ECONOMETRIC ANALYSIS OF THE EVOLUTION OF VAT IN ROMANIA AND OF THE DIRECTIONS TO FOLLOW FOR A SUSTAINABLE ECONOMY

Lecturer PhD Anamaria-Geanina MACOVEI
Stefan cel Mare University of Suceava, 720229, Romania
anamaria.macovei@usm.ro
Associate Professor PhD Mihaela TULVINSCHI
Stefan cel Mare University of Suceava, 720229, Romania
mihaela.tulvinschi@usm.ro

Abstract
The importance of efficient value added tax collection is vital for obtaining public revenues close to the level needed to finance public investment in infrastructure, health and education. In this context, the VAT rate is important because a change in it, regardless of the meaning of the change, can generate both positive and negative effects on the economic environment and budget revenues. The purpose of the article is the analysis of the evolution of the standard VAT rate in Romania in the period 1.07.1993 - 31.12.2020, based on the estimated equation of the cubic regression model. The research aims to observe whether there is a correlation between the results suggested by the cubic regression model and the decisions that have been applied or could be applied in the framework of VAT policy.

Key words: VAT, cubic model

JEL Classification: *H27, C21, C51, C87*

I. INTRODUCTION

Considering the evolution of the business environment, tax legislation has become increasingly sophisticated, expressed through a complex set of rules involving a variety of direct and indirect taxes. Internationalization of business and capital movements have forced governments to protect their tax base with increasingly complex but often different rules from country to country. Public sector growth has increased the share of tax revenues in countries' gross domestic product, as well as the effective tax rate for taxpayers. Under these conditions, there is a conflicting interest between governments' desire to increase tax revenues and the public interest in encouraging the business environment by reducing taxes and maximizing post-tax refunds.

The efficiency of the tax system can be guaranteed by the existence of a good compliance strategy involving the use of complex mechanisms by tax authorities to detect non-compliant behaviors and to constantly monitor taxpayers' relationship with tax authorities. In the literature, compliance is defined as "compliance with reporting requirements, ie tax payers record all tax returns at the right time, and the statements accurately report tax liability in accordance with the laws applicable at the time of filing" (Devos, 2013) or "availability taxpayers to act in the spirit and letter of the tax law without the intervention of the tax authorities by enforcing enforcement measures" (James & Alley, 2002). Starting from the attitude towards compliance, the tax authorities "must be able to apply various compliance strategies specific to the risk profile associated with taxpayers, in order to reduce the pressure on them" (Balteș, 2017).

Budget revenues underlie the functioning of any state. The divergence between the state's desire to collect taxes and the willingness of taxpayers to bear them encourages tax evasion. If the tax authorities want all taxpayers to comply with the law, then they should be subject to administrative measures equally. "A correct calculation involves very clear rules" (Roedler, 2014). Taxpayers are more receptive to complying with tax obligations voluntarily when tax authorities meet certain requirements, such as the focus on tax guidance services and the application of a fair tax system. „The prosperity of the taxi is appreciated today, in the western countries as being more like an obstacle for the investments, for the consumption and economic activity in general than as an instrument leading to social justice" (Grosu & Socoliuc, 2008).

Determining the tax burden threshold at the taxpayer level is difficult to estimate. „Practice has shown that an excessive taxation results in reducing budget revenue duet o tax fraud and abstinence of tax payes" (Haralambie, 2014). As a member state of the European Union, Romania updates its tax legislation to the requirements of sustainable development and European directives. In accordance with the principle of proportionality, State regulatory intervention must be adequate and necessary in order to achieve the objectives of the legislative measure in question, without exceeding what is necessary to achieve them. As the application of International Accounting Standards has reduced the usefulness of accounting information for tax purposes, the European Union has sought to recalibrate the basic elements of accounting (Sikka, 2017).

The European Union acts by supervising national tax rules to ensure the coherence of European policies, aiming at: promoting growth and the labor market, ensuring the free movement of goods, services and capital in the single market, guaranteeing non-discrimination through taxes on consumers, workers and businesses another Member Stat (https://europa.eu/pol/tax/index_fr.htm).

II. GENERALITIES REGARDING THE FISCAL POLICY ROMANIA – EU

As a component of financial policy, fiscal policy must always be approached in close connection with budgetary policy. Fiscal policy "can prove its elasticity and effectiveness especially in countries with decentralized and open economies" (Beltram & Mehl, 1997). In principle, fiscal policy must identify the sources of revenue through which the collection is made available to the state the amounts necessary to cover public expenditures. In the opinion of the authors M.Ș. Minea and C.V. Costaș (Minea & Costaș, 2006), through fiscal policy can act to protect or encourage certain economic branches by: stimulating economic agents to make investments in certain areas; increasing product quality and competitiveness, protecting the environment, stimulating exports Another author (Brezeanu, 2010) states that the last concern of the state is not economic, and the aim is to ensure the national community conditions of security, freedom and social justice, sufficient to allow citizens to "Each state has its own dual-function fiscal policy. It concerns "the distribution of public revenues between different taxes, as well as how they are collected and their share" (Heckly, 2006). The fundamental interest of the state "is to fairly collect budget revenues, and the most important responsibility of the admin is to protect the public tax authority" (James, 2009).

In the paper "The role of the accounting profession and accounting in increasing the degree of tax compliance and reducing tax evasion", the authors (Șova, Dobre & Popa, 2017) identify the causes of the high tax pressure that exists in Romania. Of these, we mention:
- the need for short-term budget revenues, regardless of the medium- and long-term objectives of strengthening the tax base;
- ignoring the fact that increasing the level of taxation decreases the taxes actually collected;
- increased bureaucracy;
- significant tax evasion, which contributes to tax increases, in order to achieve the planned tax revenue.

In Romania, the budget deficit is a main factor influencing the fiscal pressure. Worldwide, studies (Laffer, quoted by Brezeanu, 2009) show that tax increases are those that lead to a decrease in tax revenues from a certain percentage. By virtue of this demonstration, a reduced tax rate can attract to the budget revenues at least equal to a higher rate, through the effect it would have on general economic activity. The process of diminishing tax revenues in real terms has several factors, among which the most significant is the phenomenon of financial blockage generated by the economic crisis and tax evasion. In the structure of tax revenues, the existence of a balance of parity between direct and indirect taxes, with a slight upward trend in the latter, can be interpreted as unfavorable for final consumers as it affects relatively more those with average incomes and below average, representing a significant part of the population.

III. VAT IN ROMANIA

The value added tax is the main indirect tax in our country, in terms of both the scope and the large volume of revenues to the state budget. It was introduced in Romania on July 1, 1993, once the transition to a market economy took place, and thus the tax on the movement of goods during the period was replaced 1989-1993.

The evolution of standard VAT rates in Romania during 1993 - is currently illustrated in the figure:
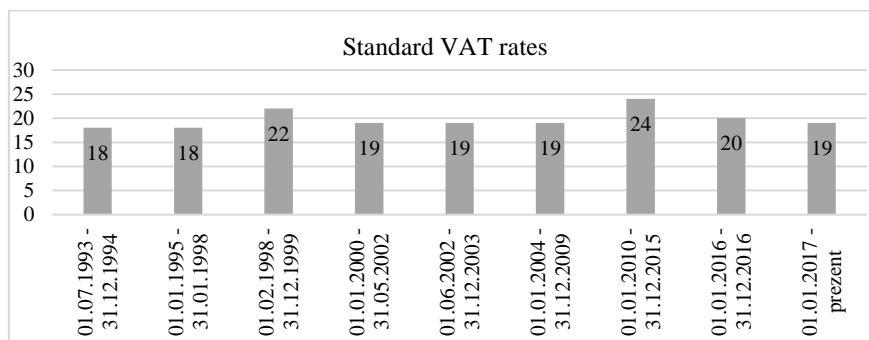

Figure 1 – **The evolution of applied VAT rates in Romania**
Source: Elaborated by the authour using the data on the
https://www.scribd.com/document/339078175/Evolu%C5%A3ia-Cotelor-TVA-In-Perioada-1993-2017

Since the introduction of the value added tax in Romania until now, it has registered the following VAT rates quoted in ascending order of their size, namely: 18%, 19%, 20%, 22% and 24%. Between July 1, 2010 and December 31, 2015, in Romania it was practiced among the highest VAT rates in the European Union. The highest VAT rate was applied by our neighbor, Hungary with a percentage of 25%, followed by Sweden and Denmark, with a percentage of 25% of the VAT rate. As an average of the value added taxes used in the member countries of the European Union is a percentage between 18% and 21%.

Table 1. Descriptiv VAT

			Statistic	Std. Error
Standard VAT rates	Mean		20.18	.212
	95% Confidence Interval for Mean	Lower Bound	19.76	
		Upper Bound	20.60	
	5% Trimmed Mean		20.09	
	Median		19.00	
	Variance		4.957	
	Std. Deviation		2.227	
	Minimum		18	
	Maximum		24	
	Range		6	
	Interquartile Range		3	
	Skewness		.935	.230
	Kurtosis		-.834	.457

Source: Authors Computation with the aid of IBM SPSS Statistics, version 24

Analyzing the standard VAT rates, the lowest value of 18% is reached in the period 1.07.1993 - 31.01.1998, and the highest value of 24% is reached in the period 1.01.2010 - 31.01.2015. According to Table 1, the average value of standard VAT rates for the analyzed period is 20.18%, lower than the European average (Tulvinschi & Macovei, 2020).
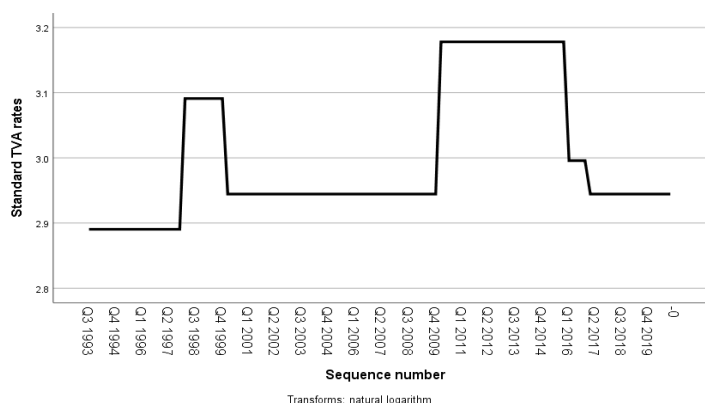

Figure 2 – **The evolution biannual VAT rates in Romania**
Source: Authors Computation with the aid of IBM SPSS Statistics, version 24

The changes in the standard VAT rates, both in Romania and in other European Union countries take place at certain periods of time because these changes are imposed by the fiscal policy of each country, and in the case of European Union member countries, the changes take place. due to the EU's fiscal policy, thus wanting a harmonization of the fiscal policies in the field of VAT. For value added tax, Member States have set standard quotas, ie with a quota of 10 percentage points above the mandatory minimum level of 15%. Cyprus and Luxembourg have a 15% share of the minimum VAT rates, followed by Germany and Spain with 16%, the United Kingdom with 17.5% and then Estonia, Latvia, Lithuania and Malta with a VAT of 18%. (Văcărel, 2007).

More about this source text Currently, in Romania, three VAT rates are used: the standard rate of 19%, as well as the reduced rates of 9% and 5% respectively. The standard rate applies to all taxable transactions, but except for VAT-exempt transactions or transactions subject to reduced rates, and its level is 19% as of January 1, 2017. The same value of 19% is found in Cyprus. In 2020, in the EU member states we find the lowest value of the standard VAT rate in Germany of 16%, and the highest value in Hungary of 27%.

IV. MODEL ANALYSIS. EMPIRICAL DATA AND RESULTS

The present research aims to analyze the evolution of the standard VAT rate in Romania in the period 1.07.1993 - 31.12.2020. The estimated equation of the cubic regression model (Macovei, 2020), has the form:

$$VAT = \alpha + \beta \cdot t + \gamma \cdot t^2 + \mu \cdot t^3 + \varepsilon, \qquad (1)$$

where VAT represents the standard VAT rate in Romania and t represents the time variable, namely the rank of the period. The variables of the analyzed model are presented in table 2:

Table 2. Model Description

Model Name		MOD_28
Dependent Variable	1	Standard VAT rates
Equation	1	Cubic
Independent Variable		Rank period (t)
Constant		Included
Variable Whose Values Label Observations in Plots		Unspecified
Tolerance for Entering Terms in Equations		.0001

Source: Authors Computation with the aid of IBM SPSS Statistics, version 24

The intensity of the connection between the variables of the cubic model is presented in the Summary table:

Table 3. Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.623	.388	.370	1.767
The independent variable is Rank period (t).			

Source: Authors Computation with the aid of IBM SPSS Statistics, version 24

According to Table 3 there is an average link between the model variables, because the correlation ratio is 0.623 less than 0.750. The determination ratio is 0.388, so 38.8% of the change in the standard VAT rate is explained by the change in the rank of the period (t). Standard VAT rates have changed over the period under review due to changes in fiscal policies.

The validation of the cubic model is presented in the Anova table:

Table 4. ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	209.537	3	69.846	22.379	.000
Residual	330.826	106	3.121		
Total	540.364	109			
The independent variable is Rank period (t).					

Source: Authors Computation with the aid of IBM SPSS Statistics, version 24

In the Anova table the value of Fisher statistics is 22.379%. The cubic model explains the significant dependence of the standard VAT rate depending on the rank of the period (t) because we have in the Anova table a value of sig. = 0.000. Using the least squares method, the sum of the errors in the square is 330,826. In 1999, the basis for applying the value added tax in Romania was only 62% compared to the environment in the European Union and only 77% compared to the average in the countries of Central and Eastern Europe.

The highest residual values are found in the period 1.01.1998 - 31.12.1999, where the VAT value is 22%, having an increase of 4% compared to the previous analysis period. If in 1996, in Romania, the Gross Domestic Product (GDP) registered an increase of 3.9% compared to 1995, in the period 1997-1999, the Romanian economy was marked by the crisis, with negative effects on economic growth, the level of collection of budget revenues and GDP developments. Thus, in 1997, GDP decreased by 6.6%, in 1998 by 7.3% and in 1999, by 3.2% (Anghelache, Deacon & all, 2016). Often, during periods when budget revenues are considerably reduced, the principle of tax flexibility is used. In this context, the increase in the VAT rate can be seen as a rapid adaptation to the needs of short-term fiscal policy.

Table 5. Table Residuals Statistics[a]

	Minimum	**Maximum**	**Mean**	**Std. Deviation**	**N**
Predicted Value	18.00	22.15	20.18	1.386	110
Residual	-2.752	3.628	.000	1.742	110
Std. Predicted Value	-1.571	1.423	.000	1.000	110
Std. Residual	-1.558	2.054	.000	.986	110

a. Dependent Variable: Standard VAT rates

Source: Authors Computation with the aid of IBM SPSS Statistics, version 24

Since 2000, the standard VAT rate is 19%, registering a decrease of 3% compared to the previous year. This change was valid until the end of 2009. In 2007, starting with January 1, Romania became a member of the European Union. Analyzing the evolution, the prediction for Romania in the period analyzed according to the cubic model minimum value is reached, namely 18%, and the maximum value is 22.15%, much lower than the value reached in July 2010 when the largest increase of 5 % of the standard quota reaching a value of 24%. The year 2010 is the year in which the effects of the economic crisis that broke out in the USA in 2007 were felt the most.

The correlation coefficients for the cubic model are calculated in table 6:

Table 6. Coefficients

	Unstandardized Coefficients		**Standardized Coefficients**	**t**	**Sig.**
	B	Std. Error	Beta		
Rank period (t)	-.138	.054	-1.977	-2.548	.012
Rank period (t) ** 2	.005	.001	7.933	4.273	.000
Rank period (t) ** 3	-3.364E-5	.000	-5.807	-5.020	.000
(Constant)	19.480	.697		27.933	.000

Source: Authors Computation with the aid of IBM SPSS Statistics, version 24

According to Table 6 the equation of the model is:

$$VAT = 19.480423717584 - 0.1380277796901313 \cdot t + 0.004832959213311957 \cdot t^2 \quad (2)$$
$$-3.363840746866611e\text{-}005 \cdot t^3$$

The VAT value at time 0 is 19.48%, lower than the average of the standard WATT quota for the analyzed period of 20.18%. According to the model obtained, the value of the standard VAT rate in Romania for the first quarter of 2021 should be 17.70%, so it should decrease by 1.30% compared to the previous year. For the sustainability of the economy, fiscal policy measures cannot be based solely on lowering the VAT rate, but could aim at three medium and long-term objectives: improving and simplifying value-added tax collection, improving VAT administration and ensuring non-discrimination for investors. Analyzing the data and assuming that the evolution of VAT keeps its trend and variation, then the value of the standard VAT rate in Romania in 2021 should be 17.22% with 1.78% lower than at present. The standard VAT rate of 17% is found in Luxembourg. In most EU Member States the standard value of VAT is constant in recent years, but there are exceptions, Germany which in 2019 had a VAT of 19%, and in 2020 drops sharply by 3% and has a VAT of 16%, a change that can be interpreted as a trend to encourage consumption. If we derive the relation (2) in relation to the rank of the period (t), then we obtain:

$$\frac{\partial VAT}{\partial t} = -0.138027779690131 + 0.0096659184266239 \cdot t - 0.0001009152224066 \cdot t^2 \quad (3)$$

If $\frac{\partial VAT}{\partial t} = 0$, then the discriminant of this equation has the value 0.0000377135626873, therefore the determined cubic model has two inflection points, one of minimum for which the VAT value is 18.3647 and one of maximum for which the VAT value is 22.1551. Analyzing the values of the standard VAT rate, we notice that in the period 1.07.1993 - 31.12.1999, Romania has the VAT closest to the inflection points. The two inflection points are also observed in the graph of the cubic model determined:
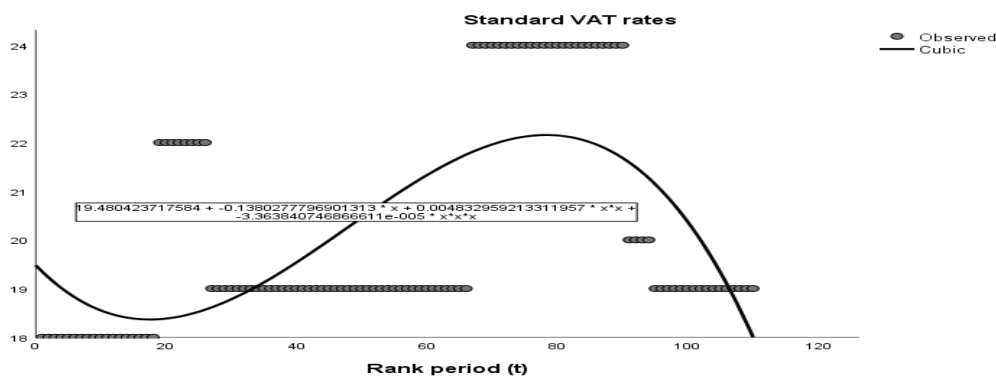
Figure 3 – **Estimarea modelului de regresie cubic**
Source: Authors Computation with the aid of IBM SPSS Statistics, version 24

A decrease in the standard VAT rate would have the effect of increasing domestic consumption and reducing tax evasion. In the event of a reduction in the standard VAT rate, final consumers would pay less for the goods and services purchased, but we cannot neglect the fact that the final price is set by traders and there are no economic levers to diminish traders' desire to practice commercial surcharges. bigger. VAT revenues are one of the main sources of revenue for the state budget. Budget losses could be supplemented by revenue from increased economic exchanges, but if there is no such increase, the state budget will not have the resources to finance spending. In such a situation, the fiscal policy would involve a compensation on the part of tax revenues, in other words, it would lead to an increase in another tax or another tax.

V.   CONCLUSION

Value added tax is carried over from one stage to another of the production and distribution process to reach the final consumer, who bears VAT as an integral part of the selling price of the product, service or work performed. So VAT is, in essence, a tax that affects consumption, being borne by the person who purchases and uses for himself the good or service in the price of which the tax is also incorporated. In this context, the decrease in the VAT rate, as it results from the cubic regression model, can be interpreted as an influencing factor for the increase of domestic consumption. This increase in consumption is not always beneficial because it can deepen macroeconomic imbalances.

The reduction of the standard VAT rate must be approached not only as a reduction of the tax burden and a useful tool in planning and optimizing cash flow, but especially as a real oxygen bubble for honest economic agents in their economic competition with evaders. If, at the same time as the reduction of the standard VAT rate, a decrease in tax evasion is achieved, the budget revenues do not decrease in a significant proportion. In the short term, lowering the tax rate can create a cash gap because it cannot be compensated quickly by increasing the tax base. In the medium and long term, the tax bases declared by taxpayers will be re-established at a fair level, and lowering the tax rate may prove to be a beneficial measure. If the reduction of the VAT rate does not have as a consequence the reduction of tax evasion, the beneficial effects can be expected. Only a stimulation of consumption is achieved, but not a better collection of tax revenues. Encouraging too much consumption in Romania can also have negative consequences, by increasing the trade deficit and the current account deficit, given that domestic production can not cover increased demand. A further reduction in VAT would further stimulate consumption in a macroeconomic context where a moderation rather than an acceleration would be needed to limit the deepening of deficits. The collection of VAT tax revenues could be achieved through reform and digitization of the tax administration.

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