ANALYZING THE CORRELATION BETWEEN GDP AND IMPORT USING A STATISTICAL-ECONOMETRIC MODEL

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Abstract

In order to analyze the correlation between GDP increase as a result of exports, it is relevant to make a similar analysis regarding their effect on GDP evolution. It a known fact that beginning with 1990 up to the present, exports have been fewer than imports. There are many explanations but we shall mention just few of them. First of all, by narrowing down the structure of domestic production, Romania felt the need to realize imports with two directions. The first would be the direction towards completing the quantity of imports, where economic processes of goods and services production needed additional values. The second direction of imports would be that a series of imports completed the consumption need of population.

Key words: *evolution, population, GDP, import, econometrics*

Introduction

A critical study of realized imports would emphasize the fact that some imports (the ones which complete) are strictly necessary to realize economic activities of production, and others, those for consumption, determined the reduction of domestic productions. In the game of market prices, many imports, being cheaper, determined the massive entry on the Romanian market, which discouraged local producers to make efforts to increase production. On the other hand, in the present economic situation of Romania there are very few fields in which Romania to be market leader in Europe or on a larger scale in the world.

Literature review

Andrei (2008) is a reference work for econometric instruments, including dedicated software systems, Anghelache and Anghel (2014) describe the instruments of economic modeling, Baltagi (2001) emphasizes the econometric analysis of a dataset. Anghelache, Anghel and Popovici (2016) analyze the Gross Domestic Product of Romania in 2015, Anghelache and Anghel (2015) focus on the use of statistic-econometrical instruments in the study of GDP. Boshnakov and Iqelan (2009) analyze time series with certain properties. Fox and Dodge (2012) is a referentece work for the study of economic systems. Hamilton, Waggoner and Zha (2007) study the normalization in econometrics. Mazurek (2013) realizes a comparative analysis of GDP growth across European states, during the period 2008-2012. Phillips and Sul

(2003) approach the testing of homogeneity. Vernon (1996) analyzes the international investments and trade in the product cycle.

Research methodology and data

All this considered, we conceived a model in which GDP is the result variable, and imports represent a factorial variable. We mention the fact that the indicators which will be obtained will reveal the fact that imports increased from one period to another at a certain rate, it is true, slower than in the previous periods, but the effect on GDP increase is negative. In other words, a part of the accomplished values in the domestic activity should be used in realizing imports, of all categories, which, by calculating the indicator Export Net (exports-imports) diminished the value of GDP every time. In this sense, the function we can apply is simple. After We established the function of the model (PIB=a+bImp+**ε**), we have proceeded to statistic analysis, using the series of data for 1990-2015 period.

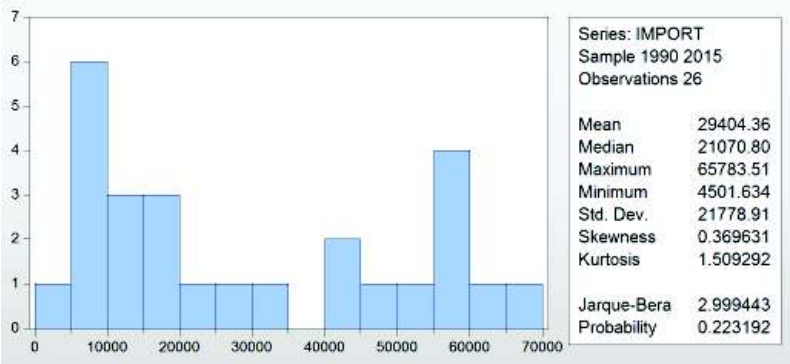
GDP and Import Evolution in 1990-2015 period

Year	PIB (million euro)	Import (million euro)
1990	24231,1	4501,6
1991	25071,2	5190,3
1992	25925,6	5957,4
1993	26824,6	6805,4
1994	27676,9	7750,9
1995	28763,0	8766,0
1996	29228,7	9966,1
1997	31683,6	11010,2
1998	37313,9	11424,1
1999	33942,7	10936,9
2000	40796,8	15501,6
2001	45503,5	18447,0
2002	48810,4	19926,7
2003	52931,0	22214,9
2004	61404,0	27372,1
2005	80225,6	34512,3
2006	98418,6	43296,7
2007	125403,4	54484,0
2008	142396,3	57222,5
2009	120409,2	40676,1
2010	126746,4	48724,8
2011	133305,9	56537,9
2012	133511,4	56659,0
2013	144253,5	58457,2
2014	150230,1	62388,2
2015	155938,8	65783,5

Source of data: Statistic Annury of INS şi EUROSTAT.

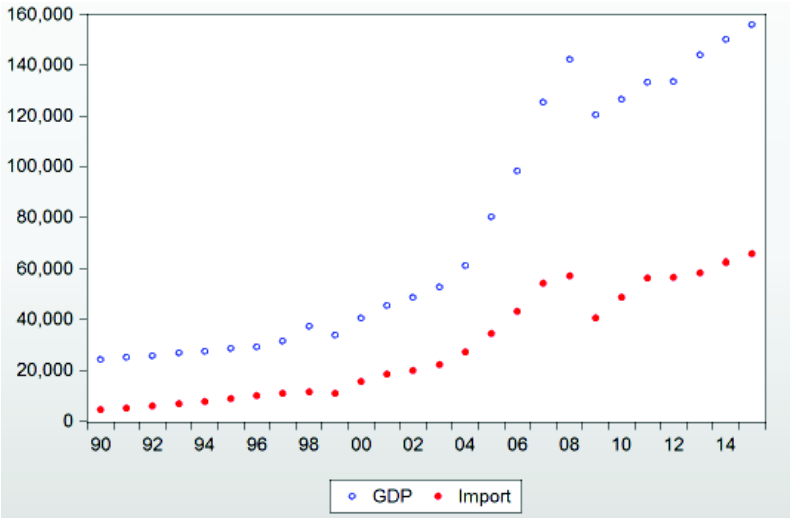
Data were taken over and statistical methods (interpolation) were applied to complete the statistical series

Main statistical tests realised on the evolution of imports in Romania in 1990-2015 period



From previous chart in which we presented the result of the main statistical tests on the evolution of imports, we infer that the annual average figure of imports was of 29404,36 milions of euro. There is a considerable variation between the minimal value of 4501 milions of euro srecorded in 1990 and the maximal value of 65783,51 milions of euros recorded in 2015. This was probably due to the fact that the realisation of direct foreign investments involved many imports which should be somehow correlated with the results of exports realised by companies which benefited from direct foreign investments. Is is nonetheless a complete and compex analysis which would give results but, taking into consideration the objective of this paper, we only emphasise the aspects which have result from the applied statistical tests.

Correlogram of GDP and Import



Considering the grahical representation (corelograma) of the cloud of dots determined by the evolution of the two considered indicators, we may draw several conclusions. The first one is that the increase tendency is somehow similar, in the sense that once the imports have increased, the value of GDP increases. Here we have to mention the fact that GDP increased based on other influential structural factors and imports diminished somehow the absolute value of GDP indicator. On the other hand, the evolution of imports may be influenced by the increase in the direct foreign investments. It is natural that an increased value of FDIto imply an increase in imports but they are useful to national economy as they contributed to an increase in production, which was exported to a great extent, leading this way to an increase in GDP.

When analysing the strcture of imports, analysis can go further by considering their structure, in the sense that they were used to complete the activity of production or they were used for consumption.

Results of the estimation of regression parameters

Dependent Variable: GDP
Method: Least Squares (Gauss-Newton / Marquardt steps)
Date: 10/10/16 Time: 18:14
Sample: 1990 2015
Included observations: 26
GDP=C(1)+C(2)*IMPORT

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	8916.779	2067.996	4.311796	0.0002
C(2)	2.248633	0.056905	39.51572	0.0000

R-squared	0.984863	Mean dependent var	75036.39
Adjusted R-squared	0.984232	S.D. dependent var	49347.68
S.E. of regression	6196.617	Akaike info criterion	20.37520
Sum squared resid	9.22E+08	Schwarz criterion	20.47197
Log likelihood	-262.8776	Hannan-Quinn criter.	20.40307
F-statistic	1561.492	Durbin-Watson stat	0.805684
Prob(F-statistic)	0.000000		

By using the regression function we mentioned, it resulted that there was a positive influence between GDP (value evolution) and the volume of imports.

So, we may write the regression function like:

GDP=8916,779+2,248633*IMPORT

We must mention the following: in the structure of the realized imports it is clear that most imports referring to FDI had a positive effect. It is possible for this effect to be greater if imports for consumption had been more temperate or more critically analyzed.

Conclusion

In the case of this regression function, the free term has a big value 8916,779, and the regression coefficient is 2,248633. In other words, by interpreting $R^2$and adjustedR^2 parameters which have values above 0,98, we may conclude that between the two characteristics there is a relation, in the sense, that imports have influence on GDP value. Nonetheless, the analysis may go further by using other statistical methods to emphasize the influence of structured imports on imports for development and imports for consumption but, for the purpose of this study, this interpretation is enough to demonstrate that econometric models may successfully be used in all macro-economic analyses.

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