THE IMPORTANCE OF GOODS PRODUCTION AND INTERMEDIATE CONSUMPTION FOR AN INCREASED GDP

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Abstract

Human existence is conditioned, of course, by the consumption of goods to meet the needs. Using the property to obtain other goods in this way is not consumption, but production. Goods that are the object of consumption can be natural or economic (created or produced by man). The natural goods that we can find in the human consumption, even if there are extremely important, there are not the subject of our attention because they are a gift of nature. In economics, the effect that a good is predicted to have during or after it is consumed is designated by the term of utility. In the context of a severe economic crisis, which determines a real sacrifice of consumer's wishes, under the impact of budgetary constraint, the utility and the consumer optimum suffer various modifications.

Increasingly limited resources and low incomes lead to more people sacrifices concerning the goods that they will consume, respectively purchase. So we consume less, we produce less, causing a reduction in GDP. The economical crisis, through its effects has changed the people consumption habitudes by editing it according to the available resources. Manufacturers, in the absence of profits will be forced to find new solutions to attract consumers.

The main objective of this paper is to highlight the relationship that exists between the consumption, goods and services production and GDP. In terms of economics, the goods and services production and intermediate consumption directly influence GDP, as two independent variables and dependent GDP. We performed a simple regression model based on a series of data in Romania, during 1995-2009, to evidence the importance of the two independent variables in obtaining an increased GDP.

Keywords: goods and services production, intermediate consumption, increased GDP, budgetary constraint, economical crisis.

1. Introduction

Man and society, to exist, are forced to satisfy the needs and because nature provides readymade only a little of the necessary, they must ensure all the others. The activities of all kinds through which people achieve the necessary form economic activity or economics. In essence, these are acts or transactions that are exercised by the people and nature together forming together the economy (of one area, one country, one region etc..). What causes people to act economically are: insufficient resources that nature provides ready-made, the needs while in time are growing and diversifying.

Needs are demands determined by the nature or by the social life. They represent the aspirations, expectations or human's unfulfilled desires. The needs nature and intensity are different in time and space. There are individual, collective and social needs; they are felt by each person in every way and in different intensities; the needs are different both in terms of how we perceive them and how to meet them. In comparison with the limited means the people have to meet their needs, they are much bigger and different and tend to grow and diversify quickest than the means of satisfying them. Resource limits are permanent but fluctuating in time.

Resources are the means of any kind which serve to satisfy needs or, depending on the progress of science, art and technology, are likely to serve this purpose. They are designed as both consumption and production (economic activities). In essence, resources are assets. Some resources are used directly in individual consumption, others are used in economic activities and there is another category used to make resources reserves.

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2. The dependence between GDP and goods production and intermediate consumption

Simple regression model is concerned with describing and evaluating the relationship between a dependent variable and one or more independent variables. Analyzed using regression functions, called regression functions, how the variable outcome (dependent) evolves in relation to changing one or more known variables (independent). The general form of the simple regression model: $f(x) = \alpha + \beta x$, where α , β are the parameters of linear regression function. If addiction is a stochastic, then: $y = f(x) + \varepsilon$, where ε is called error of significance and has a known probability distribution - is a random variable.

We created a simple regression model through which we tried to explore one of the most important economic aggregates, namely GDP. For this application we chose the GDP calculated by the method of production. In the application GDP calculated by the method of production is denoted by PIB_PR, representing the dependent variable. Through this application we tried to analyze the influence the production of goods and services (PBS) has on GDP calculated by the method of production. So in other words independent variable, the dependent variable is influencing the production of goods and services, denoted by PBS.

We defined a simple regression model, in which the estimated variable is represented by PIB_PR and explanatory variable is PBS. Of course GDP calculated by the method of production is also affected by other variables such as intermediate consumption, for example, the variable will be analyzed in another application, also through a simple regression model. We could estimate the dependence using a multiple regression model, but we want to show each independent variable influence on GDP, separately.

The decision to analyze the relationship between GDP by production method and the actual production of goods and services was taken from the study of two macroeconomic reference books. Depending on the method that underlies its determination, the GDP can be defined in three ways: GDP by production approach, GDP by expenditure approach and the income approach GDP. GDP represents the value calculated by the method of production of goods and services for final consumption, intermediate consumption being excluded, within a country, is a flow variable representing the sum of gross value added (GVA) carried out within the national economy, the rule of GDP site calculated at market prices, which include indirect taxes and excise taxes. In other words, we can observe other variables that influence the dependent variable in our model.

Simple regression model is widely used in applications of economic theory, but we chose the model application to the existence of a linear relationship between PIB_PR and PBS. As mentioned above, is PIB_PR represents GDP calculated by the method of production, explained variable, and PBS is the production of goods and services, representing the explanatory or independent variable. The model has been defined by the following equation:

PIB_PR $i = bi + a PBS + \varepsilon i$,

- ✓ PIB PR GDP calculated by the method of production the dependent variable;
- ✓ PIB PRi GDP share calculated by the method of production;
- \checkmark PBS production of goods and services independent variable;
- ✓ PBSi production of goods and services share;
- ✓ a, b model parameters;
- ✓ ε = residual variable;
- ✓ i = 1.....15

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This model is analyzed by simple regression model in conditions which we do not specify the existence of other exogenous variables on which the GDP by production method depends. In the conduct of the research, I needed more data series. Thus, we sought statistical databases on various specialized websites, especially the annual statistical yearbooks.

To determine the previous econometric model, by estimating two parameters, bi and a, there are needed real data sets for the two variable PIB PRi and PBSi. The data series used are those for GDP and production of goods and services, imported after processing in Excel and displayed in the table. 1. Data series are designed for a total of 15 years, from 1995 until 2009, so there are 15 observations, $i = 1 \dots 15$.

	Table 1 – GDP by production	method an	nd production	of goods	and	services	evoluti	on
from	1995 until 2009, in Romania							

AN	PIB_PR	PBS	
1995	7648,9	16004	
1996	11384,2	25354,4	
1997	25529,8	54366,2	
1998	37055,1	71346,2	
1999	55191,4	108872	
2000	80984,6	156917,5	
2001	117945,8	228796,5	
2002	152017	295622,9	
2003	197427,6	381863,6	
2004	247368	483917,4	
2005	288954,6	547894,3	
2006	344650,6	656511,9	
2007	416006,8	784007,5	
2008	514700	985670,9	
2009	491273,7	943867,3	

Source: National Statistic Institution, www.insse ro

Data on GDP and the production of goods and services have annual frequency refers to Romania during 1995-2009, and did not need any transformation. Units of measurement for both variables are million. The two data sets are used to calculate descriptive indicators, development of graphics and statistical estimation. To obtain the required characteristics of the original series regression model requires no additional processing in this case.

Based on the data series can make graphics for data interpretation. Depending on the measurement scale that is each feature, we can calculate a number of descriptive indicators, such as average, minimum and maximum outliers, alternative indicators to describe and characterize the shape distribution. These indicators can be calculated separately for each variable or several variables simultaneously. Equally, we can develop and histogram.



Figure 1: PBS evolution from 1995 until 2009 Figure 2: PIB_PR evolution from 1995 until 2009

For a better illustration of the evolution of both explained and explanatory variables we created the following graph:



Figure 3: PIB_PR and PBS evolution from 1995 until 2009

After elaborating the histogram we can say that the two variables are highly dependent on one another, PBS greatly influencing PIB_PR, demonstrated by Adjusted R-squared that shows that the variation of the dependent variable is explained by the model rate of 99.97%. This shows the dependence between two variables.

Figure 4: PIB PR vs. PBS



Following the interpretation of these results, the variation of GDP calculated by the method depends on the production rate of 99.97% in the production of goods and services. GDP by production approach is equal to 0.525499 x PBS - 1917.091. This equation reveals that between 1995 - 2009 minimum production of goods and services was 1917.091 million annually.

We can see that the parameters are significantly different from zero, so that when p = 0, F is 62809.83, so the model is valid. So we can say that the production of goods and services determine a rate of 99.97% variation PIB_PR.

Since the dependence between the independent and dependent variable in the model analysis, we conducted other tests on the explanatory variable. So we conducted an analysis to see if PBS is normally distributed.

Empirical Distribution Tes				
Sample: 1995 2009				
Included observations: 15				
Method	Value	Adj. Value	Probability	
Lilliefors (D)	0.149528	NA	> 0.1	
Cramer-von Mises (W2)	0.077164	0.079736	0.2089	
Watson (U2)	0.071135	0.073507	0.2186	
Anderson-Darling (A2)	0.522227	0.553560	0.1535	
Parameter	Value	Std. Error	z-Statistic	Prob.
MU	382734.2	86634.77	4.417790	0.0000
SIGMA	335535.0	63410.16	5.291503	0.0000
Log likelihood	-211.6363	Mean dependent var.		382734.2
No. of Coefficients	2	S.D. depender	S.D. dependent var.	

Table 2 - Empirical Distribution Test for PBS

We used the method of least squares for **PIB_PR** $\mathbf{i} = \mathbf{bi} + \mathbf{a} \mathbf{PBS} + \varepsilon \mathbf{i}$ and got:

Dependent Variable: PIB	PR			
Method: Least Squares				
Sample: 1995 2009				
Included observations: 15				
	Coefficient	Std. Error	t-Statistic	Prob.
PBS	0.525499	0.002097	250.6189	0.0000
С	-1917.091	1051.675	-1.822892	0.0914
R-squared	0.999793	Mean dependent var		199209.2
Adjusted R-squared	0.999777	S.D. dependent var 176341.4		176341.4
S.E. of regression	2632.447	Akaike info criterion 18.71278		

Table 3 - Method: Least Squares

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Sum squared resid	90087116	Schwarz criterion		18.80719
Log likelihood	-138.3459	Hannan-Quinn criter.		18.71178
F-statistic	62809.83	Durbin-Watson stat		1.854276
Prob(F-statistic)	0.000000			
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After the calculations are done we can observe:

• regression slope value is 0.525499, statistically lower than 1, which show a marginal propensity to product; if the slope is less than 1, it has a marginal propensity to production, the slope is positive, so the parameters are significant and is a significant dependence between variables, it showed also by the value of R-squared, which is 0.999793, an addiction of 99.97% between the two variables analyzed;

• PBS coefficient and C coefficient is different from zero, rejecting the null hypothesis, t-statistic evaluation (high in both cases) and P-value equal to 0;

• Between the value of F statistics and t, which corresponds to the regression slope, check that relationship, t2 = F (250.6189 squared = 62809.83).

• From small values of the calculated probabilities and from those of t student statistics we reject the null hypothesis and conclude that the parameters are significant.

• The value of Adjusted R-squared shows that the dependent variable variation is explained 99.97% by the model.

• F test or Fisher Test has more meanings: F-statistic has a high value, of 62809.83, and the probability calculated for F-statistic is 0, so our regression model is correct, confirmed by the R-squared and Adjusted R-squared, which have values close to 1.

• R squared/Adjusted R shows the dependent variable variation R squared = 0.999793, which means that PBS explain 99.97% of PIB PR variation;

• Durbin Watson test - we can verify the hypothesis of autocorrelation. It is better if this value is close to "2", because the relationship with first order autocorrelation coefficient r or $\rho = DW = 2$ (1-r). The coefficient measures the connection / correlation / dependency between two variables. The value of Durbin Watson statistic is 1.854276, close to 2, which indicates that errors are independent and leads to the conclusion that the dependency equation is correctly specified.

Predicted values of GDP if the production will be 940,000.0, 900,000.0, and 950,000.0 in the next three years are presented in Figure 5. To this end we have covered these steps:

- We resized the data series by introducing three values for the following 3 years, range from 15 to baseline values will be 18 by the command: proc / structure / resize, we introduced the three prospective data;

- We expected the three values of GDP, depending on the values set for the production forecast command. In our case we obtain the following chart:



Upon implementation of this process, we can see that the dependency relationship between two variables is very close. On a fall PBS, GDP will register a decrease and an increase in the explanatory variable, will be its growth. In other words we can conclude that the two variables are directly proportional, increasing and decreasing in the same way.

Our model was made also for the intermediate consumption. We created the same model, where the only difference was the explanatory variable, which was the intermediate consumption. We used the data from the National Statistic Institute for the same period and we got the following results. We started our analysis based on the following equation:

PIB PR i = bi + a CI + ε i,

- ✓ PIB_PR GDP calculated by the method of production the dependent variable;
- ✓ PIB_PRi GDP share calculated by the method of production;
- \checkmark CI intermediate consumption independent variable;
- ✓ CIi intermediate consumption share;
- ✓ a, b model parameters;
- ✓ ε = residual variable;
- ✓ i = 1.....15

The results are presented in Table 4.

Table 4 - Method: Least Squares

Dependent Variable: PIB_PR				
Method: Least Squares				
Sample: 1995 2009				
Included observations: 15				
	Coefficient	Std. Error	t-Statistic	Prob.
	Coefficient	Std. Error	t-Statistic	Prob.

CI	0.987052	0.005935	166.3173	0.0000
С	-3225.837	1590.667	-2.027978	0.0636
R-squared	0.999530	Mean dependent var		199209.2
Adjusted R-squared	djusted R-squared 0.999494 S.D. dependent var		/ar	176341.4
S.E. of regression	3966.241	Akaike info criterion		19.53259
Sum squared resid	2.05E+08	Schwarz criterion		19.62700
Log likelihood	-144.4944	Hannan-Quinn criter.		19.53159
F-statistic	27661.43	Durbin-Watson stat		2.189366
Prob(F-statistic)	0.000000			

After the calculations are done we can observe:

• regression slope value is 0.987052, statistically lower than 1, which show a marginal propensity to consumption; if the slope is less than 1, it has a marginal propensity to consumption, the slope is positive, so the parameters are significant and is a significant dependence between variables, it showed also by the value of R-squared, which is 0.999530, an addiction of 99.95% between the two variables analyzed;

• CI coefficient and C coefficient is different from zero, rejecting the null hypothesis, tstatistic evaluation (high in both cases) and P-value equal to 0;

• Between the value of F statistics and t, which corresponds to the regression slope, check that relationship, t2 = F (166.3173 squared = 27661.43).

• From small values of the calculated probabilities and from those of t student statistics we reject the null hypothesis and conclude that the parameters are significant.

• The value of Adjusted R-squared shows that the dependent variable variation is explained 99.95% by the model.

• F test or Fisher Test has more meanings: F-statistic has a high value, of 27661.43, and the probability calculated for F-statistic is 0, so our regression model is correct, confirmed by the R-squared and Adjusted R-squared, which have values close to 1.

• R squared/Adjusted R shows the dependent variable variation R squared = 0.999530, which means that CI explain 99.95% of PIB PR variation;

• Durbin Watson test - we can verify the hypothesis of autocorrelation. It is better if this value is close to "2", because the relationship with first order autocorrelation coefficient r or $\rho = DW = 2$ (1-r). The coefficient measures the connection / correlation / dependency between two variables. The value of Durbin Watson statistic is **2.189366**, more than 2, which indicates that errors are independent and leads to the conclusion that the dependency equation is correctly specified.

3. Conclusions

Production method - determine GDP as the sum of gross value added (GVA) of final goods (whose production was completed) completed a given period, usually one year. Capital consumption for the production of new goods of any kind is not included in GDP and is called Intermediate consumption.

Economic growth is the process by which economic activities taken in their assembly in a country produce more goods. It is apparent from the upturn in macroeconomic variables or aggregates and especially of the GDP, GNP and VN - both at country level and per capita. In reality there may be an increase in GDP in the country but a decrease in GDP per capita for the population

grew faster than production. When the results of economic activity (GDP) and population increase at the same rate so that the results of per capita (GDP / capita) remains constant we deal with zero growth. This latter type of growth is the expression of the inability of existing resources in terms of economic policy and population growth to meet needs. As we can see, GDP represents the most important aggregate for an economical growth.

We tried to explain the dependency between GDP and production, and GDP ad Intermediate consumption. As we can see in this analyze, if we want an economical growth we have to stimulate the production and the intermediate consumption. Stimulating these two variables, we will stimulate the growth of GDP. This relative, of course, because here we talk about the GDP calculated through production method.

The logic of the capitalist economy (market) growth is, first, aggregate supply source but by its very nature induces the formation of a very large part of aggregate demand as it needs inputs (machinery, equipment, raw materials, materials, etc..) and labor. Therefore, achieving economic growth has become a central goal of any economic policy. Obviously, economic policy starts from the premise of achieving economic growth based on economic potential, the exploitation of its opportunities at the highest level. In this respect, the starting point is therefore growth potential and the goal is potential GDP - the highest level of production that can be achieved over a relatively long or longer and not as an exception, in terms of stability prices and natural unemployment.

In reality the economies are often affected by economic fluctuations or increases in prices and worrying levels of unemployment which makes it impossible to use the full potential they have. Therefore policies should remember that real growth objective embodied in a certain level of real GDP that is not possible under existing concrete. The difference between potential and actual GDP is the potential production that can not be achieved due to which, through appropriate measures, could provide greater economic growth. Indicators of economic growth (GDP, GNP, VN) are quantities that are expressed in nominal and real value. In nominal terms, their values are calculated as current prices charged in the period, while in real terms are established by making use of constant prices or that is comparable to prices in an earlier period taken as a reference to remove influence of price increases during the calculation. Calculated in real terms remove the influence of price changes (increase or decrease them).

So as we can see, the analysi done in this paper shows the importance of knowing each variable and the proportion of influence, because then we can take the best policies of economical growth.

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