

# COMPARATIVE ANALYSIS OF VAT EVOLUTION IN THE EUROPEAN ECONOMIC SYSTEM

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## Abstract

*In this paper we study a comparative analysis of VAT in different states of the world. I made some observation on this theme because I believe that VAT is very important in carrying out transactions and the increase or decrease of this tax has a major impact upon national economies and also on the quality of life in developing countries. The papers has to pourpose to make a comparison between the American and European system of taxation with its advantages and disadvantages and, in the end to render an economic model and its statistics components. VAT is a value added tax which appeared about 50 years, initially with two purposes: one to replace certain indirect taxes, and another to reduce the budget deficit according to the faith of that time. The first country that has adopted this model was France, calling it today as value-added tax.*

**Keywords:** rate, tax, VAT, budget deficit

## Introduction

One of the important factors that led to this measure was established to avoid tax cascading phenomenon, namely the taxation of the same product. Today often easier and more correct, tax only the value-added product. This is why we consider taxes a necessary phenomenon . Along parallel between the U.S. and Europe which has been taken as reference models in order to discuss and debate their favorable and less favorable points, and most of them in my opinion is representative of the French model, implementation of the tax where it had a beneficial role in the economy. As an example, we use the European model which is used in the VAT and the American model. In the first chapter I talked about the effects of introducing VAT in the euro zone and pros to this measures. On the other hand we will use the U.S. model as an example for countries that have introduced this tax measure. It will be discussed the pros and cons of implementing these measures in both Europe and the USA and see why are the reasons for which VAT was implemented or not. In the next chapter I will analyze some concrete examples of Europe countries that have value added taxation system and will analyze the benefits that were subsequently introduced this measure in developing economies.

Today most European Union states have increased the rate of VAT and the effects of this measure for each economy participant will be a subject of debate. The largest VAT increase since 2010 had 5 percent, the case of Romania will be discussed and also the effects of this increase. This increase was primarily due to the population, and secondly due to the economy.

However, in addition to countries that have increased the VAT rate to reduce the budget deficit exists also the countries that have not implemented this measure, like France. Separately will discuss about tax reform and the reason which have not adopted the VAT increase in 2010 thus making a parallel with the current situation in Romania. I consider necessary the parallel

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between American and the taxation of European countries in order to see the effects on the population especially at the time when this method had been introduced but also to determine the need for that change in the economic environment. To see what effect had the change when decided to reduce its rate of VAT, and especially if it had the desired effect. Furthermore, I have chosen our country as a reference model to determine what effect had increased VAT revenues in 2010 and especially the share of VAT and its direct relationship with revenue. In this model we determine whether the increase in VAT in our country had a negative effect of higher government spending and see what steps were taken to overcome the crisis in Romania and especially their effectiveness.

At the end of the work are presented conclusions and also some methods for improving the Romanian tax now, and we will see if Romania has achieved its purpose by increasing the VAT by 5 percent, especially if taken fiscal measures will be able to recover Romania.

#### COMPARISONS OF TAX POLICY IN THE EUROPEAN AND ECONOMIC SYSTEM

In this comparative approach of VAT in Europe versus the United States, we will determine why the U.S. did not want to adopt this tax, value added and the advantages and disadvantages of its implementation. In a paper drafted in 2001 and suggestively named "tax systems in the world," Lawrence W. Kenny American professor says: "There is surprisingly little empirical work to explain why the countries choose different tax policies." Although between tax systems currently existing in the world there are some similarities, however, we must observe that each country has its own individuality generated by specific elements (traditions, history, religion) and in finding a common ground should be determined on the basis of which can indicate similarities and differences between two or more countries. VAT is designed to charge efficient and comprehensive personal consumption in a economic reform .TVA site was most prevalent in the second half of the 20th century and into the 21st century, and proved to be a major source for government information .TVA's revenue is used both in developed and developing countries, both at local, national and supra-national level (European Union). It is effectively an indirect tax, originally adopted in France at the initiative of M. Laure in 1954. In the following years the value added tax was adopted on 1 January 1970 to all Common Market countries tax replacing the movement of goods cascade that leads to taxation.

VAT is in fact a tax on consumption in general, calculated and applied at every stage of goods and services flow from primary production to final consumption stage. Unlike European powers, the United States of America had many attempts to implement VAT in recent years but without success. This is due to the fact that VAT is regarded as having three weak points, namely: the first, is considered to be so-called "money machine" in the hands of government, secondly it is considered that the VAT is regressive, and at last it is believed that consumption taxes are used to broaden the State tax. In 2006, Keen and Lockwood points out the existence of two types of "money machine", a poor form and poor strong. This form is characterized by the assumption that countries with VAT budget revenues higher than those without VAT, or at least the same, which could lead to a better mobilization of savings inside a better financing of certain sectors. In strongest form it is suggested that an increase in budgetary revenues results in an increase in government spending is not beneficial within an economy. Such studies showed last year the opposite, namely the American belief that the VAT is not so-called "money machine" in the hands of pro government. An another argument for applying VAT in the U.S. is that it would reduce the deficit of the budget. This contradicted by Alverson (1986) showing that the average budget deficit is higher in countries that have adopted the VAT as a form of taxation and increased more rapidly with the implementation of VAT, except in countries that have adopted this method . Ali Agha and

Jonathan Haughton (1996) stating that VAT is the perfect money making machine. Take, for example when Switzerland with the introduction of this tax, budget revenues have not increased, remained the same as in the period before the introduction of VAT, but in developing countries such as New Zealand budgetary revenues have increased substantially.

VAT proponents conclude that compared with other forms of taxation, VAT is not discouraging savings and create certain ways of fair competition in international trade. It is said that the burden of VAT may be in the worst case proportional and regressive if not the denominator for purposes of measuring the tax burden was a lifetime income rather than annual income as contradicting American economists.<sup>1</sup> We notice that the socialist states tend to use more than other regimes, tax sources Corporation, sales and excise taxes, so that business can be more easily monitored. There is a strong ideological interest in taxing business and a necessity lower in individual taxation to achieve social goals. Making parallels between the fiscal pressure of the EU member countries and appreciation of the level of tax burden in the European Union in general is also facing many difficulties, due to the fact that tax levels are not the same from one country to another. Disagreement is due to a variety of general and specific factors for each country.

Most important are the following:

- differences in reference periods and methods;
- social security contributions, which are quite large in some countries (including Germany), tax levels are sometimes included, sometimes not, an example of this is given by employers' social security contributions for government employees;
- required government contributions are not included in fiscal reports;
- taxes on inheritance and gift taxes are sometimes considered, sometimes it is estimated that taxes should not be included in the category. For EU countries, VAT and customs duties sometimes appear as a net value sum. In the researched work, they also show that the level of taxation is determined and influenced by many factors, and that between taxation and its base and the level of GDP there is no strict correlation.

In a brief listing of factors influence the tax burden is represented by the volume of public expenditure, which depends on various economic, social and political, to reduce the effect of regressive some countries; especially in Eastern Europe, have provided substantial reduction of VAT on consumer goods and also primary health services, and this is underlined by Angelo Faria (2001). When the consumption tax rate increases on higher income levels it means that this rate is progressive, when this ratio is proportional when we deal with a proportional tax, we say that this rate decrease is a regressive tax

Unable to pay this fee are those who feel the tax burden harder. But this regressive is reduced by certain exemptions from VAT for commodities and population. The necessary medical services to France and New Zealand tried to reduce this effect by collecting the tax on social security and its spending for poor grades. Another pro argument is that VAT is not significantly different from other fees and does not encourage such an increase in taxation or to raise government spending.

On the other hand, opponents argue that a VAT increase in taxation will bring government spending, and this form of tax raises the overall tax burden too easy.

Another appeal of VAT is that it is vulnerable to fraud significant, this is to say that fraud losses in these countries was about 10% net income of such damage VAT collected. We can

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<sup>1</sup> Angelo Faria (2001) - "Tax Policy IMF Fiscal Affaires Department Handbook" (P275).

remember Germany (1.5% of revenues from VAT) and the UK (about 1.5 to 2.5% of revenues from VAT).

Cnossen says that tax is probably the best ever invented in terms of increasing budget revenues, but also in terms of fraud is much easier a tax fraud and RST (Retail Sales Tax) . But still, VAT fraud is significantly less than other types of consumption taxes, property taxes because it refers to different stages in production and not to the final property tax as it is used in the American system. (Retail Sales Tax)<sup>2</sup>. This form of taxation, perhaps better than the VAT it is much less expensive to implement because it represents just the final property tax and is much faster to implement in the tax system of a country, but has one big disadvantage: it is much easier to rig. This type of fraud is based on a fairly simple mechanism, at least in appearance: the country of origin trader VAT invoices (as performed an intra-Community, which fall into the category exempt operations with right of deduction), and the operator economic destination country applying the reverse charge for this operation (because making an intra-Community acquisition calculating and accounting for VAT on intra-Community acquisitions, so that VAT is collected, as well as the tax deductible, but without actually pay it) .Piggot and Whalley (in 2001) illustrates that expanding the tax base of VAT in developing economies can reduce the population welfare sector informal. This deeper critique was developed by Joseph Stiglitz at the Congress IIPF 2003. Many countries in Eastern Europe have adopted lower VAT rates tax hoping to reduce the evasion that would be created with the adoption of a higher rate.

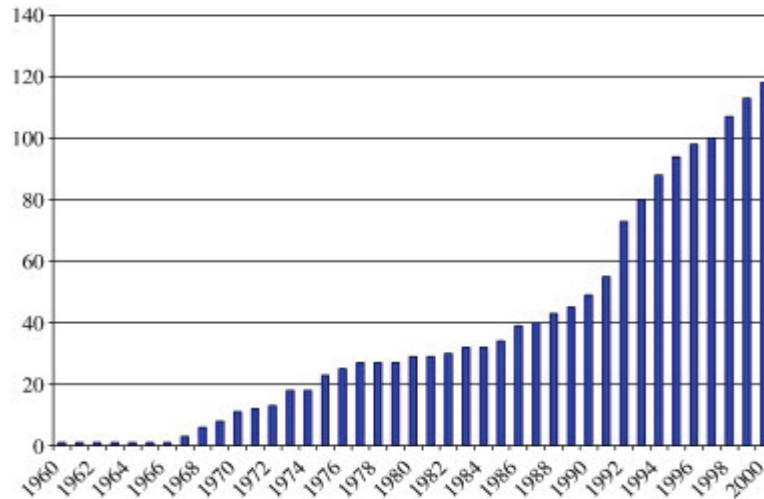
Many European countries have adopted this form of taxation as opposed to letting the United States as income levels increase further or being introduced as a substitute for existing taxes. Comparing the income tax used by countries that have adopted VAT in European countries we can say that income tax is more flexible as a tool to achieve a progressive tax.<sup>3</sup> However, unlike the European model, Americans have no VAT in the tray instead they have a similar sale of VAT ranging from 5% to 12% being imposed in many stages of production (RST-Retail Sales Tax). But still why VAT is better than a sales tax that excludes taxes like VAT cascade? In case of VAT, the taxation is taking place in various stages of production, so is much more difficult to nearly impossible to find certain Legal wickets.

Countries that have adopted VAT charge have chosen this path because this structure does not meet budgetary requirements. Also this method has raised a number of problems and over the years this have been intensely debated. Thus depending on the levers of government each country has its own system of taxation,so that in some states this form of consumption tax works, but in other countries like the U.S. is considered ineffective. Comparing tax rates in the world is difficult and somewhat subjective, tax laws are complex and in most countries the tax burden falling on different groups in each country. However, a strong point of this charge is that avoid cascading charge ( charge applies several times on the same income) by taxing the value added at each stage of production. This practically be the main reason that most countries in Europe adopted VAT. In the chart below we see the number of countries that have implemented this form of taxation over the years:

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<sup>2</sup> Bird, Richard M. & Cnossen, Sijbren. 1998 - "The Personal Income Tax: Phoenix from the ashes?".

<sup>3</sup> John Piggott & John Whalley, 2001. - "VAT Base Broadening, Self Supply, and the Informal Sector".



Value Added Tax (flat tax collected divided as it is called) is calculated in Romania on increasing the value added by each undertaking participating in the cycle of making a product or performance of works that fall in the incidence of this tax circuit eliminating inequalities between phases economic products, applying the attributes on its share of all economic activities. Value added is the difference between the proceeds from the sale of goods or services and effectual payments for goods or services relating to the same stage of economic cycle. By setting the value added to avoid repeated entries external consumption (consumption from third parties) of productive enterprises. VAT tax is a single, neutral, and payment to be made in a single part. The character of this form of taxation whether you cycle through raw material to finished product realization (in this way can pass by two or more companies), is the same level as the rate of taxation, the tax is not dependent on the extent of the economic cycle, it is applied at every stage of manufacturing value added. Operating system of value added is based on a fundamental principle that the fee charged for goods delivered and partner services rendered minus the fee for goods or services purchased or manufactured in their own units for the realization of taxable operations. The object is the value of taxable goods, works and services at billing prices and also a taxable lump sum from the sale.

The mechanism by which one determine the VAT due to state budget continues to show it succinctly. The VAT account is recorded output VAT collected on sales or work product. The account is registered VAT paid input, VAT on buying by traders of material, to receive papers which were made or the payment of benefits. Reducing the output VAT results input VAT which the operator has to pay state tax (VAT to pay). If this difference is negative, output VAT is less than the input VAT, meaning that the trader has to recover this amount from the state. It is easily seen that the trader is not affected by VAT, and it pays only one who actually bear the ultimate consumer.

In fact, the producer who purchased raw materials, manufactures suppliers, although with the delivery of their share of VAT paid do not suffer a monetary loss because the asset sale will collect that amount, state and will return that value but the final consumer is not credited by the state, so that it will fully support the value added tax related. From product tax, value added is considered a consumption tax, borne by the final consumer and the state budget. Therefore an

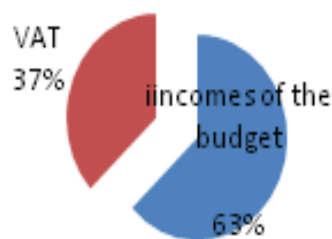
increase in the tax rate primarily affects the final consumer for the same commodity bought in a previous period will have to pay more in the current period.

Regarding foreign trade, VAT is not paid for exports and imports. VAT levied on imports is to offset losses which occur due to taxes export. If goods were delivered to the internal state, revenues would increase.

Also, the VAT on imports represents an equalization of opportunities for companies, because if there is no VAT for importing foreign goods the competitiveness of prices would be more applying that the national one

Countries where the product is consumed implemented VAT and not where it performs. Consequently, everything is exported, is completely absolved of paying this tax, but what is imported is taxed accordingly. VAT has a greater elasticity to economic processes in the sense that, if the business is developing, the VAT payment will be higher. If sales stagnate and VAT amount will be lower consequently in state revenues. The VAT as well as all indirect taxes "copy" the economy going. VAT is a tax, high tax efficiency, but that any indirect tax is unfair. This translates in that VAT is regressive in relation to revenue growth and do not lend themselves to a minimum non-taxable. The VAT affects more pronounced low-income people and those who affect a large proportion of their income for consumer spending. In our country the VAT was introduced for the following reasons: reasons of compatibility with the tax systems of European countries to increase resources for the state and the necessity of replacing the outdated formula has been taxed on the movement of goods. Our country's accession to EU economic structures imposed a series of changes in the national tax legislation to harmonize it with European regulations domain. In global crisis, the government of Romania was forced to increase the VAT rate from 19% to 24% to shrink the deficit this way budgetary. It is true that those who felt that this change was more low-income population small, the final consumer in the position are those that support this growth. Among European countries, Romania had the highest rate increase along with it and arousing discontent of the population who have experienced a rise in consumer prices. This increase had the intended effect, registering a substantial increase from the state budget. With this increase in overall share of VAT revenues increased indicating an increase in revenues as the chart below illustrates:

*The structure of VAT in the total incomes of the budget*



**Source of data: National Institute of Statistics, INS**

To play multiple linear regression model we used data on the United Kingdom, between 1990 and 2007 about the total indirect taxes, excise duties, VAT and consumer price index, thus

implementing the data extracted in Eviews. The base year chosen is 2000. Values are taken from the table below re expressed in millions of pounds.

Year	Total indirect taxes	Excise duties	VAT	Price index
1990	61.096	19.871	34.136	76.8
1991	66.466	21.660	37.523	82.6
1992	70.361	22.501	41.031	86.1
1993	72.591	24.267	41.762	88.3
1994	78.338	26.457	44.690	90
1995	85.507	28.167	47.539	92.4
1996	91.537	30.174	51.692	94.7
1997	96.637	31.866	54.475	96.4
1998	102.478	34.487	57.003	97.9
1999	109.161	36.471	61.415	99.2
2000	112.874	37.271	64.302	100
2001	115.007	36.597	67.051	101.2
2002	120.246	37.284	71.154	102.5
2003	127.731	38.081	77.308	103.9
2004	133.748,5	39.458,45	81.735,42	105.3
2005	135.366,6	39.289,65	83.537,46	107.5
2006	142.036,1	46.196,13	79.359,44	110
2007	155.309,3	50.612,33	87.678,99	112.5

Sursă: [www.eurostat.com](http://www.eurostat.com)

The linear multiple model is:

$$\text{Imp}_{ind\_tot_t} = \alpha + \beta_1 * \text{accize}_t + \beta_2 * \text{TVA}_t + \beta_3 * \text{IPC}_t + e_t; \quad t=1,2,\dots,T,$$
unde  $T=18$ .

In Eviews, the model is:  $\text{Imp\_Ind\_Tot} = C(1) + C(2)*\text{Accize} + C(3)*\text{TVA} + C(4)*\text{IPC}$

$$\text{Imp\_Ind\_Tot} = 8528,4194 + 1.49457*\text{Accize} + 1.01587*\text{TVA} - 157.62403*\text{IPC}$$



Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8528.419	5692.535	1.498176	0.1563
ACCIZE	1.494572	0.087339	17.11226	0.0000
TVA	1.015874	0.037614	27.00770	0.0000
IPC	-157.6240	92.74270	-1.699584	0.1113
R-squared	0.999543	Mean dependent var		104249.5
Adjusted R-squared	0.999445	S.D. dependent var		28264.28
S.E. of regression	665.7775	Akaike info criterion		16.03292
Sum squared resid	6205635.	Schwarz criterion		16.23078
Log likelihood	-140.2963	F-statistic		10208.15
Durbin-Watson stat	1.623409	Prob(F-statistic)		0.000000

Tabel 1 The results for testing the parameters model in Eviews

For testing the parameters model, it is used the t test

#### Test student

The hypotheses are:

- The null hypotheses,  $H_0: \alpha = 0$  or  $\beta_t = 0$ ,  $t = 1, 2, 3$
- The alternative hypotheses,  $H_1: \alpha \neq 0$  or  $\beta_t \neq 0$ ,  $t = 1, 2, 3$

Thus, the coefficient of excises is  $\hat{\beta}_1 = 1.4945$ , the standard error  $SE(\hat{\beta}_1) = 0.087339$ , and the statistics  $\hat{t}_1 = 17.11226$ , calculated thus:  $\hat{t}_1 = \frac{\hat{\beta}_1}{SE(\hat{\beta}_1)} = \frac{\text{Coefficient}}{\text{Std. Error}}$ ; the value p (*p value*) = 0.0000, which shows that the volume of excises in the total indirect taxes is an important factor.

The VAT coefficient is  $\hat{\beta}_2 = 1.015874$ , the standard error  $SE(\hat{\beta}_2) = 0.037614$ , and statistics  $\hat{t}_2 = 27.0077$ . The value of this probability is 0.0000, so VAT is another significant component of total indirect taxes estimated regression model.

The coefficient of the price index is  $\hat{\beta}_3 = -157.624$ , standard error  $SE(\hat{\beta}_3) = 92.7427$ , thus the statistics  $\hat{t}_3 = -1.699584$ . But the probability for this indicator is 0.1113, which exceeds the threshold of 0.05. But student test (t test) has an associated p-value of 0.1113 that is close, so we can say, by assuming a 11.13% risk of error that we are doing by rejecting the null hypothesis is still small, so we can reject, and thus influence the CPI's total indirect taxes.

The intercept is  $\hat{\alpha} = 8528.419$ , the standard error  $SE(\hat{\alpha}) = 5692.535$ , the statistics  $\hat{t}_\alpha = 1.498176$ , and the p value is 0.1563. Although he exceeds the probability of 0.05 applying the t



test we can say that we take a risk that the value of 15.63% to be 0 and thus reject the null hypothesis, accepting the fact that free time is significant for multiple regression model chosen.

Report of determination ( $R^2$ ) indicates what percentage is explained by the significant influence. It is calculated as:  $R^2 = \frac{SPAR}{SPAT} = 1 - \frac{\sum e_t^2}{SPAT}$ . It is used in assessing model quality.

It can take only values falling in the interval [0,1]. The values are closer to 1, the model is better. The value that we take here is 0.999543, and thus we can say that the regression model is good. Approximately 99.95% of total indirect taxes are explained by multiple linear regression model chosen.

S.E. regression is the following indicator of our table, calculated as follows:

$$SE\ of\ Re\ gression = \sqrt{\frac{\sum r_i^2}{n-4}}$$

where r represents the errors;  $\sum r_i^2 =$  Sum Square Resid.

$$\text{Then SE of Regression} = \sqrt{\frac{6205635}{14}} = 665.7774.$$

$$\text{Im } p\_ind\_tot_t = \hat{\alpha} + \hat{\beta}_1 * accize + \hat{\beta}_2 * TVA + \hat{\beta}_3 * IPC$$

$$\text{Im } p\_ind\_tot_t = 8528.419 + 1.494572 * accize_t + 1.015874 * TVA_t - 157.624 * IPC_t.$$

The previous table contains the value of the residuals for each among from the 18 calculated:

$$r_t = \text{Im } p\_ind\_tot_t - \text{Im } p\_ind\_tot_t$$

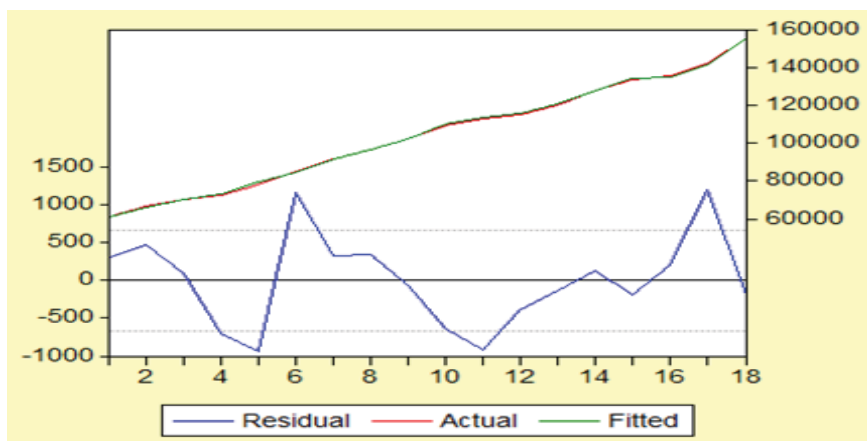
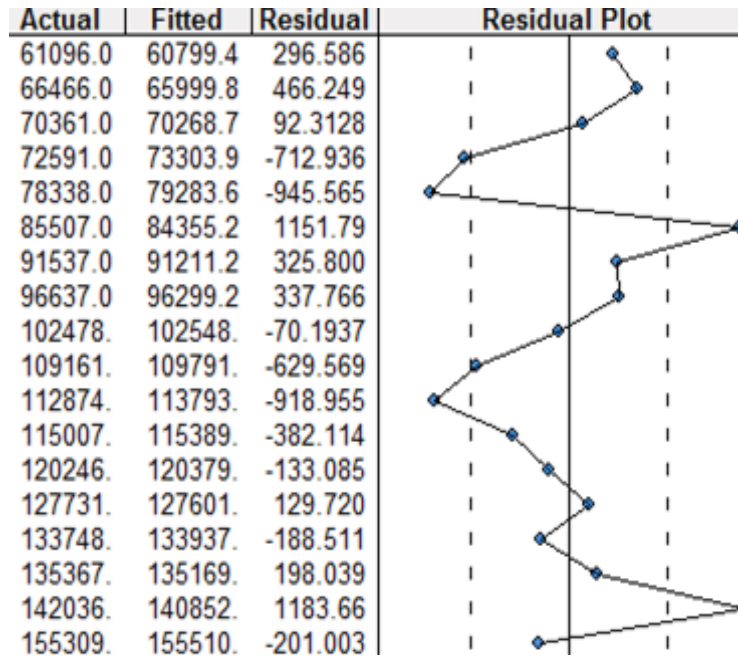


Table 3: The values for residuals, actual and fitted indirect taxes

Charts explaining residue values were also extracted from Eviews as follows: the below graph were residues is calculated as total indirect taxes chart taken from table in nominal source, represented by the red line (Actual) and total indirect taxes taken chart adjusted value, represented by the green line (Fitted). The blue line, is represented precisely by the difference of the residuals of the other two values above



Tabel 4: The values for residuals, actual and fitted indirect taxes

It can be noted that the nominal values are almost equal, so the lines overlap almost second chart thus resulting in low values of their residues.

F test is used to test the validity of the model as a whole.

It is calculated as the ratio between the variation explained by regression and regression unexplained variation each of which is in turn divided by their degrees of freedom. The calculation formula looks like this:

$$F = \frac{\sum(\hat{y}_i - \bar{y})^2 / k}{\sum(y_i - \hat{y}_i)^2 / (T - k - 1)},$$

with k = number of variables for the model, here 3 and

T = number of observations 18.

Analyzing the data in our model we see that F = 10208.15 and a probability of 0.00000. Therefore, we accept that overall multiple linear regression model is better studied.

**The multicollinearity test:** The test of Klein

For the multiple linear model chosen:

$$\text{Im } p\_ind\_tot_t = \alpha + \beta_1 * accize_t + \beta_2 * TVA_t + \beta_3 * IPC_t + e_t;$$

The hypotheses are:

$$H_0 : \exists r^2_{x_i, x_j} > R^2 \text{ is the multicollinearity phenomenon;}$$

$$H_1 : r^2_{x_i, x_j} < R^2 \text{ it is not the multicollinearity phenomenon;}$$

From EViews the obtained results:

Correlation Matrix			
	TVA	IPC	IMP_IND
TVA	1.000000	0.967591	0.991579
IPC	0.967591	1.000000	0.980201
IMP_IND	0.991579	0.980201	1.000000

Tabel 5: The correlation matrix

Value is 0.9995 and find that is greater than the pearson coefficients so multicollinearity phenomenon is not present in the multiple regression model.

#### To check homoscedasticity

Homoscedasticity refers to the hypothesis that the regression model that states that errors must have the same variance model: for any  $t = 1, \dots, T$ . Homoscedasticity presence or not we can identify both graphically and by statistical tests. Graph residuals can not say for sure that neither the existence nor the homoscedasticity heteroskedasticity. The best known test is White's test to test the following hypotheses:

The nule hypohese  $H_0 : \sigma_i^2 = \sigma^2$  for all  $i = 1, \dots, T$

The alternative hypohese  $H_1 : \sigma_i^2 \neq \sigma^2$  for at least one  $i$ .

White Heteroskedasticity Test:				
F-statistic	0.653726	Probability	0.730593	
Obs*R-squared	7.628003	Probability	0.572025	
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 01/23/10 Time: 12:25				
Sample: 1 18				
Included observations: 18				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.23E+08	1.56E+08	-0.785164	0.4550
ACCIZE	-4400.584	5096.226	-0.863499	0.4130
ACCIZE^2	-0.086030	0.070530	-1.219766	0.2573
ACCIZE*TVA	0.019991	0.043870	0.455694	0.6607
ACCIZE*IPC	93.46943	86.50170	1.080550	0.3114
TVA	-1082.017	2819.240	-0.383798	0.7111
TVA^2	-0.003665	0.014057	-0.260728	0.8009
TVA*IPC	7.316386	40.42917	0.180968	0.8609
IPC	4585351.	5405744.	0.848237	0.4210
IPC^2	-41077.56	46417.93	-0.884950	0.4020
R-squared	0.423778	Mean dependent var	344757.5	
Adjusted R-squared	-0.224472	S.D. dependent var	461276.3	
S.E. of regression	510429.2	Akaike info criterion	29.42407	
Sum squared resid	2.08E+12	Schwarz criterion	29.91872	
Log likelihood	-254.8167	F-statistic	0.653726	
Durbin-Watson stat	1.888994	Prob(F-statistic)	0.730593	

Tabel 6: The White test applied for our model for test homoscedasticity

For the initial model has been build:

$$e_i^2 = \alpha_0 + \alpha_1 * accize + \alpha_2 * TVA + \alpha_3 * IPC + \alpha_4 * accize^2 + \alpha_5 * TVA^2 + \alpha_6 * IPC^2 + \alpha_7 * accize * TVA + \alpha_8 * accize * IPC + \alpha_9 * TVA * IPC + v_i$$

New errors  $v_i$  are normally distributed and the independent of  $e_i$ .

In these circumstances I have the null hypothesis: the alternative: not all  $\alpha$  parameters are zero. If we accept the null hypothesis when the hypothesis homoscedasticity accept, and if there are different parameters of 0 accept heteroscedasticity. Output table for this new model obtained by regression apply t test of significance for each coefficient separately. The probability is 0.455 for the free time that exceeds the threshold of 0.05 and 0.8 is smaller than that are in the area of uncertainty. In this interval are coefficients of variables with two exceptions, the coefficient of VAT and the coefficient of CPI. For later, we can accept the null hypothesis. Also for F-test probability is quite high and again located in the area of uncertainty,  $p = 0.73059$ . Considering the value of  $p$  we could say that we reject the null hypothesis (presence of heteroskedasticity) with an error of 73%, therefore we can accept the null hypothesis (presence homoscedasticity) with an error of 27% (100% -73%).

**The autocorrelation analysis of the first rank:**

**The Durbin – Watson test:**  $\text{cov}(e_t, e_{t-1}) = 0$

For the analysed equation:

$$\text{Im } p\_ind\_tot_t = \alpha + \beta_1 * accize_t + \beta_2 * TVA_t + \beta_3 * IPC_t + e_t; \text{ first-order}$$

autocorrelation of errors is expressed by the relation:  $e_t = \rho e_{t-1} + v_t$ , for  $t=2, \dots, T$  where  $v_t \sim N(0, \sigma_t^2)$ . DW statistical test used pair of hypotheses:  $H_0: \rho = 0$  (the nule hypotheses);  $H_1: \rho \neq 0$  (the alternative hypotheses). DW statistics are tabulated, its values depend on the specified significance level, the number of observations in the sample and the number of variables influence the regression model. This, for a specified significance level, has two critical values is obtained from the DW tables.

Reject the null hypothesis regions are defined as:

If  $DW \in (d_2, 4 - d_2)$ , it does not autocorrelation, if  $DW \in (0, d_1)$  the positive autocorrelation of the residuals; if  $DW \in (4 - d_1, 4)$  the negative autocorrelation of the residuals; if the DW is between the two intervals  $(d_1, d_2)$  or  $(4 - d_2, 4 - d_1)$  the test is not conclusive. In the model analyzed, DW statistics = 1.6234. For a significance level of 5%, a total of 18 observations and four variables influence the statistics are tabulated values: 0.93 and 1.69. The value obtained in the model belongs to the range so we can not rule on the autocorrelation of disturbances.

After analyzing the data entered in the multiple regression model, for best results on homoscedasticity, autocorrelation of errors, or model of normality may enter more observations to capture the relations between them

## Conclusions

The model which explained the relationship between the indirect taxes, VAT, CPI and excises is a valid model and the majority of parameters are significant. The relationship is linear and strong between the four variables. It was studied the hypotheses for testing our model.

I think that it is a strong relationship between that four variables because the taxes represent an important factor for the quality of people's life. If people are pressured by the taxes, they cannot concentrate for increase their educational level and they are only oriented how to obtained money.

The model can be improved by analyzing a long series of data and can be extended for many countries and the obtained results can be compared and can be established which country has the better taxation system. VAT is in fact a tax on consumption, calculated and applied at every stage of goods and services flow from primary production to final consumption stage.

Many European countries have adopted this form of taxation as opposed to United States as income levels increased further or were introduced as a substitute for existing taxes. Comparing the income tax used by countries that have adopted VAT in European countries it can be said that income tax is more flexible as a tool to achieve a progressive tax. Comparing tax rates in the world is difficult and somewhat subjective, tax laws are complex and in most countries the tax burden falling on different groups in each country.

Value Added Tax is calculated in Romania on increasing the value added by each undertaking participating in the cycle of making a product or performance of works that fall in the incidence of this tax circuit eliminating inequalities between phases economic products, applying the attributes on its share of all economic activities.

Fiscal pressure generated by the size of taxes paid by taxpayers is high in Romania and distribute. In Romania VAT became the target of argued opinions due to the tax burden on the population and especially small and medium businesses, besides direct taxes population supports a series of indirect taxes which currently holds the principal place within fiscal resources.

A high taxation, a „sick” economy can only have negative consequences because of the disrupt demand for goods and services and less likely investments. Among various tax savings in order to attract resources used by the State budget, those which are pressured are significant tax: personal income tax, consumption taxes and social contributions. I believe that indirect taxes are very burdensome for taxpayers and the dimensions of income and wages are lower compared to the fees and charges incurred by individuals.

For a more judicious distribution of income the tax system is necessary for policymakers to consider how it is constructed, the criteria underly the differentiation of taxes and how they participate in the formation of budgetary resources.

I appreciate that in the current period, the configuration of our country's tax revenue will over-tippe the balance in favor of indirect taxes along with the increase in VAT to 24%, resulting in increased tax burden on labor, with extremely negative effects on investment and savings.

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