



## WHAT DRIVES THE PERFORMANCE OF VALUE-ADDED TAX? INVESTIGATING THE EFFECTIVENESS OF TAX ADMINISTRATION IN SERBIA

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**Abstract:** It is generally accepted that within nations devoid of significant limitations on administrative capacity, all products and services should be subject to a uniform value-added tax (VAT). If compliance is impeccable, the c-efficiency of VAT in these countries, which measures actual revenue over prospective revenue, should be one. The establishment of a proficient VAT administration, characterized by streamlined processes and procedures, is advantageous for many stakeholders. This includes national administrations as well as individual taxpayers and citizens. The study used primary data sources to identify the relationship between tax administration and the performance of VAT. This paper offers an assessment of tax administration effectiveness in Serbia in the period from 2005 to 2022. The investigation aims to accumulate empirical information regarding administrative components that affect the c-efficiency ratio through careful observation and data collection. The study assured that tax administration significantly affects the performance of VAT. The outcome variable, the c-efficiency ratio is highly affected by the effectiveness of tax administrators.

**Keywords:** VAT, tax administration, performance of VAT, c-efficiency ratio, tax reform, EU, Serbia.

**JEL classification:** H21, H25, H70

## Introduction

Numerous scholars have explored the efficiency of Value Added Tax (VAT), and currently, there is available empirical research on this subject<sup>1</sup> (Ebrill, Keen, & Perry, 2001). This is largely because VAT holds a crucial position in global tax systems, constituting the predominant share of tax revenues in state budgets when compared to other tax forms and that, compared to other forms of taxes, this form of tax makes up the largest part of tax revenues in the state budget (Bikas, Anduskaite, 2013, p. 41).

Enhancing the effectiveness of VAT is particularly essential in nations dependent on indirect taxes and those with national incomes categorized as lower middle or low (Cnossen, 2022). The performance of VAT, as predicted by theory, is a significant factor in its expeditious global implementation. Nonetheless, this forecast is not substantiated by substantial empirical evidence, particularly with regard to developing nations (Adhikari, 2020).

Therefore, it is very important to assess VAT's performance as precisely as possible, and, if necessary, create a tax policy concept based on the estimated ratio. In order to ensure optimal tax revenues, measuring the performance of VAT therefore plays a very important role.

A number of factors can affect how efficient VAT is. On the other hand, the number of studies dealing with the performance factors of VAT is limited. After reviewing pertinent literature on elements influencing VAT performance, it was determined that there is insufficient research specifically investigating the influence of tax administration on VAT performance. Bearing in mind the importance of tax administration, the subject of the paper is factors in the domain of tax administration that can affect the performance of VAT.

The research aims to scrutinize the influence of tax administration on VAT performance, following an in-depth assessment of relevant factors. It seeks to highlight the significance of tax administration in enhancing the effectiveness of this tax form. In order to compare the performance of the Republic of Serbia with the European Union (EU) developing countries, the VAT performance of those countries was also evaluated. The paper concentrates on EU member states that underwent "significant changes" amidst economic transformations, with a specific focus on those where VAT serves as the primary source of tax revenue. The study centers on Greece, Hungary, Estonia, Slovakia, Czech Republic, Poland, Romania, Bulgaria, Latvia, Lithuania, and Slovenia. Accordingly, the analysis is a continuation of the research conducted in 2019 (Đorđević, Todorović & Ristić, 2019). Due to the non-transparency of the data, the continuation of the research is limited to the Republic of Serbia in the empirical part. Therefore, the impact of tax administration factors on the performance of VAT was analyzed in the Republic of Serbia. In particular, the

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<sup>1</sup> VAT is an essential and often primary contributor to the budget in the EU Member States.

paper aims to address the following queries: What empirical connection can be found between the independent variables under analysis that explain how well VAT performs and how effective tax administration is? What factors of tax administration determine the performance of VAT and how to achieve higher revenues? Due to the fact that data on the effectiveness of tax management are non-transparent, empirical research on tax administration factors was conducted using primary data from the Republic of Serbian Ministry of Finance.

The document is divided into five sections. In section two, an overview of the existing literature on the factors that determine the performance of VAT is presented. Section three reviews the performance of VAT in the analyzed countries. In section four, an empirical analysis for the Republic of Serbia is conducted. Accordingly, the empirical methodology and evaluation of the model are given. In the last section, guidelines are given to fiscal policymakers in the direction of improving the efficiency of VAT. Bearing in mind that developing countries do not have enough funds to implement certain measures, as well as the fact that it is impossible to instrumentalize all countries within the framework of one strategy, this part indicates the mechanisms that would be applicable in developing countries. The investigated mechanisms should enable an increase in VAT collection and an improvement in its performance.

## 2. Literature review

The earliest research on the determinants that could influence the improvement of the efficiency of VAT and the mitigation of collection problems is related to the *standard tax rate*. Using statistical data from 34 countries, Bogetic & Hasan (1993) looked at the main factors influencing VAT. They examined the connection between VAT performance and the tax base, the single rate of VAT, and the variables that indicate the variation between the highest and lowest rates. Twenty nations with a single tax rate and fourteen nations with tax policies that use multiple VAT rates were included in the analysis. Their OLS-based regression analysis's findings validated the effect of tax rate and tax base on VAT performance. With the growth of the tax base, VAT revenue rises. Additionally, empirical evidence demonstrates that nations with a single rate generate more revenue from taxes than do nations with multiple rates. The model they came up with is useful for forecasting VAT potential in nations like Bulgaria that are thinking about enacting a single tax rate.

This empirically proven conclusion is connected with the position of the well-known economist Keen, who, after fifty years of dealing with VAT, emphasizes that this tax form is the most effective if only one single tax rate is applied in the tax system in connection with it (Keen, 2007). Keen, a few years later, looked at the c-efficiency coefficient with his collaborators. Economists find factors that are positively correlated with the coefficient, such as a high literacy rate, the period of application of VAT, and the relationship between gross domestic product and trade

(Ebrill et al., 2002). According to Keen's (2007) research, the standard rate of VAT is one element that may have a capital impact on how effectively this type of tax is collected.

Empirical studies about the effects of tax rates on EU member states were carried out by Široký & Kovářová (2010). Certain studies indicate that the tax rate may have unfavorable effects. Antić (2014) carried out an analysis on the VAT efficiency of Bosnia and Herzegovina and the EU. The policy of raising the standard rate in EU member states without broadening the base and maintaining the current tax rate structure, according to the author's research, would jeopardize the effectiveness of VAT collection. Excessive standard rates exacerbate market turbulence and hinder crisis recovery. Several empirical investigations have demonstrated a negative relationship between the effectiveness of VAT collection and the standard rate of VAT. Economists concur that high tax rates are insufficient to guarantee any type of taxation's required efficiency in terms of collection. Owens (2011) provides theoretical support for this claim, showing that while raising the standard rate is thought to be the simplest approach to lower budget deficits, doing so may jeopardize VAT's performance. Many reliefs are applied in tandem with the rise in the standard rate, and these measures, when combined with lower rates, may restrain the increase in tax collections. Therefore, additional factors should be taken into account when analyzing the improvement of VAT performance.

Increasing the tax base, utilizing reduced rates sparingly, and enhancing the efficiency of tax administration are further ways to enhance the performance of VAT. VAT performance may benefit from more efficient tax administration. As a result, over the past 20 years, some research has looked at how effective tax administration is. The analysis of collection efficiency for the years 1970–1999 is done by Aizenman et al. (2005) using panel analysis and demonstrates how control probability, structural factors, and penalties for overpayment of taxes all play a role. A country's level of urbanization, the proportion of its gross domestic product devoted to agriculture, and the progress of international trade are all variables that can impact the efficiency of VAT collection. The degree of urbanization can potentially impact tax revenues in a substantial way, since a low degree of urbanization inherently facilitates more convenient methods of evading VAT.

Under the auspices of the EU, Bikas et al. (2013) examine additional variables that have a substantial impact on VAT collection. In order to accomplish this, they utilized data spanning from 2004 to 2011 and implemented a multiple regression model. Concerning the calculation of VAT and income, their research revealed a strong correlation between the variables under consideration. The authors incorporated the following macroeconomic indicators into the model: unemployment, consumption (including household and government consumption), exports, imports, and gross domestic product per capita within the EU member states. Additionally, this study proposes that governments should prioritize public policy and administration reforms.

Enhancement of tax authorities' quality of control is the most significant determinant affecting the collection of VAT revenue. Nonetheless, this is an additional "burning issue" in the tax administration of every tax system. By using Bosnia and Herzegovina as an example, Grgić and Terzi (2014) provided a response to the question of what will occur to the economy if the issue of tax collection is not addressed. As per the authors' assertions, the most significant determinants affecting tax collection are those pertaining to the proficiency of inspectors and administration.

The performance of administration in thirteen EU countries was assessed by Savić et al. (2015) through the utilization of the data envelopment analysis efficiency measure and regression analysis technique. The findings derived from the regression analysis suggest that the effectiveness of tax inspectors has a substantial impact on evasion within the countries under examination. Evasion is less prevalent in nations with more efficient tax inspectors (Savić et al., 2014, p. 1146). Several authors have investigated the impact of information regarding the efficiency of tax authorities and the likelihood of control on taxpayers, among other variables (Alm & McKee 2006). It was discovered that taxpayers are more likely to provide consent when the tax authorities announce their control.

The topic of tax administration have been studied by modern scientists (Keen and Slemrod, 2017; Olivares, 2018; Gashenko et al., 2019). Recent research on this topic indicates that the performance of VAT is also determined by the mobility of the population (Rosso & Wagner, 2023). Rosso and Wagner (2023) investigate the extent to which reduced mobility affects VAT collection. Analyzing a panel of twenty countries, the authors came to the conclusion that the policy of mobility restrictions affects revenue collection. Indić et al. (2023) concluded that the c-efficiency coefficient is positively impacted by the economy, consumption, expenditures of countries, and VAT when examining the Benelux countries. At the same time, the authors came to the conclusion that the tax rate, unemployment, and inflation have a negative effect on the collection of VAT revenue.

Research by Ma et al. (Mu et al., 2022) shows that VAT performance is affected by ineffective VAT audits. Analyzing primary data from 377 registered VAT payers in Ethiopia, the authors concluded that ineffective auditing, a poor tax education system, a lack of tax resources, and long-standing tax rates negatively affect the performance of VAT. According to the authors, inspectors' level of knowledge or tax elements are factors that have a substantial and positive impact on the outcome variable, tax revenue performance. A mentorship chain connecting seasoned auditors to less skilled and inexperienced auditors was suggested by the study. The government ought to provide easy-to-use technologies that can swiftly identify instances of tax avoidance. Both the current tax rate and the tax education program need to be changed. Authors, Kowal & Przekota (2021) also gave a proposal reform of tax authorities. The suggested modifications have the potential to enhance the efficacy of VAT administration, diminish the prevalence of the informal economy, curtail instances of tax evasion, and exert a favorable impact on economic growth.

### 3. C-efficiency ratio as an important diagnostic tool in assessing the performance of VAT

#### 3.1. Estimating the performance of VAT in EU developing countries

The c-efficiency coefficient is one of the most important tools in assessing the justification for applying VAT in a country.

**Table 1. C-efficiency ratio in selected countries, 2022**

Country	%
Bulgaria	0,69
Czech	0,64
Estonia	0,76
Greece	0,42
Croatia	0,79
Latvia	0,57
Lithuania	0,59
Hungary	0,62
Poland	0,56
Rumunia	0,46
Slovakia	0,53
Slovenia	0,59

Source: Eurostat, author's calculation.

In addition to using this ratio to assess the performance of VAT, it is also used in the analysis of uncollected income from VAT. Table 1 shows that in the countries analyzed in 2022, the maximum efficiency was recorded in Croatia, while the lowest efficiency was recorded in Greece. In other words, on average, Croatia and Estonia use 75% of the VAT potential in providing public revenues, while in Greece and Romania, this potential is used around 40%. Furthermore, according to the data presented in Table 2, it can be inferred that there are no noteworthy variances in the c-efficiency coefficient values among the scrutinized nations.

**Table 2. Descriptive statistics for the entire sample of developing countries in the period from 2002 to 2022**

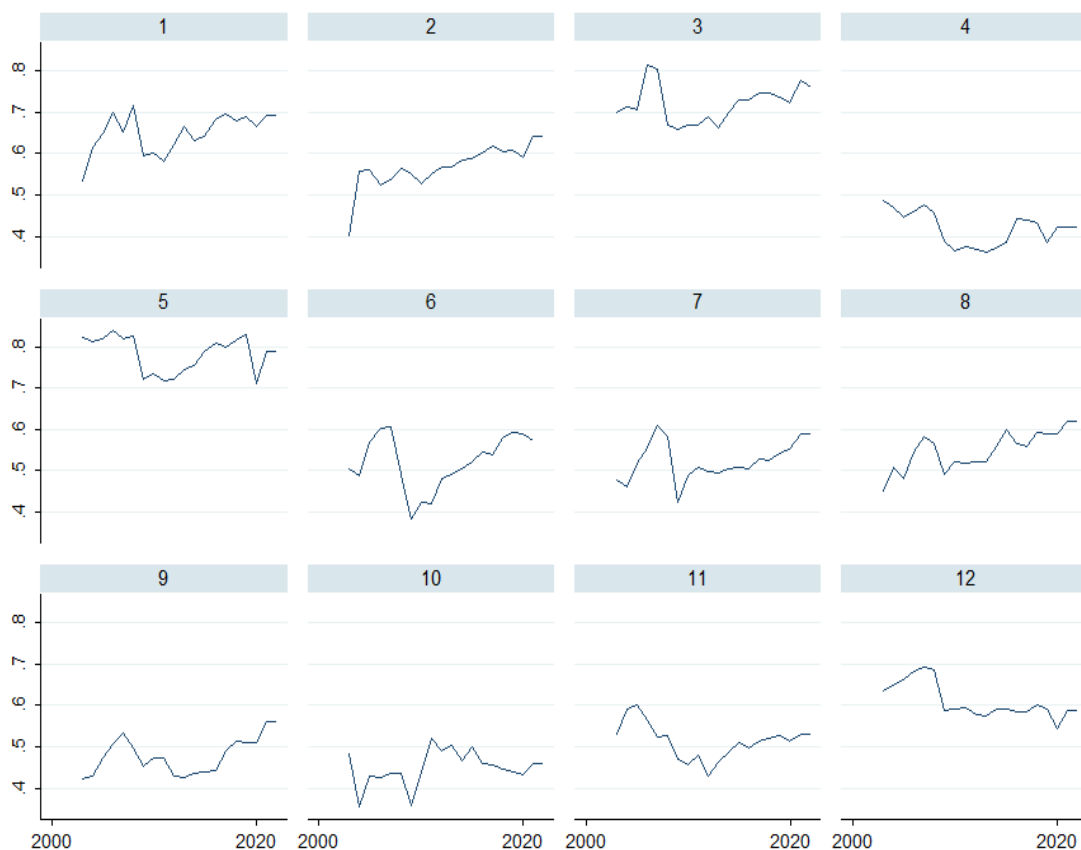
	N	Minimum	Maximum	Mean	Standard deviation
c-efficiency ratio	239	0.35	0.84	0.5658	0.11405

Source: Authors' calculation

The minimum value of the c-efficiency ratio is 35% (Greece, 2013), while the maximum value is 84% (Croatia, 2006). The average value of the c-efficiency ratio is 56%. Deviations of the c-efficiency ratio from the mean value are positively correlated with the production gap in a country (actual production - potential production). This means that higher values of this coefficient were achieved during periods of economic expansion.

In the succession of periods, both upward and downward trends of the c-efficiency ratio were observed in many countries. Graph 1 illustrates clearer movements of this ratio in the analyzed period.

**Graph 2: Movement of the c-efficiency ratio for the entire sample of developing countries in the period from 2002 to 2022**



Source: Eurostat, author's calculation.

Note: 1-Bulgaria, 2-Czech, 3-Estonia, 4-Greece, 5-Croatia, 6-Latvia, 7-Lithuania, 8-Hungary, 9-Poland, 10-Rumunia, 11-Slovakia, 12-Slovenia.

The c-efficiency ratio has the highest value in periods of economic expansion. Empirical study shows a correlation between the evolutionary stage of an economy and the efficiency of its VAT system (Minh Le, 2003; Le, 2016). The tax efficiency is stable among the developing nations studied, as shown by the trend of the relevant measure. Croatia excelled in VAT collection efficiency, whereas Greece performed the worst. Croatia's c-efficiency ratio has consistently increased in parallel with its economic output during the previous several years. On the other hand, Greece's growth in GDP and public debt have led to a decreased value for this ratio due to its economic conditions.

Large cyclical The c-efficiency ratio has a very periodic behavior in Bulgaria. Upon examining Bulgaria's tax policy, it is possible that shifts in tax rates have a significant role in these periodic fluctuations (European Commission, 2023). In the Czech Republic, there is a tendency for the value of efficiency indicators to rise in line with changes in the standard VAT rate. Positive fluctuations in the c-efficiency ratio were seen in the years after the rate decrease. changes can be observed in Romania and Hungary, which may be related to frequent changes in the standard and reduced VAT rates in these countries. Additionally, the Global Economic Crisis of 2008 had consequences for fiscal and financial stability in Romania (Oprea, Mehdian & Stoica, 2013). The sharp drop in the c-efficiency ratio can therefore be linked to the consequences of the crisis.

In 2001, Lithuania experienced the onset of a decline in its VAT-generated revenue. The fiscal shortfall in Lithuania during that period can be attributed to the prevailing circumstances, which were linked to the harmonization of taxes in compliance with EU legal acts (Bikas et al., 2017). According to Bikas and Raškauskas (2011), adjustments in rates are a consequence of harmonization. The revenues generated from VAT are predominantly determined by the tax base to which the reduced rates are applied. Lithuania experienced a phase of economic expansion from 2004 to 2008. During this time, there was a noticeable trend toward increased consumption, which consequently led to a corresponding rise in the value of the coefficient. The sharp decline in 2008 can be attributed to the global economic crisis.

According to Sancak et al. (2010, p. 4), "Estonia, Latvia, and Lithuania are the economies that experienced the biggest impact of the Worldwide recession during 2008–09," specifically mentioning the decrease in the effectiveness of VAT implemented in those nations after that time.

In 2007, Poland's rate of collection peaked, coinciding with the country's GDP growth. Regarding Slovenia, we see that in 2009, the c-efficiency ratio was much lower than in the years that were before examined. This downturn may be attributed to the nation's GDP falling at a rate of decline in 2009. Slovakia is also seeing the effects of the altered tax legislation. The value of the c-efficiency ratio increased in response to drops in the VAT rate in 2003 and 2004, but the value of the ratio decreased in response to increases in the VAT rate in 2011.



Due to the fact that the COVID-19 recession has major repercussions on the economies of all the analyzed countries, it is believed that the ratio will decrease. Accordingly, more significant measures from the tax authorities will be required.

### ***3.2. Estimating the performance of VAT in Serbia***

According to Jarratt (1996), there are two primary approaches to boosting tax revenues: introducing additional tax forms for taxation or processing current ones more effectively. Bearing in mind that the tax system of the Republic of Serbia mainly relies on indirect tax forms, among which is VAT, improving its performance is of crucial importance for achieving the goals of economic policy.

After the first year of the introduction of VAT in the tax system of the Republic of Serbia<sup>2</sup>, its participation in tax revenues recorded a decline. Average participation in the period from 2005-2022. is around 27% of tax revenues and has a tendency to fall. Such results point to the necessity of examining the efficiency of its collection.

The introduction of VAT into the tax system of the Republic of Serbia was accompanied by a major reorganization of the country's indirect taxes and large administrative costs of collection. In addition, the introduction required the professional training of taxpayer services, whose records would enable effective control. Therefore, in the initial years of its application, low efficiency in its collection was recorded. As measured by the basic performance indicator of VAT (VAT to GDP ratio), the efficiency of this tax in the first year tended to decrease (10,32%). Also, the tendency of the share of VAT revenue in the total GDP to decrease with mild cyclical movements was recorded until 2013 (9,23%).

As the implementation of VAT in developing countries is related to the simplification of their tax systems, the share of VAT in the tax revenues of these countries reaches up to 65%. Today, VAT is the most generous form of tax on consumption in the Republic of Serbia. The share of this tax form in consumption taxes is about 60%.

However, the question that arises is: whether, in all countries where VAT has been implemented, there is a satisfactory level of collection efficiency. The results of the coefficients (Table 3) show that, on average, the Republic of Serbia uses 60% of VAT potential to secure public revenues. In other words, about 40% is unused, so there is a significant space for collecting additional tax revenues from VAT.

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<sup>2</sup> If we take into account the fact that the conditions and possibilities of introducing VAT into the tax system of Yugoslavia were discussed as early as the early seventies of the XX century, it can be concluded that the very process of introducing this form of tax represented a serious step forward for the Republic of Serbia. Work on legal solutions lasted until 1995, and after several years of attempts, preparations and delays, on January 1, 2005, VAT was introduced.

**Table 3: The Republic of Serbia's C-efficiency ratio**

Yr.	c-efficiency ratio
2005	0.65
2006	0.67
2007	0.68
2008	0.67
2009	0.63
2010	0.64
2011	0.61
2012	0.56
2013	0.56
2014	0.60
2015	0.61
2016	0.65
2017	0.65
2018	0.64
2019	0.67
2020	0.67
2021	0.73
2022	0.71

*Source:* Public Finance Bulletin for the month of February 2023, author's calculation.

The VAT performance in the observed period shows a downward trend until 2013 and an upward trend since 2013.

**Table 4: The Republic of Serbia's descriptive statistics**

	N	Minimum	Maximum	Mean	Standard deviation
c-efficiency ratio	17	0.57	0.73	0.6449	0.04171

*Source:* Authors' calculation

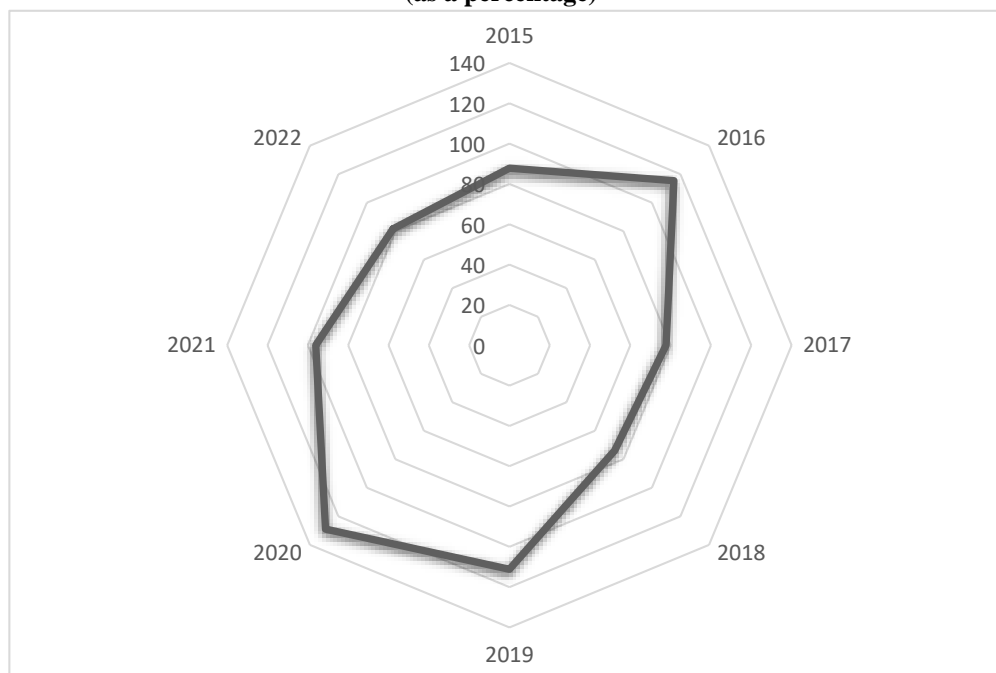
It may be inferred from descriptive data that 2012 was the year with the lowest c-efficiency ratio value (57%), while the maximum value was recorded in 2021 (73%). It should be borne in mind that the standard VAT rate in the Republic of Serbia was changed in 2012, in October (+2%). The rise in the VAT rate is correlated with an increase in this tax form's collection efficiency, according to the c-efficiency ratio trend. However, the standard rate cannot be the only explanatory variable for efficiency. According to Capasso et al. (2021), the establishment of robust fiscal institutions is critical in fostering a favorable public perception regarding tax compliance.

The rate level should be at the optimal level (European Commission, 2023). However, the highest levels of tax efficiency are attained when fiscal policyholders effectively execute fiscal policy measures; furthermore, a nation's progress and coherence can be enhanced by a policy that is unambiguously defined. That the collection of income from VAT is a "burning problem" of the tax administration is also proven by the fact that the efficiency of collection in the domain of VAT is the lowest, compared to the collection of other tax forms.

Drawing upon the chain indices that were computed and primary data obtained from the Tax Administration of the Serbian Ministry of Finance, the collection efficiency of the tax administration is not at a satisfactory level.

Graph 2 shows the calculated chain indices of the collection of VAT by the tax administration in the period from 2014-2022.

**Graph 2: Evaluating the efficacy of tax administration in the Republic of Serbia (as a percentage)**



*Source:* RS Ministry of Finance, Tax Administration; Public Finance Bulletin for the month of February 2023. Calculations made by the authors.

The graph indicates the dynamics of decreasing chain indices. The effectiveness of the tax administration can be mentioned as one of the causes of these fluctuations in collection. In the last analyzed year, the chain index was 81.6%, which indicates

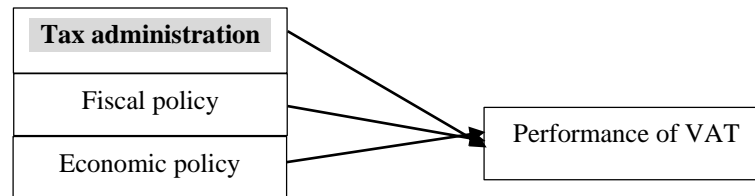
a decrease in efficiency in the collection of VAT revenue compared to last year. It is interesting that in the last year, a significantly worse result was recorded compared to the previous years, 2022/2021 (81.6%), 2022/2015 (74.5%), and 2022/2014 (65.4%).

#### 4. Methodology for Analysis

##### 4.1. Design of Research and Collection of Data

The effects of tax administration on the performance of VAT are analyzed in the following section. The model includes certain exogenous variables that could affect the performance of VAT.

**Figure 1. Conceptual Research Model, Authors Design**



The primary obstacle encountered in empirical research pertains to the dearth of comprehensive and dependable data concerning the impacts of administrative entities. "It is this concealment that makes empirical work quite difficult" (Alm, Jackson & Michael, 1992, p. 107). The research is supported by variables, the estimates of which are based on the results of the work of the tax authorities of the Republic of Serbia. More specifically, data access is extremely difficult in developing nations, which creates additional complications. Annual primary data from the databases of the Ministry of Finance, in the period from 2005 to 2022, were analyzed. Based on annual data in a given period, the paper analyzes the impact of selected explanatory variables on the c-efficiency ratio. Therefore, the dependent variable in the model is the c-efficiency coefficient (Cratio).

In the empirical analysis, nominal values of income from VAT and GDP were used. Accordingly, the variables used to analyze the effectiveness of the tax administration of the Republic of Serbia are expressed in relation to the nominal gross domestic product. In this way, the influence of inflation and cyclical fluctuations of the gross domestic product are excluded.

Additionally, to reduce model bias, the model includes important variables that affect the level of VAT revenue, such as statutory VAT rate and cyclical dynamics. Accordingly, the standard VAT rate and the GDP growth rate are included as control variables in the model.

The study assessed the information gathered. The gathered and confirmed data were prepared, and examined using the statistical program SPSS Statistics 26. To investigate the link between the dependent variable and the explanatory variables, a multiple regression model was employed. The two main statistical methods employed in the study were regression analysis and Pearson correlations.

#### **4.2. Measuring of Independent Variables**

The independent variables in the model which explain the effectiveness of tax administration are: the number of tax administration controls with irregularities and total number of tax administration controls.

**Table 4: Selection of explanatory variables**

Variables	Symbol	Calculation	Expected effect
Number of tax administration controls with irregularities	IC	% in GDP	+
Revenues from direct taxes	DT	% in GDP	+
Total number of tax administration controls	TC	% in GDP	+
Standard VAT rate	SR	Annual rate (in %)	-
GDP growth rate	GDP	Annual rate (in %)	+

*Source:* Illustration by the authors

Fiscal policy variables are revenues from direct taxes and the standard rate of VAT. The GDP growth rate is included as an economic policy variable. The empirical framework for measuring c-efficiency ratio in the Republic of Serbia was based on the research concept of the author Keen (Keen, 2013).

The results of the correlation analysis of tax administration indicators, fiscal and economy policy determinants, and the c-efficiency ratio show the interdependence of the variables and the strength of the relationship between investigated variables.

The results of the correlation analysis for tax administration indicators indicate that the highest degree of agreement exists between the total number of tax administration controls and the c-efficiency ratio. A high degree of agreement also exists between direct taxes and the dependent variable.

**Table 5. Matrix of correlation with c-efficiency ratio**

		Cratio	IC	DT	TC	SR	GDP
Cratio	Pearson Correlation	1	.172	.763**	.605*	-.085	.595*
	Sig. (2-tailed)		.510	.000	.010	.746	.012
	N	17	17	17	17	17	17
IC	Pearson Correlation	.172	1	.329	.014	-.694**	.363
	Sig. (2-tailed)	.510		.198	.956	.002	.152
	N	17	17	17	17	17	17
DT	Pearson Correlation	.763**	.329	1	.408	.029	.561*
	Sig. (2-tailed)	.000	.198		.104	.913	.019
	N	17	17	17	17	17	17
TC	Pearson Correlation	.605*	.014	.408	1	.366	.342
	Sig. (2-tailed)	.010	.956	.104		.148	.179
	N	17	17	17	17	17	17
SR	Pearson Correlation	-.085	-.694**	.029	.366	1	-.084
	Sig. (2-tailed)	.746	.002	.913	.148		.749
	N	17	17	17	17	17	17
GDP	Pearson Correlation	.595*	.363	.561*	.342	-.084	1
	Sig. (2-tailed)	.012	.152	.019	.179	.749	
	N	17	17	17	17	17	17

\*\*The correlation is statistically significant at the 0.01 level (2-tailed).

\* The correlation is statistically significant at the 0.05 level (2-tailed).

Source: Author's calculation

A linear regression prediction model was established by examining the specific associations between each predictor and the dependent variable. To investigate the determinants of the c-efficiency ratio, the following basic linear regression model is estimated:

$$Cratio = \alpha + \beta_1 IC + \beta_2 DT + \beta_3 TC + \beta_4 SR + \beta_5 GDP + \varepsilon \quad (1)$$

Where Cratio stands for c-efficiency ratio; IC - number of tax administration controls with irregularities; DT - revenues from direct taxes; TC - total number of tax administration controls; SR - standard VAT rate, GDP - GDP growth rate, and  $\varepsilon$  - standard statistical error.

This model explained 94.9% of the total variability of the c-efficiency ratio variance, and the model as a whole has a statistically significant prediction potential (Sig. 0.00).

**Table 6. Predictive power of the model**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	250.815	5	50.163	20.003	.000 <sup>b</sup>
	Residual	27.585	11	2.508		
	Total	278.400	16			
a. Dependent Variable: Cratio						
b. Predictors: (Constant), IC, DT, TC, SR, BDP						

Source: Author's calculation

**Table 7. Estimated values of regression coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	33.136	12.455		2.660	.022
	IC	-6.221	1.574	-.623	-3.952	.002
	DT	2.472	.473	.649	5.229	.000
	TC	681.416	149.955	.537	4.544	.001
	SR	-3.002	.663	-.714	-4.527	.001
	BDP	.298	.168	.213	1.779	.103
a. Dependent Variable: Cratio						

Source: Author's calculation

The regression coefficients' estimated numbers, as seen in Table 7, may be represented by the following equation:

$$Cratio = 33.136 - 6.221 \cdot IC + 2.472 \cdot DT + 681.416 \cdot TC - 3.002 \cdot SR + 0.298 \cdot BDP \quad (2)$$

The findings from the assessed model indicate that each of the four independent variables exerts a statistically significant impact on the dependent variable. We can conclude, on the basis of the estimated results of the regression model, that the two analyzed variables have a positive impact on the c-efficiency ratio and a negative impact on the aforementioned variable.

The B coefficient for the independent variable, which represents the number of tax administration controls with irregularities in the Republic of Serbia, may be used to explain that an increase in the number of controls with irregularities in the

Republic of Serbia by 1% of the GDP causes an average decrease in the c-efficiency ratio by 6.22% ( $p < 0.05$ ). The second factor, revenues from direct taxes, has a positive effect on the c-efficiency ratio. An increase in direct tax revenues by 1% of GDP causes an average increase in the c-efficiency ratio by 2.472% ( $p < 0.01$ ). The number of tax administration controls on VAT performance has a positive effect. An increase in the number of controls by 1 percent of the GDP causes an increase in the c-efficiency ratio by 6% ( $p < 0.01$ ). The c-efficiency ratio is adversely affected by the standard VAT rate. The c-efficiency coefficient will decrease by 3%, if the standard rate of VAT increases by 1% of GDP ( $p < 0.01$ ).

The final variable included in the regression analysis, the growth rate of GDP, failed to demonstrate statistical significance. Nevertheless, it cannot be ruled out that signs suggesting that a heightened rate of economic expansion could have an impact on a greater coefficient of c-efficiency. As a result, this analysis established a foundation for the inclusion of this economic variable in subsequent empirical models.

The study validated the correlation between effective tax administration and VAT performance in a positive way. Diverse conclusions may be derived from various models and implemented in the formulation of a pertinent strategy to enhance the efficiency of VAT across all nations. Through the examination of specific variables, we aim to offer a partial solution to the enigma surrounding the factors that influence the efficacy of VAT in the Republic of Serbia with regard to tax administration.

## **5. Concluding remarks**

The collection of income from VAT is an important instrument for ensuring economic stability and development of developing countries. Additionally, VAT revenues represent one of the most important items of government revenue in these countries. Accordingly, revenues from VAT can be used to achieve the basic and specific goals of fiscal and economic policy.

Based on the analyzed data, it was determined that the effectiveness of the work of the tax administration is not at a satisfactory level. Bearing in mind that the efficiency of VAT collection recorded a downward trend, the effects of tax administration on the c-efficiency ratio were analyzed. Given that the effectiveness of tax administration can be cited as one of the main causes of collection efficiency, further analysis continued by looking at the impact of tax administration on the c-efficiency ratio. The paper confirmed the statistically significant impact of the tax administration's work efficiency on VAT performance. Therefore, we can conclude that in order to improve the performance of the VAT, it is necessary to increase the effectiveness of the work of the tax administration. It is necessary to improve the quality of existing and introduce new services adapted to the needs of taxpayers. It



is necessary to establish business processes and organization in accordance with international practice in order to increase controls and collection of tax revenues. In the end, it is necessary to improve the legal framework for a more efficient and expedient tax offense procedure and to define a strategy for managing the collection of income from corporate income tax that will enable greater detection of controls with irregularities in the Republic of Serbia.

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## **ŠTA POKREĆE PERFORMANSE POREZA NA DODATU VREDNOST? ISTRAŽIVANJE EFIKASNOSTI PORESKE ADMINISTRACIJE U SRBIJI**

**Apstrakt:** Opšte je prihvaćeno da u zemlji bez značajnih ograničenja administrativnih kapaciteta, svi proizvodi i usluge treba da podležu jedinstvenom porezu na dodatnu vrednost (PDV). Ako je usklađenost besprekorna, c-efikasnost PDV-a u ovim zemljama, koja meri odnos ostvarenih prihoda i prihoda koji bi mogli biti stvoreni, trebalo bi da bude jedan. Uspostavljanje iskusne administracije PDV-a, koji karakterišu postavljeni procesi i procedure, predstavlja prednost za mnoge zainteresovane strane. Ovo uključuje nacionalne administracije, kao i pojedinačne poreske obveznike i građani. Studija je koristila primarne izvore podataka za identifikaciju odnosa između poreske administracije i načina PDV-a. Ovaj rad nudi procenu efikasnosti poreske administracije u Srbiji u periodu od 2005. do 2022. godine. Studija ima cilj da dobije empirijski dokaz o administrativnim faktorima koji utiču na koeficijent. Studija je uverila da poreska uprava značajno utiče na učenik PDV-a. Variabla ishoda, odnos c-efikasnosti je pod velikim uticajem efikasnosti poreskih administratora.

**Ključne reči:** PDV, poreska administracija, performanse PDV-a, ratio c-efikasnosti, poreska reforma, EU, Srbija.

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