

TRACKING ECONOMIC GROWTH: A CORRELATION ANALYSE ON THE DETERMINANTS OF GROSS DOMESTIC PRODUCT

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Abstract: *Gross Domestic Product (GDP) is the most important measure of economic activity in a country. It represents the total value of all goods and services produced in a particular country in a given period. GDP can be calculated using three methods, namely, the production approach, the income approach, and the expenditure approach. In this paper, we will focus on the Expenditure Method. The Expenditure Method of calculating GDP involves adding up the total value of all final goods and services purchased by the four groups of spending agents: households, firms, government, and foreign buyers. The purpose of this paper is to discuss how the components of GDP using the Expenditure Method influence GDP. Specifically, we will explore the relationship between each component of GDP and GDP as a whole, considering also the impact that inflation has on the real growth of the economic activity, and which is the real trend of this macroeconomic result indicator.*

Keywords: GDP, economic development, consumption, inflation, expenditure

1. Introduction

Gross Domestic Product (GDP) is one of the most commonly used metrics for measuring the economic performance of a country. It is defined as the total value of all goods and services produced within the borders of a country in a given period of time, usually a year. By analysing and monitoring changes in GDP over time, policymakers can identify trends and take appropriate action to stimulate economic growth or mitigate economic downturns [1]. Furthermore, GDP analysis can help policymakers understand the impact of economic policies on the broader economy. Changes in policies, such as tax cuts or government spending, can have significant effects on GDP, both in the short and long term. By analysing the relationship between policy changes and GDP, policymakers can

assess the effectiveness of different policy interventions and adjust their approach accordingly [2]. Also, for a better understanding of the trends that mark the economic activity, it is particularly important to analyse the factors that determine these, and that are the basis of the formation of the gross domestic product.

The analysis of the components that form the basis of the gross domestic product is particularly important in order to identify the factors that determine the evolution of this indicator [3]. Such an analysis provides particularly important information for all economic policy decision-makers and interested parties, such as investors, because it highlights the interdependencies that are established among the production and consumption processes.

In this paper we aim to analyse the components that are used in determining GDP by using the Expenditure Method. This method involves adding up the total value of all final goods and services purchased by the four groups of spending agents: households, firms, government, and foreign buyers [4]. The components of GDP using the Expenditure Method are consumption expenditure (C), investment expenditure (I), government expenditure (G), and net export expenditure ($X - M$, where X is Export and M is Import). The purpose of this paper is to discuss how the components of GDP using the Expenditure Method influence GDP. Specifically, we will explore the relationship between each component of GDP and GDP as a whole.

Consumption expenditure refers to the total value of all goods and services purchased by households in a given period. In general, it can be argued that a higher level of consumption expenditure leads to higher GDP. This is because an increase in consumption expenditure can result in an increase in demand for goods and services, which in turn can lead to higher production levels and employment rates [5].

Investment expenditure refers to the total value of all goods and services purchased by firms in a given period. This includes capital purchases in the form of machinery, equipment, and buildings, and inventory investments. An increase in investment expenditure can lead to increased economic growth because it boosts a country's production capacity, which can increase future GDP.

Government expenditure refers to the total value of all goods and services purchased by the government in a given period. This

includes spending on defence, education, health care, infrastructure development, and other public services. Government expenditure can have either a positive or negative effect on GDP depending on how it is financed. If government expenditure is financed by taxes or through borrowing, it can lead to an increase in GDP, as it increases the overall level of demand in the economy. However, if the government has to increase taxes too much, it can lead to a reduction in consumption expenditure, which in turn can lead to a reduction in GDP.

Net export expenditure refers to the total value of all exports minus the total value of all imports. This can have either a positive or negative effect on GDP depending on the value of the net exports. If the country exports more goods and services than it imports, it leads to an increase in GDP. However, if the country imports more goods and services than it exports, it leads to a decrease in GDP.

2. Analysis of GDP evolution in Romania for the period 2007-2022

2.1. Methods and tool of the analysis

In order to identify the main elements that were the basis of the GDP evolution during the period under analysis, we proceeded to carry out a correlation analysis to establish which of the variables taken into account had the most significant influence, as well as to establish the nature of the relationship between these independent variables and the dependent variable GDP.

The values of the variables analysed using the expenditure method to determine the evolution of Romania's GDP for the period 2007-2022 are presented in table no.1.

Table 1 - Variables selected for correlation analysis

Year	GDP	Consumption Expenditure	Investment and Government Expenditure	Net Export
2007	367557,4	324029,8	137755,4	-76118,9
2008	465312,2	381064,4	177299,7	-63980,6
2009	510049,7	405244,4	132969,7	-33640,2
2010	510183	402506,1	134220,1	-34367,6
2011	564743,8	443950	151104,4	-34352,6
2012	598506,9	470751,5	161602,3	-26269,8
2013	622945,9	466163,7	158782,8	-8611,1
2014	657629,1	498986,4	162543,3	-7006,6
2015	690016,3	525142,9	175564,7	-13949,4
2016	732904,9	562892,2	173848,3	-7563,2
2017	813763,7	640708,4	183463,9	-20694,9
2018	902964	724211,8	194426,8	-34928,6
2019	996012,7	799847,2	230875,9	-47984,1
2020	1024673,5	825542,3	247153,8	-59697,8
2021	1128581,7	906220,6	255735,9	-61972,1
2022	1243732,8	1001068,7	304396,9	-75807,2

Source: Data taken from the website of the Romanian National Institute of Statistic

In the analysis of the correlation it was used the correlation matrix. Correlation matrix is a statistical method to show the relation of two or more variables. It is a very frequently used mechanism and finds its application in many fields, including the economy. The matrix correlation contains the values 1 on the principal diagonal and the correlation coefficients for the other components.

The Pearson correlation coefficient returns a value between -1 and 1. If the correlation coefficient is close to -1, indicate a strong negative relation, if it is 0, does not indicate any relation and if it is close to 1, it indicates a strong positive relation between the variables. In other words, if the value of the correlation coefficient is in the positive

interval, then it shows that the relation of the variables is positively correlated and that both values decrease or increase together. On the other hand, if the value is in the negative interval, then it shows that the relation of the variables is negatively correlated, and both values will go in opposite direction.

In order to calculate the correlation matrix the XLSTAT was used, which is a powerful and flexible statistical tool for data analysis.

2.2. Results of the correlation analysis

The results generated regarding the calculation of the correlation coefficients in the matrix for the components analysed in the determination of GDP by the expenditure method are highlighted in the table below.

Table 2 – Correlation Matrix (Pearson)

Variables	GDP	Consumption Expenditure	Investment and Government Expenditure	Net Export
GDP	1	0.994	0.887	0.078
Consumption Expenditure	0.994	1	0.909	0.122
Investment and Government Expenditure	0.887	0.909	1	0.256
Net Export	0.078	0.122	0.256	1

As it appears from the values obtained for the correlation coefficients in the matrix of the analysed variables, we observe that the favourable developments regarding the economic growth in Romania during the analysed period was strongly influenced by

the consumption demand from the households. One of the most obvious causes that determined the increase in consumption for this category of economic agents was represented by salary increases, especially starting with 2014.

A direct and quite close connection is also noticeable in the case of public spending and investments, especially from the perspective of gross fixed capital formation, which according to the value obtained by the correlation coefficient, had a significant contribution to the positive results obtained at the level of the national economy.

Regarding net export, the value of the correlation coefficient highlights a very weak connection of the independent variable on the evolution of the GDP indicator, highlighting Romania's high dependence on imports, compared to the

economic capacity to externally exploit the national production of goods and services. Considering this aspect, we consider that economic policy decision-makers should intensify their efforts in the direction of substantiating some strategies and projects that support domestic production to become more competitive and attractive in relation to the external economic environment.

The nature of the causal relationships and the dependence between the variables that determine the GDP value through the expenditure method is highlighted through the correlation map (Figure no.1).

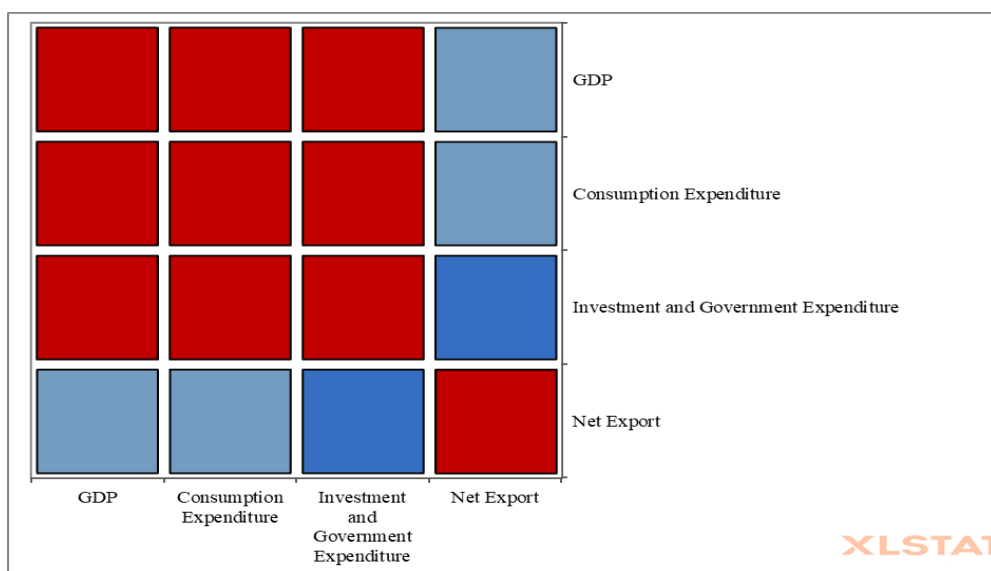


Figure 1: Correlation maps provided by the XLStat software

3. Projections regarding real economic growth between 2007-2022

Considering that the GDP evolution analysis focused on the expenditure method, and the resulting conclusions led to a favourable evolution of this indicator, especially in the context of the final consumption, we sought to verify to what extent the recorded developments also led to a real growth of the national economy. It is well known that against the backdrop of increased demand from consumers, prices in the economy tend to rise, producers seeking to maximize their profits.

Therefore, in such a context, one can observe the manifestation of inflationary tendencies that affect the real value that the

macroeconomic indicators register.

Inflation can affect GDP in several ways:

1. Reducing purchasing power: as prices of goods and services rise, the purchasing power of consumer's decreases, meaning that they can buy fewer goods and services with the same amount of money [6]. This reduction in spending power can lead to a decrease in consumer spending and lower GDP.
2. Higher production costs: inflation can lead to an increase in production costs for businesses, which can lead to a decrease in profits and a reduction in investment in new projects [7]. This can lead to a decrease in economic growth and a lower GDP.
3. Devaluing currency: Inflation can also

cause the value of a currency to decrease, which can negatively impact export-based economies as their goods and services become less competitive in international markets. This can result in a decrease in exports and a reduction in GDP.

Taking into consideration these influences, in order to establish the real developments that marked the GDP trend in the period under analysis, we proceeded to determine the correlation coefficients between GDP and the inflation rate.

Based on the data on the evolution of GDP and the inflation rate in Romania in the period 2007-2022, which were subjected to correlation analysis using the XLSTAT software, a correlation coefficient of 0.299 was obtained. This value confirms the direct link between the inflation rate and GDP but highlights a weak link between the two variables. The relatively weak link between the two variables is also shown in Figure 2.

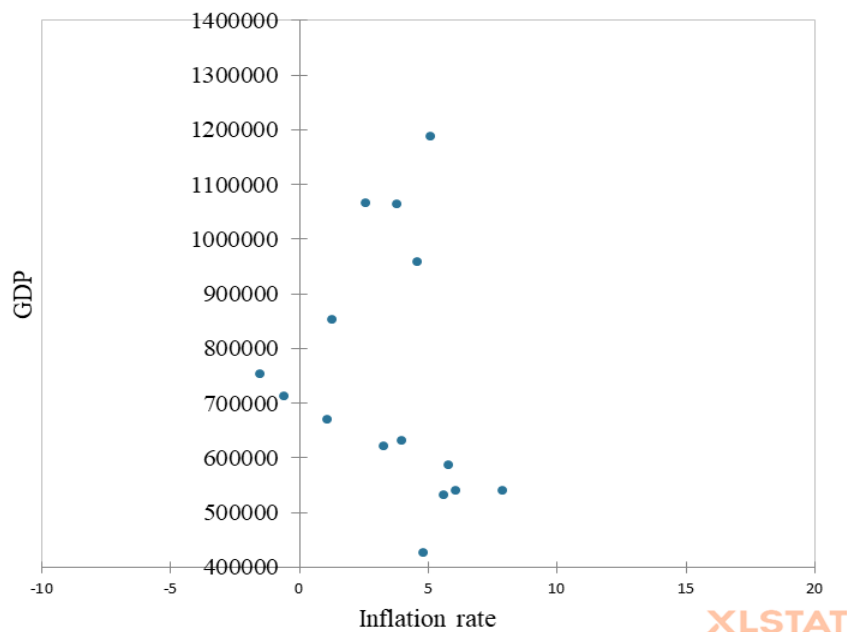


Figure 2: GDP – Inflation rates Scatter plot

Romania's Gross Domestic Product (GDP) has been experiencing growth over the past few years, with a slight dip in 2020 due to the COVID-19 pandemic. In 2019, Romania's GDP reached a record high of \$250.7 billion, a 4.1% increase from the previous year. This was due to strong growth in the services sector, which grew 5.1%, and the agricultural sector, which grew 5%. The industry sector also saw a slight increase of 1.8%.

Private consumption grew by 4.7%, while public consumption increased by 3.2%. In 2020, Romania's GDP contracted by 3.9% due to the impact of the COVID-19 pandemic. The services sector, which accounts for over 50% of the country's

GDP, was hit the hardest, as lockdowns and restrictions affected the hospitality and tourism industries. The industry sector also suffered due to disrupted supply chains and decreased demand for exports.

The Romanian government implemented measures to mitigate the economic impact of the pandemic, including fiscal and monetary policies to support struggling businesses and households. In addition, the country received support from the European Union's Coronavirus Response Investment Initiative and the European Stability Mechanism. In the first quarter of 2021, Romania's GDP grew by 2% compared to the previous quarter, driven by growth in the services and industry sectors. The country is expected to continue its recovery

as COVID-19 restrictions are lifted and economic activity resumes.

Overall, Romania's recent GDP evolution has been positive, with a slight setback in 2020 due to the pandemic. The country has shown resilience in navigating the challenges caused by the pandemic and is poised for further growth in the coming years.

4. Conclusions

In conclusion, the components of GDP using the Expenditure Method can have a significant impact on a country's GDP. The paper has shown that an increase in consumption expenditure and investment expenditure generally leads to an increase in GDP, while government expenditure and net export expenditure can have either a

positive or negative effect depending on how they are financed. Understanding the relationship between each component of GDP and GDP as a whole is critical for policymakers who aim to promote economic growth and development.

Inflation can have negative effects on consumer purchasing power, business profits, and export-based economies, all of which can lead to a decrease in GDP.

By monitoring changes in GDP over time and examining its composition, policymakers can identify areas of the economy that require support, assess the effectiveness of policy interventions, and make informed decisions to promote economic growth and well-being.

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