THE CORRELATION BETWEEN VALUE ADDED TAX AND ECONOMIC GROWTH IN ROMANIA

Ana-Maria Urîțescu, PhD student
Bucharest University of Economic Studies
Email: ana.uritescu@fin.ase.ro

Abstract:
The study aims to investigate the relationship between the revenues collected from the VAT and the GDP in Romania, for the period of 1993-2016. The interest in studying this relationship derives from the importance gained by this tax over the years and from the actuality of the economic growth in Romania. The methods used are: estimating a regression model and estimating the autoregressive vector model using Eviews 9. The regression model has the gross domestic as a dependent variable and as an independent variable the revenues from the VAT. The results obtained from the analysis indicates that there is a positive and direct relationship between the two variables and the variation of the GDP is explained by the revenues from the VAT.

Key words: VAT, economic growth, autoregressive vector, Granger causality

JEL classification: H20, C50

Introduction

The VAT is an indirect tax which has the objective of "delivering goods to third parties and for their own consumption, purchases of goods, services, imported goods"[3]. The importance of this tax is due to the fact that it is applied to most of the sale or purchase operations of goods and services and is also a tax introduced in both European Union and non-EU countries. The history of this tax began in France in 1954. It was invented by Maurice Lauré.

The VAT has become over time a major source of income for the country where it was introduced due to its way of application ("application of the tax rate: a) on the value added at each stage of the goods from the producer to the buyer; b) either on the sales price from that stage, thus obtaining the sales tax, which deducts the tax on the sale price from the previous stage")[4] and, at the same time, due to the scope.

In our country, the VAT was introduced in 1993. Until then it was preceded by the tax on the movement of goods. The standard quota was initially 18%. The maximum quota used in our country was 24%, and it was introduced in 2010, as a fiscal measure generated by the economic crisis in Romania. In 2016 the standard quota becomes 20%. Being a consumption tax, it has a direct relationship with the level of tax revenue and the growth rate.

[3] Vacarel I., 2006, "Public Finance", 5th edition , Bucharest, Didactic and Pedagogical Publishing House, p.417
[4] Vacarel I., 2006, "Public Finance", 5th edition , Bucharest, Didactic and Pedagogical Publishing House, p.417

Literature review

Studies on the impact of fiscal policy on the economic growth of a state have been made over time and it's still a topical issue. The fiscal policy can be applied in different forms. The impact of budgetary expenditure and budgetary revenues, the impact of consumption taxes and income taxes, or the impact of other taxes on economic growth has been analyzed over the years in different countries.

Alberto Alesina and Roberto Perotti performed an analysis of 20 OECD countries for the period 1960-1994 in terms of tax adjustments applied. They consider that household taxes and social security contributions have the greatest impact on unit labor costs. They study the effects of reducing the transfers and government salaries while household taxes are maintained or reduced.

William Easterly and Sergio Rabelo (1993), using historical data and recent cross-sections, highlights the relationship between fiscal policy variables, development level, and the growth rate. They conclude that there is a relationship between the level of development and the tax structure, so that income taxes have a bigger impact only in the economically developed countries, while the poor countries are based heavily on international trade taxes.

Iulian Viorel Braşoveanu (2009) in "Analysis of fiscal policy in Romania and EU Member States" studies the evolution of the main taxes in our country, the Romanian fiscality and the fiscality of EU states. The author highlights the changes which took place over the years and their importance in the economic development of the country. He mentions that the optimal fiscal pressure is the one that allows maximization of economic growth and that the fiscal systems represent the concrete manifestation of a state's fiscal policy, overall an essential coordinate of the national policies. Funded in accordance with the realities of economic and social life, a country's fiscal strategies can ensure its well-being and progress. Otherwise, they can cause stagnation or regression of the economy, can create social tensions.[5]

Aderati, S. A., Sanni, M. R, and Adesina, J. A (2011) have conducted a study regarding the VAT and the economic growth in Nigeria. Using as a base variable the revenues from the VAT and the GDP they have conducted an econometric study for the period between 1994 and 2008. Among the conclusions of this study, there is also the fact that between the revenues collected from VAT and the GDP there is a positive correlation. According to this study, any measures taken regarding the VAT or GDP become efficient in at least two years.

Ezeji E. Chigbu and Peter Ifeanyichukwu Ali (2014) conducted an econometric analysis of the impact of the VAT on economic growth in Nigeria. Using the Granger co-integration technique for data from 1994 to 2012, they demonstrate that VAT has a positive effect on the economic growth. The two consider that the state should be involved in increasing the contribution of the VAT to the economic growth.

Lawrence Kimuhu Njogu (2015) studying the effects of the value-added tax on economic growth in Kenya for the period 1990-2014 found that there was a negative relationship between VAT rates and economic growth. He believes that the state should reduce the VAT rate or maintain it at low levels to increase the country's gross domestic product.

Dasalegn Mosissa Jalata (2014) conducts a study on the role of the VAT in Ethiopia's economic growth. Using data between 2003 and 2012, it builds an econometric model in which the GDP is the dependent variable and the VAT, the total tax revenue, the non-tax revenue, and foreign earnings are

[5] Brasoveanu I. V., 2009, Analysis of fiscal policy in Romania and EU Member States, Bucharest, ASE Publishing House,

independent variables. The results of the regression show that all independent variables, except the foreign incomes, reach the significance level of 5%, but all the four dependent variables contribute to economic growth.

Farzana Lalarukh and Mohammad Salahuddin Chowdhury (2013) using data from 1991 to 2012 study the contribution of the VAT to GDP for Bangladesh. Using the Johansen co-integration technique they demonstrate that the VAT has a positive impact on both the gross domestic product and the economic growth of this country. The authors of the study believe that the VAT could be used by the state as an efficient instrument for generating revenues, given its positive impact on economic growth.

Gustavo Canavire-Bacarreza, Jorge Martinez-Vazquez and Violeta Vulovic (2013) in the study "Taxation and Growth in Latin America" analyze the impact of the most important taxes on economic growth in countries such as Argentina, Brazil, Mexico and Chile, using the autoregressive vector. The tax instruments studied are personal income tax, income tax, general taxes on goods and services, other sales taxes and income from natural resources. One of the study's conclusions is that VAT can have significant positive effects on economic growth in the studied countries, by increasing the dependence on this tax.

There are also studies proving a negative relationship between fiscal policy instruments and economic growth.

Rogoff K. and Carmen Reinhart made a study on the impact of public debt on growth rates and on the inflation. The findings of the study are that the high levels of public debt resulted from the recent financial crisis will inhibit global growth.

Roberto Perotti (2005), studying the effects of fiscal policy on GDP, inflation and interest rates in five OECD member countries, highlights that fiscal policy has little influence on GDP, government spending and tax cuts on GDP has become weaker over time.

Alberto Alesina and Silvia Ardagna are studying fiscal stimulus and fiscal adjustment in OECD member countries between 1970 and 2007. Fiscal stimulus based on tax cuts are more efficient in delivering economic growth than those based on higher spending. Fiscal stability based on higher spending is more difficult to achieve because spending can grow faster than tax revenue.

Methodology of research

Starting from the studies mentioned above and from the previous research, I have proposed in this paper to highlight the relationship between the GDP and the VAT in Romania. Data sources for this study were the National Institute of Statistics and the Ministry of Public Finance. Next, I will estimate a linear regression model that will have the GDP as a dependent variable, and as an independent variable the earnings from the VAT. At the same time, to highlight the relationship between the two variables I also used the autoregressive vector (VAR) method.

The data used are annual, expressed in millions of RON, between 1993 (the year in which value added tax was introduced in Romania) and 2016. The notations used are GDP for Gross Domestic Product and VAT for Value Added Tax. Estimation of the regression model and autoregressive vector model is done using the Eviews 9 program.

1. Regression model description

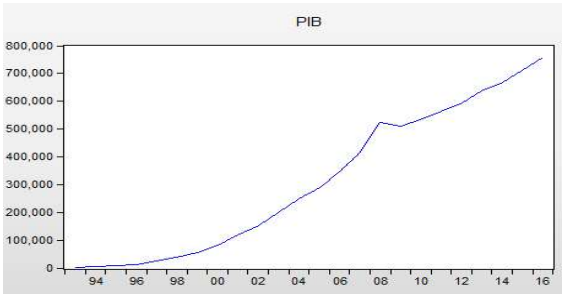
The unifactorial econometric model is of the form: $y = f(x) + \mu$, where y (the dependent variable) represents the gross domestic product for our country during the studied period, x (the independent variable) is the value-added tax and μ is the residual variable and denotes the influence of the other incidental factors and with a minor impact on the factor y. Thus, the econometric model is: $GDP = \alpha 0 + \alpha 1VAT + \mu$.

To achieve the results of the estimated model, I have completed several stages: establishing the null hypothesis, studying the data series, the graphical representation of data, descriptive statistics of the two sets of data, testing the correlation of data series, data processing, estimation model, interpretation of results.

The null hypothesis from which the econometric model has started is that VAT receipts do not affect GDP.

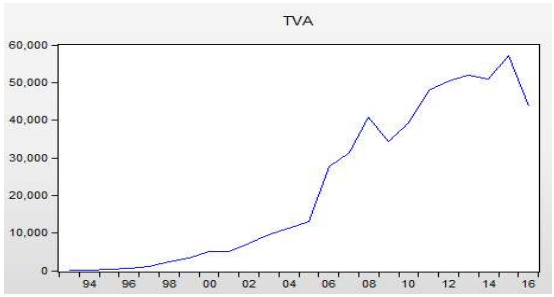
Before applying the econometric model, I analyzed the data by studying their evolution over the years. In the figures below are graphically represented evolutions of the two variables from 1993 to 2016.

Figure no. 1. The evolution of GDP during the period of 1993-2016



Source: own processing using Eviews 9

Figure no. 2. Evolution of VAT during the period of 1993-2016

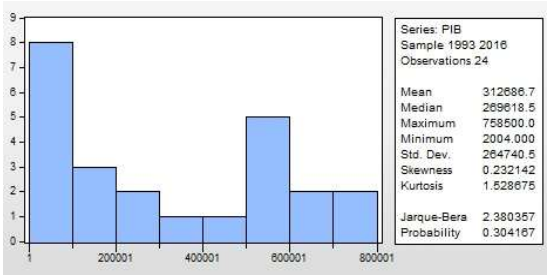


Source: own processing using Eviews 9

It can be seen from the graphical representation that the two data series had an ascending trend. Unlike VAT earnings that have suffered several variations, the GDP only decreased in 2008 from 524389 million RON to 510,523 million RON in 2009, and in the following years continued to grow. The VAT earnings decreased from one year to the next in 2009 compared to 2008, 2014 versus 2013 and 2016 versus 2015. In 2016, as compared to 2015, the decrease in the revenues collected can be explained by reducing the standard tax rate to 20%.

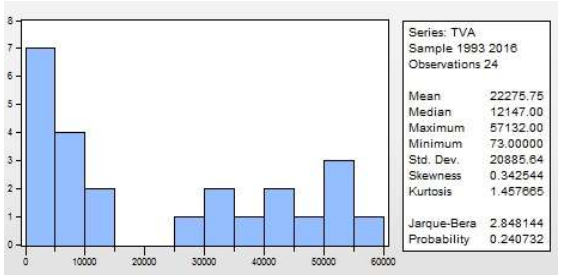
Before applying the econometric model, I analyzed the data by studying their evolution over the years. In the figures below are graphically represented evolutions of the two variables from 1993 to 2016. The descriptive statistics of the two series of data is illustrated below:

Figure no. 3. Descriptive statistics series of GDP data



Source: own processing using Eviews 9

Figure no. 4. Descriptive statistics series of VAT data



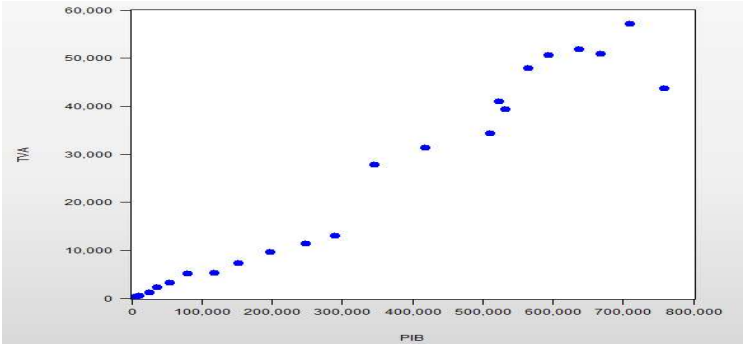
Source: own processing using Eviews 9

As shown in the previous figure for the GDP data series, the average is 312686.7 million RON, the minimum of the series is in 2004 and the maximum 758500 million RON. The probability associated with the Jarque Bera test is 0.304167, inferior to the chosen level of relevance (5%), which means that the null hypothesis is rejected, that the GDP data series isn't normally distributed.

For the VAT series, the average is 22275.75 million RON, the minimum value of the series is 73 million RON and the maximum 57132 million RON. The probability associated with the Jarque Bera test is 0.240732. This value indicates that neither the VAT data series is normally distributed.

To highlight the relationship between the two data series, I checked the correlation both graphically and by applying the Pearson correlation coefficient. From the graphical representation below, it is shown that there is a direct relationship between the two variables.

Figure no. 5. Graphical representation of the link between GDP and VAT



Source: own processing using Eviews 9

The Pearson correlation coefficient indicates that the link between the two variables is very strong. This correlation coefficient is 0.977525, higher than 0.75, which confirms the good association of the two variables.

I processed the data by logarithmic the regression equation, helping to interpret regression coefficients. The regression equation becomes:

$\log GDP = \log \alpha 0 + \log \alpha 1 \, (VAT) + \mu$

To estimate the regression model I used the least squares method, obtaining the following results:

Figure no. 6. The results of the regression model parameter estimation

Dependent Variable: L_PIB
Method: Least Squares
Date: 01/15/17 Time: 20:18
Sample: 1993 2016
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.766106	0.163053	23.09749	0.0000
L_TVA	0.895256	0.017723	50.51423	0.0000

R-squared	0.991452	Mean dependent var	11.81958
Adjusted R-squared	0.991063	S.D. dependent var	1.771327
S.E. of regression	0.167450	Akaike info criterion	-0.656611
Sum squared resid	0.616868	Schwarz criterion	-0.558440
Log likelihood	9.879332	Hannan-Quinn criter.	-0.630566
F-statistic	2551.688	Durbin-Watson stat	0.990549
Prob(F-statistic)	0.000000		

Source: own processing using Eviews 9

According to the previous figure, the equation of regression becomes:

log GDP = 3,766106 + 0,895256 log VAT + μ

Thus, the results of the regression model demonstrate that there is a positive relationship between VAT and GDP, rejecting the null hypothesis that VAT does not influence GDP. The positive coefficient of the VAT term indicates that there is a direct relationship between the two variables.

The R-squared coefficient is 0.991452, which means that 99% of the GDP variation is explained by the VAT revenues. Both the R-squared coefficient and the Adjusted R-squared coefficient (0.991063) indicate that the pattern is correct.

Durbin-Watson's coefficient measures the correlation of residues. Seeing that the value of this test is 0.99, being inferior to 2, it indicates that model errors are positively correlated.

Given the parameter estimation results of the regression model, used to establish the correlation between GDP and VAT, it can be stated that the econometric model is a valid one and there is a strong relationship between the two variables.

2. Description of autoregressive vector model

To confirm the results obtained by estimating the regression model, I will further develop the autoregressive vector model. The first step is testing the data series stationarity using the Augmented Dickey-Fuller test and the Phillips-Perron test.

The results of the Augmented Dickey-Fuller test for the two series are as follows:

Figure no. 7. ADF test for VAT series

Null Hypothesis: TVA has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.628716	0.8455
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

Figure no. 8. ADF Test for GDP Series

Null Hypothesis: PIB has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.573994	0.9990
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

Source: own processing using Eviews 9

Source: own processing using Eviews 9

Figure no. 7. and no. 8., contain the results of the ADF test, the critical values for the 1%, 5% and 10% relevance levels, and the probability associated with the test. For VAT, the ADF test is 0.628716 and for GDP 1.573994. If the test result is higher than the critical value, then the series is non-stationary (the series has a single root). From the results of the ADF test for the two series of data, both the GDP series and the VAT series are nonstationary.

At the same time, the stationarity of the data series can be tested using the Phillips-Perron test.

The results of this test can be found in the following figures:

Figure no. 9. The Phillips-Perron Test for the VAT series

Null Hypothesis: TVA has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.589366	0.8548
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

Source: own processing using Eviews 9

Figure no. 10. Phillips-Perron Test for PIB Series

Null Hypothesis: PIB has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		1.250479	0.9974
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

Source: own processing using Eviews 9

The Phillips-Perron test confirms the results of the ADF test, the two series are nonstationary.

This accepts the null hypothesis, which assumes that the series contains a unit root. The nonstationary data series transforms into stationary data series by applying differences.

The results of testing the stationarity of the 1st difference data series are as follows:

Figure no. 11. ADF test for the 1st order differentiated VAT series

Null Hypothesis: D(TVA) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.552160	0.0017
Test critical values:	1% level	-3.769597	
	5% level	-3.004861	
	10% level	-2.642242	

Source: own processing using Eviews 9

Figure no. 12. ADF test for the 1st order differentiated GDP series

Null Hypothesis: D(PIB) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.291281	0.0279
Test critical values:	1% level	-3.769597	
	5% level	-3.004861	
	10% level	-2.642242	

Source: own processing using Eviews 9

As it results from the application of the ADF test for the two series of data of the 1st difference, the GDP data series does not become stationary by applying the 1st difference. As a result, we test the stationarity of the 2nd difference GDP series and obtain the following results:

Figure no. 13. ADF test for the 2nd order differentiated GDP series

Null Hypothesis: D(PIB,2) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.950742	0.0000
Test critical values:	1% level	-3.788030	
	5% level	-3.012363	
	10% level	-2.646119	

Source: own processing using Eviews 9

Following the ADF test results, it can be stated that the VAT data series becomes stationary by applying the 1st difference, whereas the GDP data series becomes stationary only if the 2nd difference is applied.

Before estimating the autoregressive vector model, I tested the causality between the two variables using the Pairwise Granger test, to establish whether there is a relationship between the two variables. The results of the Pairwise Granger test are as follows:

Figure no. 14. The Pairwise Granger causality test

Pairwise Granger Causality Tests
Date: 03/08/17 Time: 00:02
Sample: 1993 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PIB does not Granger Cause TVA	22	2.66347	0.0986
TVA does not Granger Cause PIB		0.94279	0.4090

Source: own processing using Eviews 9

For a probability of less than 0.05, the null hypothesis is rejected. Given that the probability returned for the null hypothesis "VAT does not cause Granger PIB" is 0.4090 it results that the variation of VAT influences GDP.

The final step in this section is the estimation of the autoregressive vector model. The results are as follows:

Figure no. 15. Estimation of the Unrestricted Autoregressive GDP-VAT Vector

Vector Autoregression Estimates
Date: 03/08/17 Time: 00:43
Sample (adjusted): 1997 2016
Included observations: 20 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	D(PIB)	D(TVA)
D(PIB(-1))	0.615226 (0.26520) [2.31985]	0.036916 (0.09280) [0.39782]
D(PIB(-2))	-0.464529 (0.22751) [-2.04181]	-0.087193 (0.07961) [-1.09529]
D(PIB(-3))	0.824463 (0.20841) [3.95604]	0.151919 (0.07292) [2.08328]
D(TVA(-1))	-1.171469 (1.32995) [-0.88084]	-0.456344 (0.46536) [-0.98063]
D(TVA(-2))	3.194702 (1.25920) [2.53709]	0.504976 (0.44060) [1.14610]
D(TVA(-3))	-5.626179 (1.38633) [-4.05833]	-0.678390 (0.48509) [-1.39849]
C	14712.83 (8193.82) [1.79560]	695.2298 (2867.08) [0.24249]
R-squared	0.695172	0.320875

Source: own processing using Eviews 9

The results of the estimation of the autoregressive vector model confirm the results obtained by estimating the regression model parameters. Between the two variables, there is a direct relationship, that means VAT can influence GDP.

Conclusions

In accordance with previous studies, the main conclusion of this paper is that VAT is the most important indirect tax for both the Romanian state and the other countries that have adopted this tax.

According to the studies mentioned in the "Literature review" section, in countries such as Nigeria, Kenya, Ethiopia, Bangladesh, Argentina, Brazil, Mexico and Chile, there is a positive relationship between VAT and GDP. Empirical studies conducted for various periods, indicate that this tax contributes significantly to the economic growth of those countries.

There are also studies showing that there is a negative relationship between some fiscal policy instruments and economic growth. Regarding VAT, Lawrence Kimuhu Njogu, in 2015, demonstrates that there is a negative relationship between VAT rates and economic growth in Kenya, considering that the increase of VAT rates does not result in economic growth and that the state should reduce or to maintain the VAT rates.

In the last part of the study, using a regression model of the form GDP = f (VAT) + μ, I have processed in the Eviews 9 program data from our country from 1993 to 2016. Both the results of previous regression model estimates and those of this econometric model, indicate a strong relationship and a positive correlation between VAT revenues and GDP.

The estimated autoregressive vector model also indicates the positive relationship between VAT and GDP.

The VAT is a powerful fiscal instrument, which, correctly used and efficiently collected, can significantly improve the growth of both a developed country and a developing country.

It is not enough for this tax to be on the list of a state taxes. It is much more important to be collected correctly and efficiently. This task comes first for taxpayers and then for the state in which the tax is adopted.

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