THE DEGREE OF COMPLIANCE BASED ON VAT IN ROMANIA BETWEEN 1995 AND 2015

Silvia Paula TODOR[1], Rodica GHIUR[2], Petre BREZEANU[3], Florin DUMITER[4]

[1, 2, 3] The Bucharest University of Economic Studies, Bucharest
[4] "Vasile Goldiș" Western University of Arad

Abstract

The fiscal policy is an instrument that collects resources for the state budget. necessary to perform state functions; stabilize the economy; regulation of the economy and recovery growth. The most important instruments are taxes and taxpayers. The taxpayer is obliged by law to transfer to the state budget some of the value it creates ago performing an activity. Although there are usually many similar elements in understanding the concept of "taxpayer" globally each tax authority establish criteria according to which a citizen falls into the category of taxpayers. Analyzing the case of Romania and the evolution of VAT conformity we created some regressions that illustrate the VAT correlation in Romania between 1995 and 2015. Thus, we built three unifactorial regression models showing how VAT impacts economic indicators such as GDP, power purchase expressed through the net annual average salary, and household final consumption expenditure. Moreover, each model has been tested and verified using statistic tests to give reliable results. In a first stage, we analyzed the correlation between GDP as endogen variable and VAT, then we created another model that we kept VAT as an independent variable, but we changed the dependent variable using the consumption and in the last phase we tried to see how the purchasing power explains the variation of this indirect tax. Because according to the used tests we demonstrated that correlation coefficients are significant, we proceeded to explain them starting from fiscal and economic reality, own of these analyzed 20 years.

[1] *Ph.D. student, Faculty of Finance./Department Finance, "The Bucharest University of Economic Studies, Bucharest, e-mail:* ***silviapaulatodor@gmail.com***
[2] *Ph.D student. Faculty of Finance./Department Finance, "The Bucharest University of Economic Studies, Bucharest, e-mail: ghiur.rodica@gmail.com*
[3] *Profesor, Ph.D. Faculty of Finance./Department Finance, "The Bucharest University of Economic Studies, Bucharest, e-mail:* ***brezeanupetre@yahoo.com***
[4] *Professor, Ph.D. Faculty of Economics, Informatics and Engineering/ Department of Economic Sciences, "Vasile Goldiș" Western University of Arad, Romania e-mail:* ***fdumiter@yahoo.com***

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1. Introduction

Tax compliance questions are as old and long as tax and will remain a field of research as long as there is a tax system. Where there is no state there are no taxes. Six thousand years ago, on the clay cones, there was the inscription "There were tax collectors". "Although tax records are generally seen as challenges, perhaps the day will come when historians will realize that fiscal records tell the real story behind civilization's life. How people were taxed, who was taxed, and what was taxed say more about a society than anything else. " (Adams, 1993).

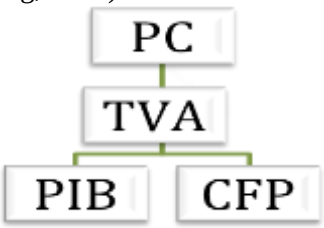
The tax education of every people could also translate into state budget receipts. However, history shows that there has always been that reluctance on the part of the taxpayer, perhaps because the latter has not always understood that he is the beneficiary of the money collected at the budget and then divided. (Coetzee, 1996) Fortunately, the majority of citizens have realized that their spending, from the money gathered hard with the payment of taxes, will eventually lead to, for example, the creation or maintenance of national infrastructures. In 2004, Roshelle Misra shadowed the need for tax education specifically aimed at taxpayers' social responsibility in paying their taxes when they showed that the South African economy was facing an industrial economy

To solve this puzzle, Benno Torgler shows in 2003, many researchers have explained it through that tax morale as an intrinsic tax incentive, which could explain the high degree of tax compliance. He also points out that the first findings on tax morality date back to the 1960s / 1970 literature, in the German literature of German scholars around Günter Schmölders, the so-called "Cologne School of Tax Psychology," but he mentions that tax morality Is a newer dependent variable in the literature on tax compliance.

A tax that has a strong impact on gross domestic product, and which ultimately impinges on final consumption, so we can say in a few words the value added tax (and VAT further). According to the VAT-based principle,

this tax applies to goods and services, a tax that is directly proportional to the price of goods and services, irrespective of the number of transactions occurring in the production and distribution process before taxation. On VAT, we can state that it is a turnover tax levied on each stage of the transaction on turnover, is a consumption tax ultimately borne by the so-called final consumer, which has no possibility of Deducts the tax, is a tax paid in tranches, because each participant subject to the economic circuit becomes a collector of this tax, he collects part of the VAT collected and paid by the final consumer, the VAT is neutral, ultimately allowing the same taxation Regardless of the number of transactions occurred. This tax is now in place in all 28 countries of the European Union, all applying in an identical manner the Common System of Value Added Tax, as we now find it in the Sixth VAT Directive, Council Directive 2006/112 / EC Of 28 November 2006. (Le Gouvernement du Grand-Duche de Luxembourg, 2015).

2. Research methodology



As can be deduced from the summary presented in the early part of the article, we have proposed (authors) an analysis of the impact of voluntary compliance through VAT. Our objective was to identify how this tax, the VAT (thus understanding the receipts to the state budget from its collection, and the IPTV), influences 2 macroeconomic indicators, on the one hand gross domestic product (hereafter And GDP), and on the other hand, own final consumption (CFP) and how this tax is in turn influenced by purchasing power (further PCs). Our objective is schematically represented by the right scheme. So to see what the impact of this tax is, how it influences, and how it is influenced, we will build 3 unifactorial models, in 2 of which VAT behaves the function of the exogenous (independent) variable, and in one of the endogenous (dependent) variables. The analysis period spans 21 years, from 1995 to 2015. As for the veracity of the data, we mention that these were taken from the European Commission's website. In order to convince us from the very beginning that the 3 models so designed can take the form of a unifactorial model, we will graphically represent the pairs of points that comprise the amounts accrued to the budget in VAT and GDP, VAT and CFP, PC and VAT, even If intuitively we can assume that the average of the

dependent variable depends on a linear relation to the average of the independent variable (Anghelache, Pagliacci and Prodan, 2013).

Figure 1 Spreading diagram TVA vs. PIB

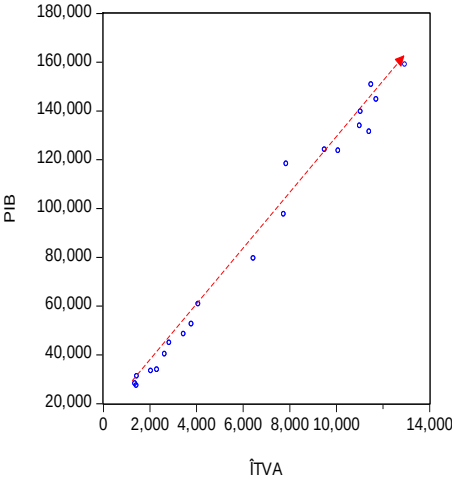


Figure 2 Spreading diagram TVA vs. CFP

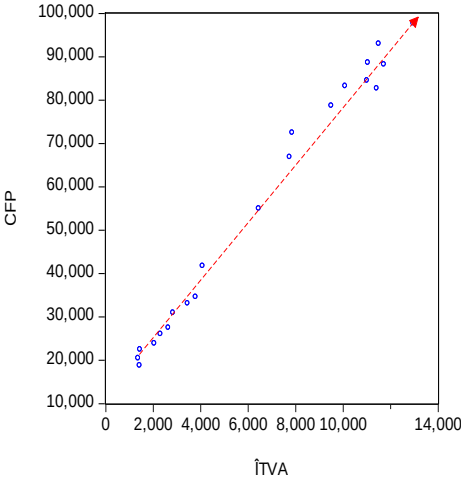
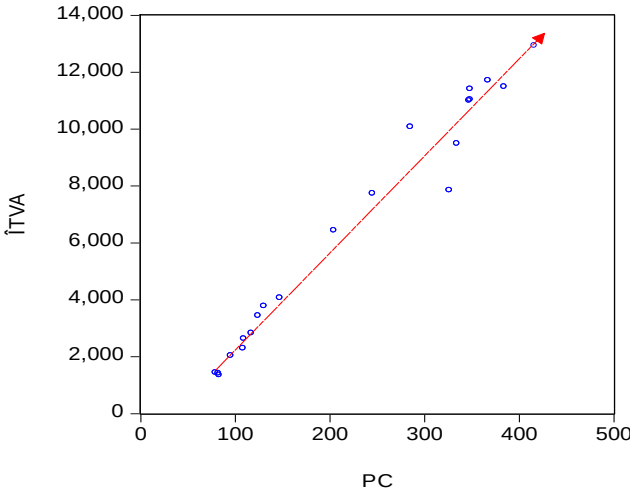


Figure 3 Spreading diagram PC vs. TVA



Thus acording to the three scattering digests, we can say that the phenomenon can be described by a unifactorial linear regression model (Anghelache, Anghelache, Prodan, Dumitrescu and Soare, 2012) which allows us to achieve the goal, construct models , Parameter estimation with software and testing.

As mentioned above, the data was downloaded from the European Commission website as follows:

Table 1 Data evidence

	ÎTVA	PIB	CFP	PC
1995	1419	27400	18835	82
1996	1360	28200	20501	83
1997	1441	31200	22516	79
1998	2303	33900	26063	108
1999	2044	33400	23936	95
2000	2633	40300	27522	109
2001	2831	44900	30994	117
2002	3449	48500	33143	124
2003	3781	52600	34622	130
2004	4075	60800	41744	147
2005	6439	79500	54994	204
2006	7741	97700	66881	245
2007	10079	123700	83257	285
2008	11036	139700	88671	348
2009	7852	118300	72488	326
2010	9494	124100	78708	334
2011	11412	131500	82713	348
2012	11003	133900	84558	347
2013	11710	144700	88238	367
2014	11496	150800	92990	384
2015	12939	159000	97693	416

where, ÎTVA – Receipts to the state budget from the collection TVA, PIB – the gross domestic product, CFP – final consumption, PC – Purchasing power. All values in the table are amounts expressed in millions of euros.

Before proceeding to the estimation of the parameters in each model, a last aspect that we believe should be presented in this part of the article is about some theoretical aspects of linear regression. Thus, a first aspect is the form: y_i = α + βx_i + ε_i, i = 1, 2, ..., n. A second aspect relates to those assumptions that are associated with each regression model in order to obtain certain properties for model parameter estimators. Therefore, as we are in the context of a classical linear regression model, we will present the six standard assumptions:Forma funcției este **liniară** (fiecare parametru este la puterea întâi)**:** : $y_i = \alpha + \beta x_i + \varepsilon_i$, *i* =1, 2,…,*n*.

1. **Random errors** are mean zero (because random error is seen as the sum of random factors with different signs, it is admitted that these unregistered factors will not affect on average the dependent variable): $E(\varepsilon_i) = 0$, *i* =1, 2,…,*n*.
2. **Homoscedasticity** of random errors (according to which the link between the dependent and independent variable is relatively stable):Var $(\varepsilon_i) = \sigma_\varepsilon^2 = \sigma^2, i = 1, 2, \ldots, n$.
3. **Random errors** are not correlated (according to this hypothesis by randomly choosing two errors they are not correlated):cov$(\varepsilon_i, \varepsilon_j) = 0$, pentru $i \neq j$.
4. **Registers and random errors** are not correlated (random errors do not depend on explanatory variables)**:**cov$(\varepsilon_i, x_i) = 0$, pentru $(\forall)$ *i* și j.
5. **5. Random errors** are normally distributed ($(\forall)$ linear function of normally distributed distributions is normally distributed; Central Limit Theorem): $\varepsilon_i \sim N(0, \sigma^2)$(Damalan, 2016).

Below we will estimate the least squares (MCMMP) model parameters. We will test the models so obtained using the Student test (Penu, 2016), we will also see to what extent the resulting coefficients are significant and what is the likelihood of accepting the alternative hypothesis. Finally, we will try to analyze the time series from three perspectives: the distribution asymmetry over its media, the height of series distribution and stationarity.

3. Research results

3.1 The impact of VAT receipts on gross domestic product

Given that we have already demonstrated that we can build a unified linear regression model using the two series, we will pass the estimation of parameters with the Eviews platform, according to the table inserted:

Table 2 The impact of VAT receipts on gross domestic product

Dependent Variable: PIB
Method: Least Squares
Date: 04/08/17 Time: 23:03
Sample: 1995 2015
Included observations: 21

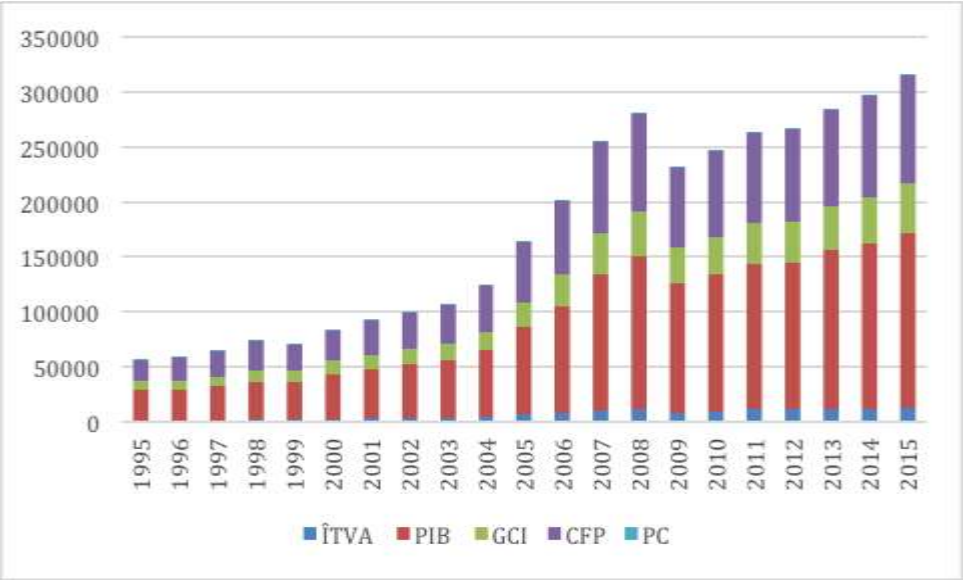
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ITVA	**11.45456**	0.297875	*38.45423*	*0.0000*
C	**11434.73**	2286.838	*5.000238*	*0.0001*

R-squared	0.987314	Mean dependent var	85909.52
Adjusted R-squared	0.986646	S.D. dependent var	48223.85
S.E. of regression	5572.633	Akaike info criterion	20.17952
Sum squared resid	5.90E+08	Schwarz criterion	20.27899
Log likelihood	-209.8849	Hannan-Quinn criter.	20.20110
F-statistic	1478.728	Durbin-Watson stat	1.729822
Prob(F-statistic)	0.000000		

By replacing the values obtained in the form of the linear function, as presented above, we obtain: $y_i = \alpha + \beta x_i + \varepsilon_i \Longmapsto$PIB = 11.45456 * ÎTVA +11434.73. Therefore, a first observation is that there is a direct link between the two variables, which implies that the increase in VAT collection revenues automatically implies GDP growth, which is more intuitive, more than analyzing the values of R and R2 we can say that the link between the two variables is very strong. According to these indicators, the variation of GDP is explained in a large percentage by the change in VAT receipts. Basically,

according to R, the link between the two variables is 98.73%, and according to R2 the GDP is explained in proportion of 98.66% of the receipts from this tax. We can also see this in the diagram below, which shows these series in time:

Figure 4 The impact of VAT receipts on gross domestic product



Next, assuming ad absurdum that VAT receipts would be 0, the GDP would be 11.45456 * 0 + 11434.73 = 11434.73. So even if there were no revenues to the state budget from VAT, GDP would be positive; A first argument demonstrating the veracity of this fact lies precisely in the idea that even if the VAT contribution to GDP growth is significant is not the only one, the second argument is that not all economic operators are automatically and VAT payers and that the final consumer, Such a case does not bear the burden of this tax precisely because of its "supplier". As shown above, we wanted to use the Student test for testing. According to the above table, t = 38.45423 and tConstant = 5.000238, ttabelar = t0.05; 21; = 1,721, from which we deduce that trictic is lower than both tVA and tC, therefore the coefficients calculated from the unifactorial model are significant. The above probabilities show to

what extent the latter are significant. Given that in both cases we disagree with values below 0.05, we infer that we can accept the alternative hypothesis for both coefficients with a probability of 95%, stating that the two coefficients are significant.

3.2 Impact of VAT receipts on own final consumption

Because we have demonstrated that in this case we can build a unified factor regression model, we continue to present the result table for parameter estimation:

Table 3 Impact of VAT receipts on own final consumption

Dependent Variable: CFP
Method: Least Squares
Date: 04/09/17 Time: 01:34
Sample: 1995 2015
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ITVA	**6.869271**	0.165518	*41.50162*	*0.0000*
C	**11102.73**	1270.711	*8.737414*	*0.0000*

R-squared	0.989089	Mean dependent var	55765.10
Adjusted R-squared	0.988515	S.D. dependent var	28893.77
S.E. of regression	3096.506	Akaike info criterion	19.00433
Sum squared resid	1.82E+08	Schwarz criterion	19.10381
Log likelihood	-197.5455	Hannan-Quinn criter.	19.02592
F-statistic	1722.384	Durbin-Watson stat	1.635280
Prob(F-statistic)	0.000000		

Replacing in this case also the values obtained in the form of the linear function, as presented above, we obtain: $y_i = \alpha + \beta x_i + \varepsilon_i \Rightarrow$CFP = 6.869271 * ÎTVA +11102.73. Therefore, a first observation is that there is a direct link between the two variables, which implies that the increase in

revenue from VAT collection automatically leads to an increase in final consumption, this makes it logical if we admit that, VAT would increase, budget receipts would increase as long as the consumption of products subject to this tax will remain constant. Analyzing the values of R and R2 we can state that the link between the two variables is very strong. According to these indicators, the variation in own final consumption is explained by a large percentage of the change in VAT receipts. Therefore, the two indicators only exaggerate the reality existing in the market economy, as I mentioned above. Basically, according to R, the link between the two variables is 98.90%, and according to R2 the final consumption variation is explained 98.85% of the proceeds of this tax. As shown above, we wanted to use the Student test for testing. According to the table above t = 41.50162 and tConstant = 8.737414, ttabelar = t0.05; 21; = 1,721, from which we deduce that trictic is lower than both tVA and tC, therefore the coefficients calculated from the unifactorial model are significant. Moreover, since the probabilities in both cases have values below 0.05 we deduce that we can accept the alternative hypothesis for both coefficients with a probability of 95%, stating that the two coefficients are significant.

3.3 Impact of purchasing power on VAT receipts

Before proceeding to estimate the parameters, it is necessary to state that purchasing power was not found to be provided by any statistical platform, so the purchasing power is the generic name we have assigned to the data series that defines the annual average Net gains in the past 21 years. So this model will show how average net earnings influence consume and implicitly VAT revenue. Below is a table illustrating the parameter estimation.

Table 4 Impact of purchasing power on VAT receipts

Dependent Variable: ITVA
Method: Least Squares
Date: 04/09/17 Time: 01:03
Sample: 1995 2015
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.

PC	**33.88669**	1.304899	*25.96881*	*0.0000*
C	**-1046.902**	329.4419	*-3.177804*	*0.0050*

R-squared	0.972598	Mean dependent var	6501.762
Adjusted R-squared	0.971156	S.D. dependent var	4183.226
S.E. of regression	710.4621	Akaike info criterion	16.06010
Sum squared resid	9590371.	Schwarz criterion	16.15958
Log likelihood	-166.6311	Hannan-Quinn criter.	16.08169
F-statistic	674.3793	Durbin-Watson stat	1.429975
Prob(F-statistic)	0.000000		

By replacing in this case the values thus obtained in the form of linear function, as it was shown above we have: $\alpha = y\_i + \varepsilon\_i \Longmapsto \beta x\_i + 33.88669$ * IA = -1046.902 PC. Thus, a first observation in this case is that there is a direct link between the two variables, which implies that the increase in average earnings automatically implies the increase in consumption, and thus the increase of VAT revenues to the budget. However, like previous models we can state that the link between the two variables is a very strong one by analyzing the values of R and R2. According to these indicators, the change in VAT receipts is explained in a large percentage by the average earnings variation. Basically, according to R, the link between the two variables is about 97, 25%, and according to R2, the ITVA variation is explained in proportion of 97.11% of the purchasing power. And for this model we will use the Student test to test the model. According to the table above tPC = 25.96881 and tConstant = -3.177804, ttabelar = t0.05; 21; = 1,721, from which we deduce that tricycle is only smaller than tPC, this is the only significant coefficient, aspect also indicated by the probability value much below 0,05, demonstrating that we can accept the alternative hypothesis only for the purchasing power coefficient with a probability of 95%.

In the first part of this article, we also proposed the analysis of the time series in terms of distribution asymmetry with respect to its media, the height of series distribution and stationarity. The first two perspectives relate to the series distribution asymmetry over its own average and the height of the distribution. In this respect, we will build the histograms for all four time series, and according to the Skewness and Kurtosis tests, let us make a

comparative analysis of these. The following 4 histograms are built using the same software platform:

Figure 5 GDP Histogram

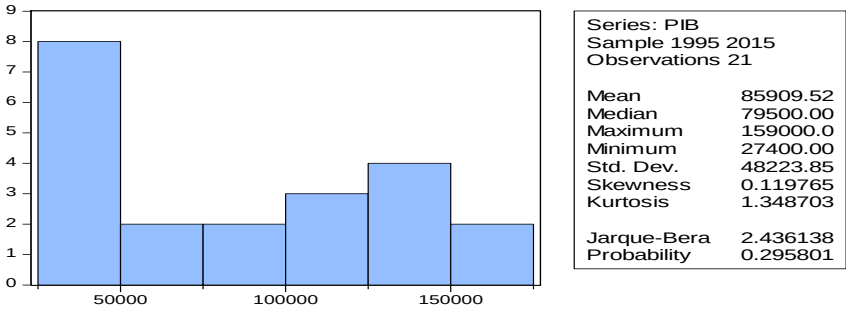


Figure 6 Own final consumption histogram

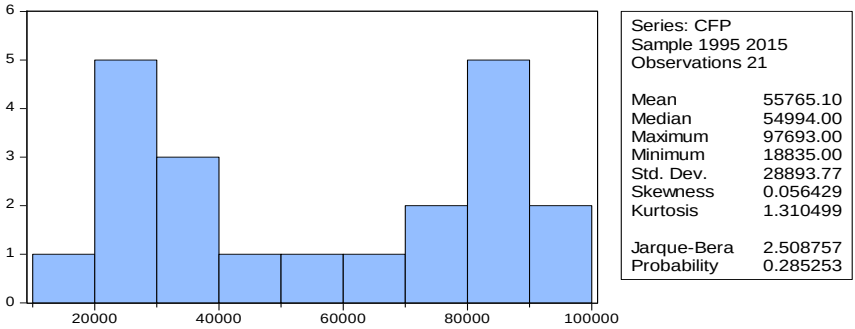


Figure 7 Purchasing Power histogram

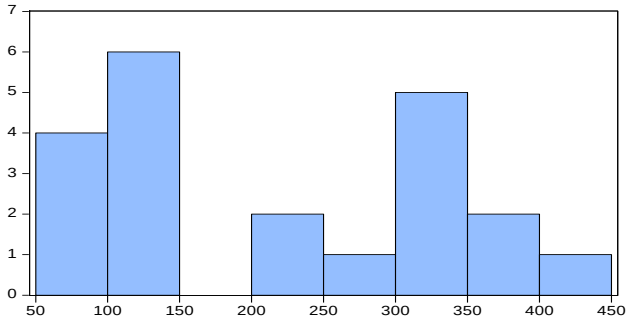
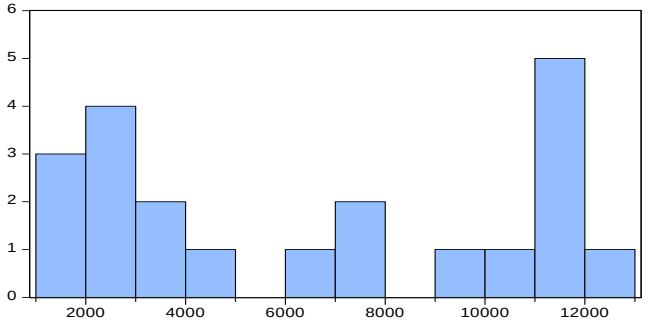


Figure 8 VAT Receipts



According to the Skewness test, which indicates the deviation of the empirical distribution in relation to the symmetric distribution around the mean, in all four cases, we are in a situation where, given that the values are greater than zero, the distribution is inclined to the left , Having several extreme values to the right. According to the Kurtosis test, a test indicating the degree of flattening or sharpening of a distribution, given that for all four series the test indicates values less than 3, we are in the situation of platictic distribution, being more flat than the normal distribution presenting dispersed values On a larger interval around the average. Therefore, for all four time

series, the probability of occurrence of extreme values is lower than if they had a normal distribution.

Another aspect that we have proposed and the last one for this article was testing stationarity. We will test the stationarity with the Dickey Fuller Test, as shown in the following 4 tables.

Table Stationarity level 1

Null Hypothesis: PIB has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		**0.079216**	0.9556
Test critical values:	1% level	-3.808546	
	5% level	-3.020686	
	10% level	-2.650413	

*MacKinnon (1996) one-sided p-values.

Table 6 Stationarity level 2

Null Hypothesis: CFP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		**-0.232407**	0.9192
Test critical values:	1% level	-3.808546	
	5% level	-3.020686	
	10% level	-2.650413	

*MacKinnon (1996) one-sided p-values.

Table 7 Stationarity level 3

Null Hypothesis: PC has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		**0.413848**	0.9783
Test critical values:	1% level	-3.808546	
	5% level	-3.020686	
	10% level	-2.650413	

*MacKinnon (1996) one-sided p-values.

Table 8 Stationarity level 4

Null Hypothesis: ITVA has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		**-0.268775**	0.9137
Test critical values:	1% level	-3.808546	
	5% level	-3.020686	
	10% level	-2.650413	

*MacKinnon (1996) one-sided p-values.

Because statistically significant values are much lower than ttabelar (1,721), it follows that stationarity of time series shows that if there was a shock on these series, it would absorb in time and would not be One with permanent effects.

4. Conclusions

In conclusion, the objective of this article has been achieved, we have succeeded in demonstrating that buying power impacts consumption and implicitly VAT receipts, which in turn directly affects their own final consumption and gross domestic product. These aspects are intuitive, but we have tried to see if and by analyzing the data statistically and econometrically, we will be able to come up with a confirmation of some suspicious aspects to be so. The links, according to the indicators analyzed, were very strong between the independent and dependent variables which again demonstrate that the time series analyzed are strongly correlated and a shock, albeit not

permanent, on, for example, VAT will generate an impact significantly over GDP.

5. References

1. *Adams, C., For Good & Evil. The Impact of Taxes on the Course of Civilization, London: Madison Books, 1993.*
2. *Anghelache, C., Pagliacci, M, Prodan, L., „Macroeconomic analysis model based on regression function", Revista Română de Statistică nr. 1 / 2013.*
3. *Anghelache, G.-C., Anghelache C., Prodan, L., Dumitrescu, D., Soare, D., V., "Theoretical elements regarding the use of the econometric model of multifactor regression", Revista Română de Statistică Trim III/2012- Supliment.*
4. *Coetzee, H., Finding the Golden Mean, Accounting SA, Accountancy SA. June, 1996.*
5. *Le Gouvernement du Grand-Duche de Luxembourg, Administration de l'enregistrement et des domaines, „Taxe sur la valeur ajoutée (TVA)", Version au 01.01.2015, www.aed.public.lu.*
6. *Penu, D. „Indirect Taxes in Romania – an Econometric Analysis", Academic Journal of Economic Studies, Vol. 2, No.1, March 2016, pp. 121-128.*
7. *Roshelle Misra, The impact of taxpayer education on tax compliance in South Africa, University of Kwazulu-Natal, 2004.*