coefficient of determination (R Square) of 0.99, which means that 99% of gross investment variations are determined by the joint action of the selected independent variables. This result is sufficient in terms of statistical significance and quality of the model. It is quite logical, because the movement of gross investments in reality is influenced by numerous factors, which are largely taken into account in this model.

In the second section, the results of the regression analysis F test (analysis of variance-ANOVA) show large values and a probability below 5%, which means that the model has enough degrees of freedom (df) to vary among the analysed phenomena, which is statistically acceptable in terms of significance and statistical evaluation which is shown in the third section in the regression model.

**Table 2:** Summary Statistics

<i>Regression Statistics</i>	
Multiple R	0.99
R Square	0.99
Adjusted R Square	0.99
Standard Error	2.01
Observations	10.00

Source: Authors' calculation

**Table 3:** ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	8	1036942	129617.7	32035.02	0.0043
Residual	1	4.046126	4.046126		
Total	9	1036946			

Source: Authors' calculation

Coefficients of variables, as regression predictors, and the significance of each for the movement of gross investments are presented in the third section (Table 4). Interest rate (nitrate), unemployment (unemployed), income from indirect taxes (ind.tax), budget deficit (budg.def) and public debt (pub.debt) negatively and statistically significantly determine the trend of investments. An increase in interest rates (int.rate) by one percentage point leads to a statistically significant

decrease in the value of investments. The change in unemployment (unemploy) for one unit inversely determines the movement of investments for 63 units. From the above, it can be concluded that there is an inversely proportional trend of unemployment and investment in EU for the period 2012-2021. The results also have a theoretical basis for the inversely proportional relationship between investments and unemployment. The results on the inversely proportional impact of income from indirect taxes (ind.tax) also have a theoretical basis in this case, because the collection of indirect taxes is mainly directed to cover current expenditures (current consumption), and not to investments. The impact of the budget deficit and public debt on investments leads to a similar conclusion.

Inflation in the observed period has a negative impact on investments, but it is also statistically insignificant. The analysis determined (period 2012-2021) stagnant and low annual inflation values. The reasons for the lower intensity of the negative correlation between the observed variables can be explained by the active role of the ECB in performing the basic task, i.e. maintenance of price stability, which was at the expense of gross investments and lower economic growth. GDP growth (gdpgrowth) has a positive impact on investments, but statistically insignificant. The variable of income from direct taxation (dir.tax) shows the same direction and insignificant influence. Although they are in a proportional relationship, the insufficient values of reinvestment of income from direct taxes do not show a statistically significant impact.

**Table 4:** Value of coefficients and significance

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Ind.tax	-1257.46	35.49	-35.43	0.02
Dir.tax	21.28	13.76	1.55	0.36
Pub.debt.	-59.00	0.96	-61.71	0.01
Budg.def.	-93.07	1.89	-49.11	0.01
Int.rate	-156.52	7.43	-21.06	0.03
Infl.	-16.91	6.42	-2.66	0.23
GDPgrowth	5.95	1.14	5.25	0.12
Unemp.	-63.16	5.74	-11.01	0.05
Intercept	25081.97	611.31	41.03	0.02

Source: Authors' calculation

#### 4. DISCUSSIONS AND CONCLUSIONS

Investments represent one of the key macroeconomic variables. First of all, their importance stems from the role they play in the theory of economic growth.

In economic theory, there is a well-known and generally accepted relationship: economic growth (that is, the rate of economic growth) depends on investments. Numerous economic indicators affect the state and dynamics of investments. Regardless of endogenous and exogenous influences, investments in most developed economies account for approximately 1/5 of GDP, and to a lesser extent, they are prone to significant oscillations.

In this research, a regression analysis of the influence of the relevant group of indicators on the movement and dynamics of investments in the European Union was performed. The selected group of macroeconomic variables represents independent variables that positively (proportionally) or negatively (inversely proportionally) influence the movement of investments. In this context, the following independent variables were analysed: economic growth rate, interest rate, inflation, unemployment, revenues from indirect and direct taxes, public debt and budget deficit, while European Union investments represent a dependent variable. The research covers the period from 2012 to 2021, i.e. the time after the global financial crisis of 2008/2009, which includes stable, but also less stable sub-periods (e.g. during the debt crisis in Greece and the Eurozone, or instability during the COVID-19 pandemic).

The chosen model is statistically significant because it enables a realistic and high-quality reading of the data. This is confirmed by the coefficient of determination (R Square) of 0.99. That is, as much as 99% of the variation of the dependent variable of gross investment is determined by the joint action of all independent variables. It should be emphasized that this result is logical and expected due to more than correct choice of variables that influence the movement of gross investments. The same is confirmed by the results of the F test with a probability below 5%. Thus, the selected model offers enough degrees of freedom (df) for mutual variation of the variables, which finally gives a high statistically acceptable and significant score.

The final results of the influence of the selected independent variables largely converge with the theoretical assumptions, but also with the results of previous research. In this context, it is obvious that interest rate, unemployment, indirect taxes revenues as variables, as well as the budget deficit and public debt have negative and statistically significant direction in relation to investments as a dependent variable.

Therefore, the direction of these variables in relation to investments is inversely proportional.

There is a logical explanation for these results because an increase in interest rates (int.rate) by 1% affects a statistically significant decrease in investments. This is a logical reaction, because any increase in the price of capital disincentivizes investors and slows down the investment process.

The situation is similar with unemployment. For the observed period in the European Union, there is an inversely proportional trend of unemployment and investment, which corresponds to theoretical knowledge and previous research. These variables have a negative coefficient because an increase in investment leads to a decrease in the unemployment rate, which is a generally accepted theoretical position.

Also, the obtained results of the impact of income from indirect taxes are theoretically based on scientific knowledge because collected indirect taxes are mainly used for current expenditures, not investments. Therefore, higher tax rates and higher collected taxes disincentivize investments. It is similar with the relationship between the budget deficit, public debt and investments. Macroeconomic and fiscal instability, which is reflected in the growth of the deficit and public debt, certainly discourages investors from making new investments.

Although the GDP growth rate is statistically insignificant, it has a positive correlation coefficient in relation to investments. Income from direct taxes, having positive direction in relation to investments, is also insignificant.

Low inflation rates are observed in the observed period, but this variable is insignificant and has a negative impact on investments. The low inflation can be explained by the consistent application of common monetary and fiscal policy in the European Union and the Eurozone, as well as by the ECB's measures to preserve price stability and even slow down in investment.

The final conclusion is that in the period from 2012 to 2021, the influence of the selected independent variables of the economic growth rate, the level of the interest rate, inflation, unemployment, income from indirect and direct taxes, public debt and the budget deficit, correlates to a large extent with the European Union investments.

As a result of the regression analysis, it is possible to give realistic assessments of the influence of independent variables on the dependent variable, and to confirm that the observed tendencies are aligned with earlier research and theoretical knowledge in the field of investments. That is, based on the research results, it is possible to make various relevant judgments or create economic policies in the context of the impact of investments on long-term economic development.

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## Conflict of interests

The authors declare there is no conflict of interest.

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## МАКРОЕКОНОМСКА СТАБИЛНОСТ И ИНВЕСТИЦИЈЕ ЕВРОПСКЕ УНИЈЕ

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### САЖЕТАК

Квантитет и квалитет инвестиција представљају услов за одрживи и дугорочни економски раст. Стога је у економској теорији стопа економског раста функција инвестиција. Ово истраживање обухвата анализу утицаја изабраних кључних макроекономских показатеља (независних варијабли) на стање и кретање инвестиција у Европској унији као зависне варијабле. У истраживању је обухваћен период од 2012. године до 2021. године. Као независне варијабле изабране су: стопа раста ГДП, висина каматне стопе, инфлација, незапосленост, приходи од индиректних и директних пореза, јавни дуг и буџетски дефицит. Истраживање је показало утицај ових варијабли на инвестиције Европске уније које представљају зависну варијаблу. Резултати регресионе анализе показују да каматне стопе, незапосленост, приходи од индиректних пореза, као и варијабле буџетски дефицит и јавни дуг имају негативан и статистички значајан смјер у односу на инвестиције. Стопа раста БДП-а, као и приходи од директних пореза, нису статистички значајни, али имају позитиван регресиони коефицијент у односу на инвестиције. И стопа инфлације је несигнификантна варијабла, али са негативним утицајем на инвестиције. Изабрани модел у контексту заједничког дјеловања свих независних варијабли је статистички значајан јер је коефицијент детерминације 0,99, резултати Ф теста указују на статистичку значајност испод 5%, модел нуди довољно степени слободу за варирање варијабли и статистички прихватљиву оцјену. Коначно, добијени резултати су значајно усаглашени са досадашњим истраживањима и теоријским поставкама.

**Кључне ријечи:** *Европска унија, инвестиције, БДП, јавни дуг, буџетски дефицит, каматне стопе, инфлација, незапосленост, порески приходи.*

