

Analysis of Gross Domestic Product Evolution under the Influence of the Final Consumption

Constantin ANGHELACHE

Bucharest University of Economic Studies, Romania
„Artifex” University of Bucharest, Romania
actincon@yahoo.com

Diana Valentina SOARE

Bucharest University of Economic Studies, Romania
dianavalentinadumitrescu@yahoo.com

Marius POPOVICI

popovicidumitrumarius@gmail.com
Bucharest University of Economic Studies, Romania

Abstract. *This paper will focus on the possible correlation between the evolution of the final consumption and the dynamics of the Gross Domestic Product. The authors have applied the linear regression method in order to draw a coherent model, whose parameters were tested by using proper instruments.*

Keywords: consumption, influence, Gross Domestic Product, variable, regression.

JEL Classification: E21, E22.

1. Introduction. Literature review

We shall demonstrate the existence of the correlation between the macroeconomic indicator Gross Domestic Product and the exogenous variable, final consumption, through the simple linear regression model, during the period 2003-2013. Through this method of regression we shall be in the position to observe the way in which the macroeconomic variable, final consumption, defined as being the independent or exogenous variable, has an impact on the evolution of the variable Gross Domestic Product, defined as dependent or endogenous variable.

In this respect, we shall analyze the way in which the main indicator of outcomes of Romania is influenced by the independent variable, the final consumption, taking into consideration as statistical interval the period 2003 -2013. We shall submit succinctly the evolution of the consumption during the last decade aiming to observe afterwards the correlation of the final consumption with the macroeconomic indicator of outcomes, the GDP.

Anghelache (2014) covers the economic status of Romania economy at the middle of the year, including a detailed analysis of the GDP. Balacescu and Zaharia (2011) have developed a simple linear regression model that emphasizes the correlation between the Gross Domestic Product and the final consumption, while Anghelache, Manole and Anghel (2015) apply multiple regression to reveal the combined influence of final consumption and gross investments on Romanian Gross Domestic Product. Mihailescu, Capatina and Burghelea (2015) develop some scenarios of economic growth for Romania. Anghelache (2008) is a comprehensive theoretical and practical reference for macroeconomic studies and analyses.

2. Research data and methodology

In order to represent the linear regression model, we considered the final consumption as being the exogenous variable, while the Gross Domestic Product has been considered as being the endogenous variable. According to the above explanations, the equation of the simple regression is set up as:

$$\text{GDP} = a + b \text{ FC}$$

In econometric acceptance, the represented model must include also the residual variable, interpreted as a possible statistical error or the so-called difference existing between the values obtained through theoretical methods and those measured at the level of the real economy. Under the circumstances, the equation will become:

$$\text{GDP} = a + b \text{ FC} + u, \tag{1}$$

where:

GDP – the Gross Domestic Product → endogenous variable;

CF – the Final Consumption I → variable exogenous;

a, b – the parameters of the linear regression model;

u – the residual variable of the linear regression model.

In order to establish practically the parameters of the linear regression model, we shall consider the dataset that covers evolution of the macroeconomic indicators GDP and FC in our country during the last ten years. The dataset is made up of information published by the National Institute of Statistics, the indicators values being expressed in million euro.

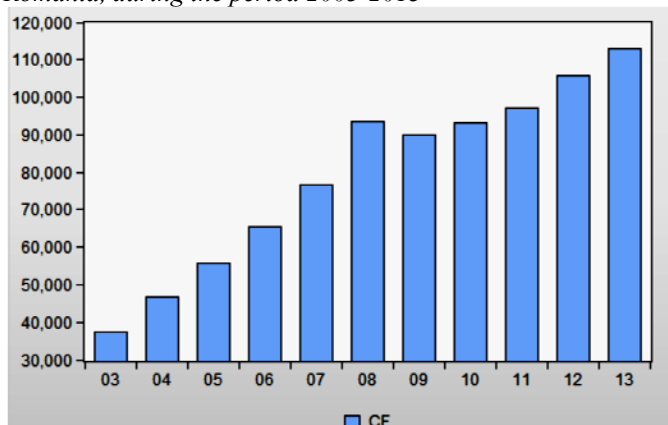
3. Data analysis

In order to extend the analysis of the correlation of the two indicators, the independent analysis of the evolution of the two variables is required at a first stage, followed by emphasizing the correlation by means of different methods and statistical tests, as previously done.

Both the tests and the implemented statistical-econometric models are achieved with the assistance of the informatics soft Eviews 7.2.

Thus, the graphical representation of final consumption evolution, as a result of informatics processing of the data basis underlined above, we get in Eviews 7.2, the following graph:

Figure 1. *The Eviews graphical representation of the evolution of the final consumption in Romania, during the period 2003-2013*



As noticeable out of the previous Figure, the evolution of the final consumption in Romania is showing a strongly up warding trend, particularly for the period of the last two years, when the final consumption recorded increases of 9 %, for the year 2012, as against 2011, respectively 6.85 % if considering the year 2013, comparatively with 2012.

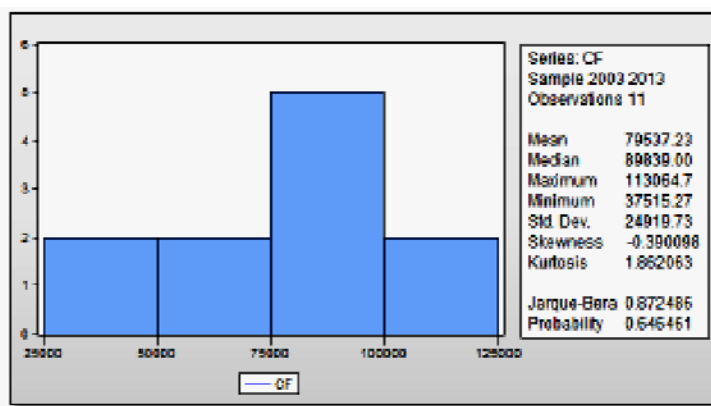
If considering the parallel evolution of the two analysed indicators, the Gross Domestic Product, respectively the evolution of the final consumption represented in the previous Figure, we notice major similarities, a fact which enables us to allege one more, that between the indicators subject of the s analysis there is a very close correlation.

An exception to the above statements in respect of the increase of final the consumption in Romania, is given by the period after the economic boom of 2008 when, due to the

economic-financial crisis, the market faced a shortage of liquidities generated by the massive dismissals as a result of the withdrawal of a significant mass of foreign investors from the territory of our country.

As a matter of fact, from a graphical point of view, we notice similarities connected with their tendency, between the evolution of the sold of the direct foreign investments and the evolution of the final consumption.

Through the statistical tests achieved in Eviews 7.2, on the final consumption in Romania, during the period 2003-2013, the results represented in the following figure have been obtained:



Out of the achieved statistical tests, we notice that the average of the final consumption over the last ten years counted for approximately 79,537.23 million euro.

Meantime, it is noticeable that during the analysed period, respectively 2003 - 2013, the point of maximum is represented by the final consumption recorded in the year 2013, amounting 113,064.70 million euro.

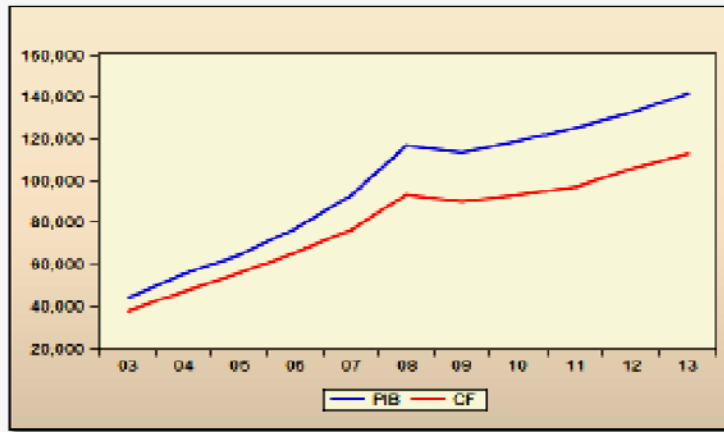
The variation interval of the final consumption is comprised between minimum de 37,515.27 million euro, sold recorded in the year 2003 and the maximum level of 113,064.70 million euro, recorded by the end of the year 2013.

Similar to the case of the analysis of the GDP evolution, we remark that the distribution of the final consumption is not quite symmetric, the Skewness test indicating the same type slope of the distribution to the right, a fact confirmed also by the concentration of the values recorded by the final consumption within the interval comprised between the minimum of 37,515.27 million euro and the average of the analysed data series, counting for approximately 113,065 million euro.

The Kurtosis test is indicating the same type of distribution, platykurtic, having more recorded values dispersed around the average, as underlined by the Skewness test as well.

Based on the obtained outcomes, we can allege that between macroeconomic evolution of the two indicators subject of the analysis, the Gross Domestic Product and the final consumption recorded over the last ten years, there was a perfect correlation between.

The graphical representation of the evolution of the macroeconomic indicators shows as follows:



Out of the previously submitted analysis, we can strongly allege that the two analysed macroeconomic indicators, GDP respectively the final consumption, have a correlated evolution, which is confirmed by the accomplished statistical tests, showing a high enough degree of similarity from the point of view of the outcomes and, implicitly of the macroeconomic evolution.

Thus, we can conclude that during the period 2003-2013, the evolution of the final consumption in Romania is influencing significantly the evolution of the Gross Domestic Product.

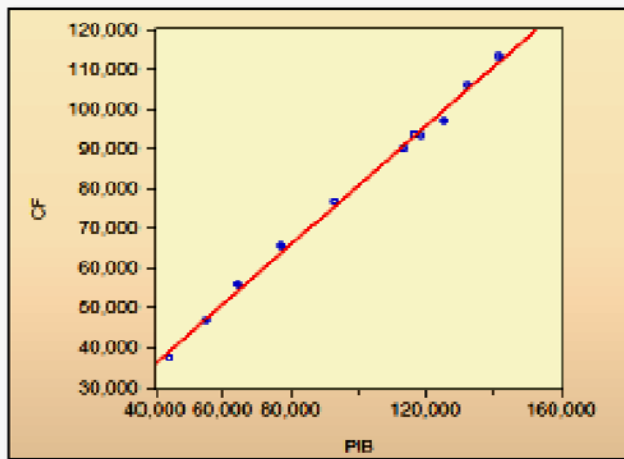
In order to get a second confirmation of the previous conclusion, with the assistance of the informatics soft Eviews 7.2, we made the Pearson correlation, another test aiming to point out the correlation between the two macroeconomic indicators.

Out of the graphical representation submitted bellow (Figure 2), it can be noticed that between the two macroeconomic indicators subject of the analysis there is a very strong connection.

Thus, the pairs of points graphically represented are obviously building up the trajectory of a line, which allows us to allege that it is very probable that the simple linear regression model may emphasize the same type of correlation between GDP and the final consumption.

In order to set up the parameters of the simple linear regression model, we shall apply the least squares method. Thus, aiming to estimate the parameters of the regression model, we shall apply this time as well to the statistical soft Eviews 7.2, through which we built up the equation where the Gross Domestic Product (*GDP*), is representing the resulting variable, or endogenous, while the final consumption (*FC*) is representing the factorial variable, or exogenous, similarly to the submitted analysis of the evolution of the GDP and the sold of the direct foreign investment.

Figure 2. The correlation Person established between the macroeconomic indicators GDP and final consumption



Meantime, in the frame of the linear regression model, we considered the residual variable "c". Based on the previous explanations and by processing the data bases individually analysed, we get the following statistical outcomes (Figure 3):

Figure 3. Econometric model econometric of analysis for the correlation GDP – final consumption

Dependent Variable: GDP					
Method: Least Squares					
Date: 05/23/15 Time: 14:45					
Sample: 2003 2013					
Included observations: 11					
Variable	Coefficient	Std. Error	t-Statistic	Prob.	
CF	1.339047	0.027032	49.53550	0.0000	
C	-8091.673	2243.940	-3.606011	0.0057	
R-squared	0.996346	Mean dependent var		93412.40	
Adjusted R-squared	0.995940	S.D.dependentvar		33429.82	
S.E. of regression	2130.211	Akaike info criterion		18.32880	
Sum squared resld	40840180	Schwarz criterion		18.40114	
Log likelihood	-98.80837	Hannan-Qulnn enter.		18.28319	
F-statstlc	2453.765	Durbin-Watson stat		1.029373	
Prob(F-statstlc)	0.000000				

We must confirm this time as well the validity of the regression model so that we know whether the obtained outcomes through its intermediary can be used in practice, for real macroeconomic analyses.

As we can remark, the probability that the represented model is correct ad valid is high enough. Thus, the tests R-squared, with a value of 0.9963 and Adjusted R-squared, which is recording 0.9959, are indicating a better outlined correlation and confirm meantime the validity of the regression model.

The validity of the regression model is also confirmed by the values of the tests F-statistic and by the null risk degree, evidenced by the test Prob (F-statistic).

Taking into account the analysis previously achieved, we can continue with defining the regression model representing the correlation between the two analysed macroeconomic indicators, the Gross Domestic Product and the final consumption, considered as being correct and valid from economic point of view.

Hence, the simple linear regression model is presented in the form:

$$\text{GDP} = 1.3390 * \text{CF} - 8\,091,67 \quad (2)$$

Through this regression model we can set up certain aspects concerning the relation between the two macroeconomic indicators.

Out of the simple linear regression model, previously transposed, (equation 2), it can be observed that there is a very close relationship between evolutions of the Gross Domestic Product and the final consumption in Romania, during the analyzed period, respectively 2003-2013.

Thus, it can be alleged that the increase by one monetary unit of the final consumption would entail generate the increase by 1.3390 EUR of the Gross Domestic Product.

The situation previously submitted underlines the fact that the economy of Romania is grounded to a very large extent on the stimulation of the consumption, this indicator playing a particularly significant role in the process of economic growth of our country.

The regression model submitted above is not entirely complete without mentioning that the free term, or the residual variable c , which is recording a negative value of - 8091.67 EUR, is representing those factors not considered by the present analysis, which exercise a negative influence on the evolution of the Gross Domestic Product (Figure 3).

Conclusions

Here we have to emphasize the fact that presently, in Romania it is strongly required to implement certain fiscal policies meant to avoid as much as possible the potential actions which might generate the diminishing of salaries or dismissals (if considering the public sector) since this kind of actions would have a negative impact on the consumption evolution.

Taking into consideration the previously achieved analysis, we can conclude that the Gross Domestic Product of Romania is influenced to a very large extent by the impact of the sold of the evolution of the final consumption but we must keep in mind that the process of economic growth is encouraged only thorough the acceleration of the flows of foreign capitals drawn in economy.

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