MODEL ANALYSIS OF THE CORRELATION BETWEEN GDP AND FINAL CONSUMPTION COMPONENTS

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Abstract

In this paper, authors analyze the evolution of the Gross Domestic Product, considered as dependent variable, under the influence of the components of final consumption. The final consumption of households, and the final consumption of public administration, are uses of the Gross Domestic Product. The final consumption can be considered as a major indicator of the Romanian economy dynamics, so the analysis of its influence, thus the analysis on its influence on economic growth will provide valuable results.

Key words: Consumption, GDP, public, private, regression

JEL Classification: E01, E21

Introduction

The final consumption is one of the factors that influence the formation of the Gross Domestic Product, according to the expenses method. Together with methods that analyse the dynamics and the structure, the study of classical indicators of time series, the regression offers more complex results on the influences of final consumption components on the macroeconomic results measure – the GDP.

Literature review

Alesina, Campante and Tabellini (2008) develop on the topic of cyclical character of fiscal policies. Andrei et.al. (2008) are preoccupied with the use of Eviews in econometric studies. Anghelache and Anghel (2016) is a reference work in economic statistics, the authors approach the issues regarding macroeconomic indicators. The application of the regression model

**Research methodology and data. Results and analysis**

Unifactorial regression model can be used to establish the influence of private consumption is set on the evolution of Romania’s Gross Domestic Product. Thus, we used data on a yearly basis covering the period 1990-2016, and to ensure that data we deflated, taking as the base year 1990 by dividing by the Consumer Price Index for that year denominations of GDP and private consumption.

In this regard, we considered a number of data on the evolution of the two aforementioned macroeconomic indicators during 1990-2016.

We shall measure the correlation between GDP and private consumption, this involves a first stage, the individual analysis of each size. As regards private consumption trends in Romania, the data set was processed using Eviews, which enabled obtaining meaningful information on the movement in the macroeconomic indicators during 1990-2016.

**The evolution of private consumption in Romania during 1990 - 2016**
Look at the chart above, notice that the household consumption in our country experienced a significant growth trend, with small fluctuations increases and decreases from 1990 to 2008, when the indicator recorded the highest consideration. Romanian private consumption for 2009 showed a decrease of 9.78% compared with the time immediately preceding because is the period before the financial and economical crisis installed worldwide, from the second half of 2008. From 2011 until 2016 there is a continuous an increase in private consumption.

Similar to these developments gross domestic product seen in the notes of evolution and private consumption. It must, however, stressed that overall private consumption trends in our country in the period under review, following the same trend as favorable GDP that allows us to say that between the two indicators there could be a significant link.

Using statistical tests implemented in software Eviews for the series of data on private consumption in our country allowed to obtain the following information:

![Statistical tests performed on private consumption in Romania, in the period 1990 - 2016](chart)

From the analysis, it appears that the average value of private consumption in the country was about 80,8 million. It also notes that the value of this indicator varied within a range between a minimum of 42,4 million and a maximum of 126,2 million.

Statistical tests revealed that in the case of private consumption, similar to those observed data aimed developments on the Gross Domestic Product and those that refer to the change in final consumption, distribution of annual values is one symmetrical, this statement based on different value Skewness test zero and on the lower level of the reference test Kurtosis.
Following this analysis is important to note that the distributions of annual private consumption in our country are very similar to the two indicators that were subject to previous research - Gross Domestic Product and final consumption.

Based on the results of the analysis presented, we can mention that private consumption of value between our country and the evolution of Romania’s gross domestic product in the period 1990-2016 there is a strong connection. This statement is confirmed by plotting the relationship between the two indicators:

**Correlation GDP - private consumption**

As can be seen from the graphical representation previous pairs of points correspond almost perfectly straight regression. As such, the econometric model that describes the relationship between the two variables is linear one single factor that has as endogenous variable GDP and private consumption as an exogenous variable.

Such an econometric model can be transcribed as:

\[ GDP = a + b \cdot CP + \varepsilon \]

where:

- GDP → dependent variable;
- Private consumption → CP = independent variable;
- a, b → regression model parameters;
- \(\varepsilon\) → residual variable.
We used the software Eviews to determine the econometric model that describes the relationship between the two indicators using least squares as a tool for estimating the parameters of this model. The results can be summarized as follows:

The results of the regression model parameter estimates

Analysis of the results obtained previously, helps us to note that although the probability associated with the model and mainly reflected the values of the tests report determinațieși report determination helped is reduced relative to that observed in the first regression analysis, it is however big enough (about 96%) to believe that we are dealing with a regression model correctly, that allows accurate estimation of the evolution of economic phenomena under investigation. The validity of this model is confirmed by the regression test values F-statistic and F-statistic Prob. How F-statistic = 772,0553 is a great value and Prob F-statistic = 0 <0.05 can accept the model chosen sample and well adjusted data can be used to analyze the dependence between variables.

However, Eviews reported for each independent variable and constant coefficient standard error, t-test and the Statistical probability associated with it. Working at 5% level of relevance, as the probability attached statistical t-test is below this level for private consumption variable, the coefficient is considered statistically significant. Free term coefficient is not significant because the probability attached statistical t-test is far superior materiality of 5%;
In this context, we can draw from the results presented by specialized software Eviews following simple linear regression model:

\[ \text{GDP} = 3.525824 + 1.337002 \cdot \text{CP} \]

Private consumption growth is directly correlated with economic growth, measured by gross domestic product indicator macroeconomic-. Population trend towards saving is partially inhibited by low-interest rates and risk capital allocation for acquisitions is slowed by the volatility of stock prices, including freight and derivatives.

The positive free term (C) leads to the affirmation that the indicators that are not part of this regression model contributes positively to the evolution of macroeconomic aggregate principal - GDP. Although this model used, although it is a fair and well chosen, can be developed and expanded further to ensure better results.

The correlation coefficient (0,968635) indicates a direct and intensity link between the two variables. In order to verify the significance of the correlation coefficient is applied t test (Student).

The analyses and tests on the model, it can be concluded that the value of our country’s gross domestic product is significantly influenced by developments in private consumption.

To complete this analysis will determine and influence public consumption on the evolution of macroeconomic aggregate principal - GDP.

To study the influence that has the second component of final consumption ie public consumption, on the evolution of Romania’s Gross Domestic Product we intend to achieve single factor analysis using regression model.

To analyze the correlation between selected variables, given with an annual frequency covering the period 1990-2016, and to ensure comparability of data we deflated, taking as the base year 1990 by dividing by the Consumer Price Index for that year denominations of GDP community and public consumption.

Regarding public consumption trends in Romania, the data set was processed using Eviews, which enabled obtaining meaningful information on the movement in the macroeconomic indicators during 1990-2016.
The evolution of public consumption in Romania during 1990-2016

Looking at the chart above, the trend of this indicator, the years of observation, it decreases the but stands strong variations from year to year, the most significant period of decline as that recorded between 1998 and 2002, followed by a period of growth until 2009, then began to rise again from 2012 until the end of the period.

We nevertheless stressed that, as a whole, developments in public consumption in our country, in the period under review, following the same upward trend as for GDP, which allows us to say that between the two indicators there may be a link.

Characterization distribution data series on public consumption in our country is based on statistical tests implemented in the software Eviews which allowed to obtain the following information:
From the analysis, it appears that for the time period covered by this analysis, the average public consumption in our country was about 9.59 million. It also notes that the value of this indicator varied within a range between a minimum of 4 million and a maximum of 13.2 million.

Statistical tests revealed that in the case of public consumption, similar to those observed data aimed at development GDP and as relates to the change in final consumption, distribution of annual values is one symmetrical, this assertion based on value Skewness zero test and the reference level lower than that of the Kurtosis test.

To describe the dependence between GDP and public consumption, and the form and direction of the relationship of dependence we plotted the chart of values two point cloud datasets. This graphical representation will help to specify an econometric model and implicit in selecting a mathematical function basis of which we can determine the correlation between the two variables.
As can be seen from the graphical representation previous empirical distribution points of public consumption and GDP in Romania in the period 1990-2016 can be approximated best by a right. From the graph, it can be seen that the resulting features, GDP per public consumption, influenced and other factors as there are points placed on the graph without any regularity, the influence of these factors random unidentified will be eliminated by adjustment, that is, by defining the teoretică. Ca such regression, an econometric model that describes the relationship between the two variables is linear one single factor that has as endogenous variable GDP and public consumption levels as an exogenous variable.

Such an econometric model can be transcribed as:

\[ \text{GDP} = a + b \cdot \text{CPL} + \varepsilon \]

where:
- \( \text{GDP} = \text{GDP} \rightarrow \) dependent variable;
- \( \text{CPL} = \text{public consumption} \rightarrow \) independent variable;
- \( a, b \rightarrow \) regression model parameters;
- \( \varepsilon \rightarrow \) residual variable.

To estimate this model using cmmp parameters. By using the software Eviews, which implements this methods, the following model has been determined:
The results of the regression model parameter estimates

Analyzing previous results can make the following clarifications to the relationship between the two indicators, as follows:

- R-squared coefficient of determination, \( R^2 = 0.26 \), shows that GDP is explained in a weight of 26% by the level of consumption; it can be said that public consumption change does not constitute a decisive factor in the change in gross domestic product;

- For each independent variable and constant coefficient standard error Eviews report, Statistical t-test and the associated probability. Working at 5% level of relevance, as the probability attached statistical t-test is below this level for consumption public variable, then the coefficient is considered statistically significant. Free term coefficient is not significant because the probability attached test t-statistic is above the threshold of 5% significance;

- This regression model’s validity is confirmed by tests F-statistic values and the F-statistic Prob. F-statistic is calculated as the table level and Prob F-statistic = 0.0058 < 0.05, we can accept the model chosen and well-adjusted sample data can be used to analyze the dependence between variables.

In this context, we can draw from the results presented by specialized software Eviews 7.2 following simple linear regression model:

\[
\text{GDP} = 35.89882 + 7.895944 \cdot \text{CPL}
\]
The high value of the constant term that reflects the influence of factors which were not taken into account when building the regression model contributes significantly to the evolution of macroeconomic aggregate principal - GDP. Although this model used, although it is a fair and well chosen, can be developed and deepened in order to ensure better outcomes for business forecasting.

The correlation coefficient indicates a moderate direct connection between the two variables. In order to verify the significance of the correlation coefficient is applied t test (Student).

Conclusions

The modification by one million lei in private consumption, leads to the GDP growth by 1.13 million, evidence of the existence of a direct link between the two variables studied.

The increase of one million lei public consumption, GDP will grow by 7.89 million, which outlines the existence of a direct link between the two variables studied.

From the analyses and tests performed, it can be concluded that the value of the gross domestic product of our country is influenced by public and, more significant, by the private consumption trends.

For both correlation case studied, we have achieved a high value of the constant term, that provides evidence on the influence of factors not taken into consideration when estimating the regression models, but they contribute significantly to the evolution of GDP.

References

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