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# ANALYSIS OF THE ECONOMETRIC MODEL OF THE CORRELATION BETWEEN GDP AND FINAL CONSUMPTION

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## Abstract

*The final consumption is one of the most important components of the Romanian GDP structural model. Divided into private and public consumption, this indicator offers valuable insight especially on the populations' determination to consume. Also, it measures the public consumption, a variable that is important in budgetary analyses. Thus, the influence of the final consumption on the GDP is one of the key topics in macroeconomic analyses.*

**Key words:** *GDP, final consumption, regression, parameter, influence*

**JEL Classification:** *E01, E20, E21*

## Introduction

The analysis of the final consumption influence on the Gross Domestic Product is one of the most important studies that follow the expenses method of GDP calculation and formation. The more complex the analysis, the more useful the results drawn. The econometric approach gives substantial results when a longer interval is approached and, one of the truths behind the econometric model is the dependence of the national economy on final consumption.

Thus, the unifactorial regression model can be used to establish the influence that the value of final consumption has on the evolution of Romania's Gross Domestic Product.

## Literature review

Davidson and Mackinnon (2004), Dougherty (2007), Anghelache and Anghel (2016), Andrei and Spătaru (2010) develop on econometric instruments and applications. The regression has been used as analysis technique at the

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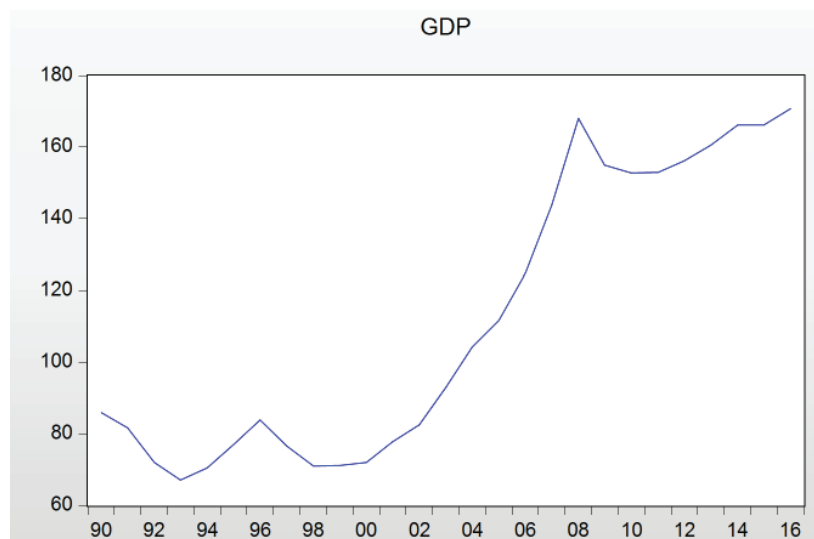
macroeconomic level, by Anghelache and Sacală (2016), Anghelache, Soare and Popovici (2015), Anghelache, Manole, Anghel (2015). Anghelache and Anghel (2014) is a reference document on theoretical and practical aspects of economic modelling. Censolo and Colombo (2008) study the structure of public consumption in a given trend of economy. Chamberlin (2011) develops on the interaction between GDP and two measures of welfare. Various aspects of consumption are analysed by Colloredo-Mansfeld (2005), Jorgenson and Slesnick (2008), Reis (2009). Newbold, Karlson and Thorne (2010) develop on statistics instruments useful in economy and business fields. De Michelis and Monfort (2008) discuss on GDP under the impact of regional convergence and cohesion policy at the European level. Hassler, Storesletten and Zilibotti (2007) focus on the public good in a democratic. Kocherlakota (2010) approach innovative dynamics of public finance.

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

We used data on a yearly basis covering the period 1990-2016, and to ensure data comparability, the values of the two macroeconomic indicators were deflated using the consumer price index (used by the National Institute of Statistics to calculate the inflation rate in Romania), which captures the evolution of asset prices and final rates purchased by the population in the current year compared to 1990, mainly as a reference. Deflating the data was performed by dividing the Consumer Price Index from that year of the denominations of GDP and final consumption.

For this purpose, we considered a number of data regarding the evolution of the two macroeconomic indicators mentioned before, during 1990-2016. Correlation analysis of the indicators involves at first stage, an individual analysis of each size.

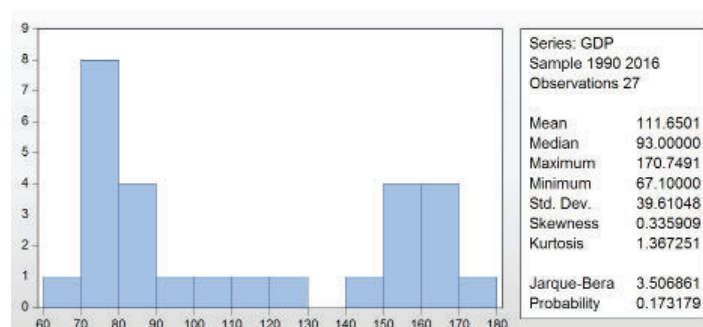
Regarding the evolution of GDP in Romania, the data set was processed using Eviewsprogram, which enabled the obtaining of meaningful information about the fluctuation of the macroeconomic indicators during 1990-2016.



**The GDP evolution in Romania between 1990 – 2016**

The GDP of our country recorded a steady growth from year to year, with small fluctuations increases and decreases from 1990 to 2008, when the indicator recorded the highest value. The value of Romania's GDP for 2009 has recorded a decrease compared to the immediately preceding time, because is the period that precedes the financial and economic crisis installed world-wide starting the second semester of 2008. From 2011 until 2016 is recorded an increase of the GDP with 2,16% in 2012 compared to 2011, with 2.75% in 2013 compared to 2012 and by 3.49% in 2016 to 2013.

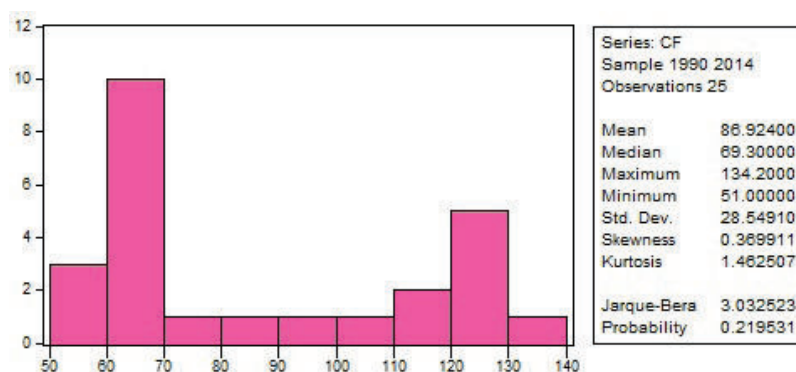
Using statistical tests implemented in the software Eviews for the data series regarding GDP in Romania, has allowed us to obtain the following information:



**Main statistical tests made on the value of the GDP in Romania 1990-2016**

Thus, we can notice that the average value of the GDP for the period 1990-2016 is 11.65 million lei, with a range between a minimum of 67.1 million lei and a maximum of 170 million lei. The values of the statistical tests previously conducted allow us to state that the distribution of GDP values for the period considered is not perfectly symmetrical (the test skewness is zero) because the value of the test Skewness is bigger than 0, we can say that the distribution is skewed towards left, with more extreme values to the right. The values of Kurtosis test is smaller than 3 meaning that we have a platikurtic distribution, flatter than a normal distribution having dispersed values over a longer interval around the average. The probability of extreme values is lower than a normal distribution.

Regarding the evolution of final consumption in Romania, the data set was processed using Eviews program, which enabled the obtaining of meaningful information on the variation of this indicator over the period 1990-2016.



**Statistical tests made on the Romania's final consumption between 1990 – 2016**

By using Eviews, we have reached the variation interval of the studied indicator, and we have established that the value of final consumption is placed between 51 million lei, in 1993 and 134,2 million lei, at the end of the year 2008. Also, we established that the mean value of this indicator for the interval, is 86.92 million lei. The values of the Skewness and Kurtosis tests allow us to conclude that the considered distribution is not symmetrical, with a predominance of values placed between the minimum and the average of the data series.

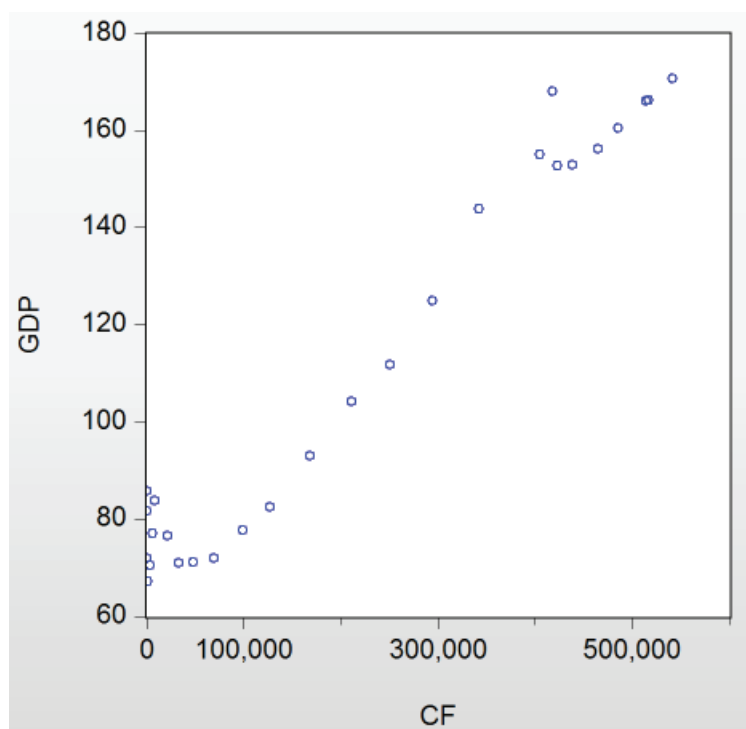
The final consumption indicator has recorded small fluctuation, low increases, small increases and decreases, but, on the overall, an accentuate evolution can be observed, from one year to the next.

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Similar to the facts observed for the evolution of the Gross Domestic Products are the observations on the final consumption. It must be outlined, however, that the general evolution of the final consumption in our country, during the period analyzed, follows the same favorable evolution as the Gross Domestic Product.

Following this analysis is important to note that the annual distributions of final consumption in our country is very similar to that of the GDP.

Based on the results of the previous analysis, we can mention that between the final consumption in our country and the evolution of GDP in the period 1990-2016 there is a strong connection. This statement is confirmed through the graphical representation of the connection between the two indicators:



**Correlation GDP – Final Consumption**

As noticed from the preceding graphic representation, it is a correlation between changes in GDP and the private consumption in Romania during 1990 – 2016, because the pair of points describes almost perfectly the trajectory of a straight line. As such, the econometric model that describes the connection

between the two variables is one unifactorial linear which has as endogenous variable GDP, and as exogenous variable the level of final consumption.

Based on these observations and methodological elements mentioned in the first part of this chapter, we used the software Eviews to determine the econometric model that describes the connection between the two indicators, using CMMP method as a tool to estimate the parameters of this model. The results can be summarized as follows:

Dependent Variable: GDP				
Method: Least Squares (Gauss-Newton / Marquardt steps)				
Date: 02/13/17 Time: 16:47				
Sample: 1990 2016				
Included observations: 27				
GDP=C(1)+C(2)*CF				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	70.01214	2.378845	29.43115	0.0000
C(2)	0.000191	8.04E-06	23.70633	0.0000
R-squared	0.957410	Mean dependent var	111.6501	
Adjusted R-squared	0.955706	S.D. dependent var	39.61048	
S.E. of regression	8.336454	Akaike info criterion	7.150340	
Sum squared resid	1737.412	Schwarz criterion	7.246328	
Log likelihood	-94.52959	Hannan-Quinn criter.	7.178882	
F-statistic	561.9900	Durbin-Watson stat	0.453278	
Prob(F-statistic)	0.000000			

### The results of the estimation of the regression model parameters

Analyzing the results previously obtained, it helps us to note that the probability associated with the model, mainly reflected in the values of determination test report and helped determination report, is very high – approximate 95.7%. In this example, final consumption,  $x$ , explains the variation GDP,  $y$ , at a rate of 95.7%. We can consider that we are dealing with a correct regression model, allowing a good estimate of the evolution of the indicator subject to research.

The validity of this regression model is confirmed by the values of F–statistic test and F-statistic Prob test. How F-statistic = 561.999 - value considerably higher than the table level which is considered to be an index in the availability analysis of econometric models, the value of F statistics and  $t$  corresponding to regression slope verifies the relation  $t^2 = F$  and F-statistic Prob = 0 < 0.05, we can accept that the chosen model can well adapt sample data and can be used to analyze the dependence between variables.

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For each independent and constant variable and Eviews reports the standard value of the coefficient, t-Statistic test and the probability associated with it.

Working at 5% level of relevance, as the probability attached to t-statistic test is lower to this level for final consumption, then the coefficient is considered statistically significant. Free term coefficient is not significant because the probability attached to t-statistic test is far above the threshold of 5%.

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

$$\text{GDP} = 70.01214 + 0.000191 \cdot \text{FC}$$

Thus, we can say that with the increase with one million lei of final consumption, GDP will grow by 0.000191 million lei, hence the existence of a direct link between the two variables studied.

The correlation coefficient indicates a direct and high intensity connection between the two variables.

### Conclusions

GDP is influenced decisively by the final consumption. The parameters of the estimated regression model demonstrate that the Romanian economy in the last twenty years has been based almost exclusively on stimulating consumption and less on promoting an accurate investment policy. Final consumption growth is directly correlated with economic growth, measured by the macroeconomic indicator - GDP. The elevated value of the constant term leads to the assertion that the indicators that are not part of this regression model contributes in a significant manner on the evolution of the main macroeconomic aggregate - GDP.

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