



VALUE ADDED TAX EFFICIENCY. A STUDY OF THE SLOVAK REPUBLIC

EFEKTÍVNOSŤ DANE Z PRIDANEJ HODNOTY. ŠTÚDIA SLOVENSKEJ REPUBLIKY

RÓBERT ORAVSKÝ

Ing. Róbert Oravský, PhD., Technická univerzita v Košiciach, Ekonomická fakulta, Katedra financií, robert.oravsky@tuke.sk, ORCID: 0000-0001-5247-0766

Abstract: *The aim of this contribution is to analyze the efficiency of value added tax in the conditions of the Slovak Republic based on the application of a modified methodology for calculating VAT efficiency according to Mendoza-Razin-Tesar.*

The Mendoza - Rasin - Tesar methodology is a widely used methodology for examining the tax efficiency of a selected tax. This work is also based on publicly available data from the Institute of Financial Policy of the Ministry of Finance of the Slovak Republic for the period from 2005 to 2019. Based on the chosen methodology and data, we determined the effective VAT rate for the conditions of the Slovak Republic, which ranged from 13.35% to 17.47% for the selected period. The findings were subsequently compared with other countries, primarily the V4 countries.

Keywords: VAT, VAT efficiency, Mendoza-Razin-Tesar methodology

JEL Classification: H21, H71, K34

Introduction

Currently, in every developed economy there are several types of taxes that together form the tax system of that economy. The modern tax system classifies taxes into direct and indirect. Direct taxes are characterized as taxes that are collected directly from the taxpayer, e.g. income tax. Indirect taxes are collected from the taxpayer indirectly, i.e. from the payer who pays the tax on behalf of the taxpayer. Such taxes are also called consumption taxes. The most famous indirect tax is the value added tax. Value added tax, also known as "VAT", is considered one of the main revenues of the state budget. The tax in question taxes consumption in the following way: the supplier - the producer of the good, is obliged to add value added tax to the required consideration for the production of the good, which the buyer - the consumer of the good, pays to the supplier together with the required consideration for the good. Subsequently, the supplier, who acts as a tax payer in a given chain, is obliged to pay the tax in question to the state budget, which is collected by the tax authority in the given economy. In the conditions of the Slovak Republic, this authority is the Financial Administration of the Slovak Republic, on whose behalf individual tax offices act.

The issue of tax efficiency in general is relatively often investigated, whether from the perspective of VAT or other taxes. The reason for introducing this unit is that within the methodology and within the objectives of our research, the tax efficiency of selected taxes will be compared. Therefore, in this unit, we present the current state of knowledge of tax efficiency in general, i.e. not only the tax efficiency of VAT. Authors usually investigate tax efficiency through indices. Tax optimality index, which measures the distance of a certain current tax structure from the optimal tax structure in the presence of public goods. This index measures the proportion of optimal tax rates that achieve the same social outcome as some arbitrarily given initial tax structures. The index in question is shown in the following Figure 1, which shows the contours of iso-utility value in three small open economies with the provision of public goods. The index can be displayed in a two-dimensional tax space (t_2 , t_3). Point W represents the optimal tax situation where non-zero taxes finance the production of public goods, while point A represents the assumed current tax situation for the economy. The curves show sets of tax rates that provide different levels of utility, and thus point W is on the highest possible curve (*Raimondos-Møller, Woodland, 2006*).

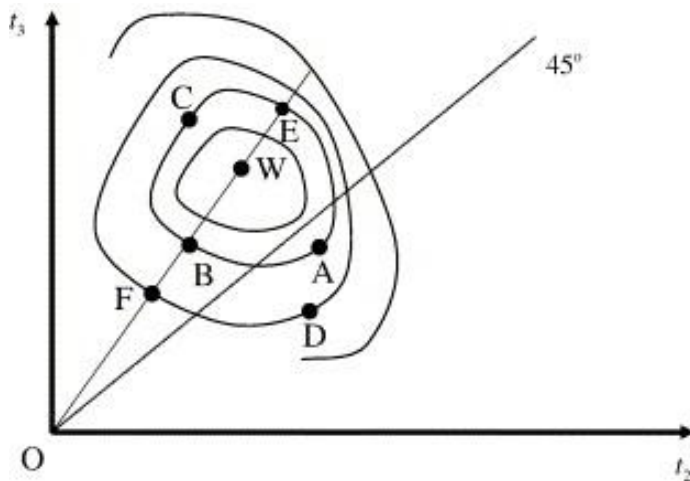


Figure 1 Tax Optimality Index

Source: Raimondos-Møller, Woodland (2006)

Anderson, Palma, Kreider (2001) examined the relative efficiency of ad valorem individual taxes in imperfectly competitive markets under conditions of firms with equal production costs. The study covers differentiated products and a wide range of market behavior. Cost asymmetry reinforces ad valorem taxation, while product taxation may be better under Bertrand competition with product differentiation. Ad valorem taxation is superior to free entry to competition, but not necessarily inferior to price competition.

The study of tax competition when local governments levy a linear corporate income tax has encountered two problems. The first is that external capital mobility can be positive or negative depending on how strong the risk-sharing effect of taxation is. The second problem is the externality feature of tax exports. Each government not only exports the tax burden, but also bears the risk that would otherwise be borne abroad. The socially optimal tax rate poses a risk of exposure to the private and public sectors, while the equilibrium decentralized tax may be inefficiently high or low (Kalamov, 2003).

Gordon, Bai, Li (1999) addressed the issue of examining the efficiency of taxes from the perspective of establishing a hypothesis whether high tax rates can distort the

decisions of private enterprises to such an extent that state ownership becomes more advantageous for efficiency reasons. In addition to examining tax efficiency, there are authors who also examine the effects of tax reforms. The problems associated with using the sum of tax deviations to measure tax reform were tested by Smart (1999). According to Smart, an excise tax never represents a potential Pareto improvement, even if the total compensatory deviation is positive. In the study of tax reform, Heer, Trede (2003) followed up, who examined the effects of income tax reform proposals from the perspective of a flat tax and a consumption tax in a general equilibrium model with flexible labor supply and progressive income taxation. The model is based on the German economy in 1996. The result of the study was that the reforms have a negligible effect on the distribution of labor income, the reforms lead to a slight increase in aggregate employment and a significant increase in aggregate savings. The last finding of the research is an increase in total consumption in the country from 3.6% to 8.2%. Within the EU countries, an Italian study was conducted to analyze a hypothetical tax reform in Italy. The subject of the study is tax breaks, which caused the transfer of the tax burden from labor to property. The study uses a methodology based on a structural model of labor supply for employees and the self-employed, as well as a model of labor market equilibrium that includes demand constraints (Moscarola, Colombino, Figari, Locatelli, 2019). The tax reform was also examined in Japan in 1989. The research assessed policy decisions, estimates of revenues from tax-incentive divestitures, and variations in tax incentives resulting from the new tax. The study was conducted on a sample of 7,619 companies. As a result, the tax affected 10.7% to 12.7% of companies established during the high tax incentive regime. In addition, companies experienced revenue leakage, which resulted in coordination problems when separating business segments (Onji, 2014).

Tax efficiency has also been addressed for equity funds, specifically examining whether asset sales were timed to take advantage of the realized capital gains discount when the holding period was at least 1 year. The research was conducted for Australian conditions. The resulting finding was that active fund managers overall significantly increased the proportion of long-term capital gains realized after the tax change, although there are significant differences between funds (Fong, Gallgher, Lau, Swan, 2009).

In examining tax efficiency, a study was conducted that examined a conservative independent central bank in an economy in which taxable income depends on institutional quality. In this study, the authors used the indicator of the degree of conservatism of the central bank and its optimal value. The finding is that the central bank must be more conservative than the government, except in the case of complete tax inefficiency. The relationship between the optimal relative degree of conservatism of the central bank and tax efficiency is affected by the volatility of supply shocks. If the given shocks are not important, the central bank should be less conservative if tax efficiency deteriorates (Ferré, Garcia, Manzano, 2018).

Currently, a frequently discussed topic from the tax perspective is the so-called environmental tax. More and more authors are addressing this issue in the context of tax efficiency. We describe the effectiveness of environmental taxes in order to expand our knowledge in compiling our methodology for determining the procedure for calculating the effectiveness of taxes we have selected. Among the first to examine the impact of environmental taxes on society in the context of tax efficiency is Felder, Schleiniger (2002). The subject of their study is the analysis of environmental measures such as uniform taxes on CO₂ production. According to the authors, environmental policy fails because it involves the redistribution of pollution rights, which results in strong and generally effective group opposition. The aim of their study is to analyze the trade-off between the efficiency and political feasibility of several CO₂ tax and compensation

schemes using a comparable general equilibrium model of Switzerland. The result of the study is that a policy combining a uniform CO₂ tax with differentiated labor subsidies that prevent cross-sectoral redistribution is a better compromise solution than tax systems in different countries. Studies in environmental taxes have been widespread mainly in the second decade of the 21st century. Another study analyses the carbon tax, which is one of the economic policy instruments for environmental protection and is intended to contribute to the reduction of greenhouse gas emissions. The purpose of a functional carbon tax is to include the costs of eliminating environmental damage in pricing decisions. A carbon tax is usually imposed on the production, distribution or consumption of carbon-containing fossil fuels. The aim of the study is to evaluate the environmental effectiveness of a carbon tax in the energy sectors of selected EU countries. The study used multiple panel regression taking into account environmental policy instruments. The results of the analysis indicate that a carbon tax in the energy industry is environmentally effective. An increased tax rate allows for a reduction in greenhouse gas production. Based on the estimated partial regression coefficient, an increase in the carbon tax by one euro per tonne can reduce annual emissions per capita by 11.58 kg (Hájek, Zimmermannová, Helman, Rozenský, 2019). Economic growth, energy consumption and taxation of negative externalities – greenhouse gases from thermal power units were investigated by Vera, Sauma (2015). The subject of the investigation was a carbon tax in the context of energy efficiency in the energy sector in Chile. Vera and Sauma concluded that an implemented carbon tax of USD 5 per ton of CO₂ results in an annual reduction of CO₂ emissions by 1.0%. This reduction will be accompanied by an increase in the marginal cost of energy production in the energy sector by 3.4%. Another environmental tax that is currently the target of research is the gasoline engine tax. Kaufmann (2019) subjected this tax to research using the estimation of two cointegrating vector autoregressive models for each of six US states (Florida, Massachusetts, Minnesota, New York, Ohio and Washington). In the case of models at the level of selected states that determine the retail price of a gasoline engine, exclusion tests indicate that gasoline engine taxes are not passed on to the consumer. The results show that taxes are passed on to wholesale prices in the cases of Florida, Massachusetts, New York, and Ohio and are subsequently converted into retail prices with a markup.

2 Mendoza-Razin-Tesar model of tax efficiency

The Devereux-Griffith model of tax efficiency can be applied to a statutory tax, i.e. a tax that actually affects the management or profitability of a business entity. Based on the profit achieved, the company decides where and how to locate its production.

Value added tax taxes consumption, i.e. it is an excise tax. In addition, value added tax is a neutral tax, i.e. it does not distort the prices of goods and services and therefore does not affect the management or profitability of a business entity. From this point of view, a business entity will not take into account what value added tax rates are in which economies and will not decide where to locate its production and sales based on their rates.

It also follows from the above that the calculation of the effective value added tax rate is not possible and therefore it is necessary to choose a different model for determining the effective value added tax rate. Currently, the most recognized domestic and global model for calculating the effective value added tax rate is the Carey and Tchilinguirian model, which is based on the Mendoza methodology and which sets out how to determine the effective value added tax rate (Mendoza, Razin, Tesar, 1994, Carey, Tchilinguirian, 2000). The methodology in question is actively used by the OECD and the Institute of Financial Policy of the Ministry of Finance of the Slovak Republic when calculating the effective value added tax rate. When calculating the average effective tax rate (abbreviated

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as "AETR"), the Mendoza methodology works with several variables that the OECD system uses when calculating the revenue component of a particular tax, see the following Table 1.

Table 1 Data on tax revenues identified using the OECD system

Variable and symbol names	
Tax revenue data is identified using the OECD Revenue Statistics system:	
1100	Taxes on income, profit and capital gains of individuals or households,
1200	Taxes on income, profit and capital gains of companies,
1300	Unallocated taxes on income, profit and capital gains,
2000	Social security contributions (2100 paid by employees, 2200 paid by employers, 2300 paid by self-employed persons and 2400 paid by persons not mentioned in the previous points),
3000	Taxes on income from dependent activities,
4000	Taxes on property,
4100	Regular taxes on real estate,
4400	Taxes on financial and capital transactions,
5110	General taxes on goods and services (5111 represents value added tax),
5120	Taxes on specific goods and services (5121 represents excise taxes, 5122 represents profits of fiscal monopolies, 5123 represents customs duties and import duties, 5126 taxes on special services, 5128 other taxes),
5200	Taxes on the use of goods and services
Variables from national accounts:	
CP	Private final consumption expenditure,
EE	Employment,
ES	Self-employment,
CG	Government final consumption expenditure,
CGW	Government final consumption expenditure on wages and salaries,
IG	Government investment,
IP	Private sector investment,
OSPUE	Net unrecorded business income,
PEI	Interest, dividends and investment income,
W	Wages and salaries in employment,
WSSS	Compensation of employees (including private employers' contributions to social security and pension funds),
OS	Net operating surplus from the total economy

Source: adapted from Carey, D. and H. Tchilinguirian (2000)

The effective value added tax rate (τ_c) according to the OECD methodology, based on the Mendoza methodology, is calculated as the sum of general consumption tax on goods and services (5110) and excise taxes (5121) divided by the sum of private consumption (CP) and government non-wage consumption (CG – CGW) excluding indirect taxes. The value added tax is the largest indirect tax in most countries, which is included in category 5110. The denominator is significantly wider than the actual tax base of government expenditure on non-wage consumption and on goods and services. This wider tax base, in particular the value added tax, is paid on inputs to the production of goods and services. Therefore, it is implicitly assumed that the input tax burden on goods and services is passed on to higher output prices in the calculation of other AETRs. Government wages are excluded from the tax base, as no indirect tax is levied on the purchase of labour. Indirect taxes are deducted in the denominator to reflect the tradition of

expressing indirect tax rates as a percentage of the pre-tax price. For example, a 20% value-added tax rate adds 20% to the pre-tax price of goods and services, but represents 16.7% of the total price including VAT. This adjustment ensures that the theoretical value of τ_c for this tax is 20% and not 16.7% (Carey, Tchilinguirian, 2000).

$$\tau_c = \frac{5110 + 5121}{CP + CG - CGW - 5110 - 5121} \quad (1)$$

The Mendoza-Razin-Tesar methodology also deals with the calculation of effective rates of other taxes, i.e. not only the effective rate of value added tax. In general, the methodology of that tax is based on the AETR (average effective tax rate), while in addition to the value added tax it also focuses on the effective rate for labor and capital (Carey, Tchilinguirian, 2000).

To calculate the AETR of labor (τ_l) or capital (τ_k), it is necessary to calculate the AETR of total household income (τ_h). This calculation is used to allocate the personal income tax rate to capital and labor, assuming that the average tax rate paid for each is the same τ_h . τ_h can therefore be expressed in the form (Carey, Tchilinguirian, 2000):

$$\tau_h = \frac{1100}{OSPUE + PEI + W} \quad (2)$$

This equation states that the AETR of household income is the personal income tax divided by household income. It should be noted that in some countries, business taxes are included in personal income tax (1100). Household income includes the operating surplus of the non-business sector of GDP (OSPUE), property income (PEI), and income from dependent activities (W) (Carey, Tchilinguirian, 2000).

We will not calculate the effective tax rate on labor income in this paper, since we do not work with this tax in our work. However, we will focus on the effective tax rate on capital, which we see used in calculating the theoretical effective tax rate on sales in the analytical part of this paper (Carey, Tchilinguirian, 2000). Capital covers the payment of several taxes, including corporate income tax, as well as personal (household) income tax and property tax. The formula for calculating AETR for capital (τ_k) is as follows:

$$\tau_k = \frac{\tau_h * (OSPUE + PEI) + 1200 + 4100 + 4400}{OS} \quad (3)$$

The first term in the numerator represents household production AETR and household capital income. This allocates household taxes to capital in line with capital income as a share of household income. The other terms in the numerator allocate corporate income taxes (1200), recurring property taxes (4100), and taxes on financial and capital transactions (4400). While 4100 and 4400 are taxes on capital and capital transactions, they represent the tax burden on capital investment, respectively, which can be expressed as a percentage of capital income (Carey and Tchilinguirian, 2000).

3 Mendoza-Razin-Tesar modified tax efficiency model

Modification of the model for social security and private employer contributions to pension funds

There are many problems with the Mendoza methodology of tax efficiency from a social security perspective. The first problem is that employees' social security

contributions (2100) are counted twice in the numerator for the AETR from labour. These are included in the national accounts series for wages and salaries (W) and total social security contributions (2000). The second problem is that social security contributions from self-employed persons (2300) are also included in total social security contributions (2000) and at the same time all income of self-employed persons, including social security contributions from the unemployed, is allocated to capital. A tertiary problem is that households are normally able to deduct social security contributions from taxable income, which already includes these contributions. Finally, social security contributions (2400), which cannot be allocated to employees, employers or self-employed persons, have been allocated to labour while they are paid from both sources. These problems are removed in the following equations below for the effective rate of VAT, household income taxes and corporate income taxes. Employees' social security is deducted from W in the denominator of the new equation for AETR from labour. This correction eliminates double counting of employees' social security contributions and also corrects the implicit assumption regarding the non-deductibility of such contributions. The deductibility of household social security contributions is further taken into account by deducting the social security contributions of self-employed persons (2300) in the denominator and the numerator for AETR from capital. Unallocated social security contributions, which are significant in some countries, notably Switzerland, are added to the numerator as they are paid by households. They are also deducted from the denominator in the same way as other social security contributions, which are also tax deductible. Under this treatment, unallocated social security contributions (2400) are deducted from the numerators in accordance with the shares of labor income (α) and capital income (β) in household income. This ensures that the household income tax (1100) and unallocated social security contributions (2400) are fully allocated to labor and capital (Carey, Tchilinguirian, 2000).

A related problem with the Mendoza et al. equation for the AETR on labor is that: the denominator excludes private employer contributions to pension funds. Such contributions are a significant part of total labor earnings in many countries. Not including these contributions in the denominator means that the denominators do not contribute as much to total GDP as they should. This problem is corrected by replacing the existing expressions with a national accounts series and a total compensation of employees (WSSS) that includes these contributions and existing conditions. The modified equations that incorporate this and other changes are as follows (Carey, Tchilinguirian, 2000):

$$\tau_h = \frac{1100}{OSPUE + PEI + W - 2300 + W - 2100 - 2400} \quad (4)$$

$$\alpha = \frac{W - 2100}{OSPUE + PEI - 2300 + W - 2100} \quad (5)$$

$$\beta = 1 - \alpha \quad (6)$$

$$\tau_k = \frac{\tau_h * (OSPUE + PEI - 2300 - \beta * 2400) + 2300 + \beta * 2400 + 1200 + 4100 + 4400}{OS} \quad (7)$$

Splitting self-employment income into capital and labor components

Mendoza et al. unrealistically assumed that all self-employment income is a return to capital. This assumption is dropped in favor of an approach that attributes this income stream to both labor and capital. The modified model works with the assumption that self-employed individuals “pay themselves” in the same year of wages without social security

contributions as the average employee. This is given by wages and salaries of dependent employment (W) after deducting employees' social security contributions (2100), all divided by dependent employment (EE). The sum of this imputed wage rate and the number of self-employed individuals (ES) provides the imputed "wage cost" for self-employed individuals (WSE) without social security payments (Carey, Tchilinguirian, 2000):

$$WSE = ES * \frac{W - 2100}{EE} \quad (8)$$

This change does not affect the modified τ_h , as it is not necessary to distinguish between the labour and capital components of household income for the calculation of the AETR for households. However, the α item needs to be adjusted to also take into account imputed labour wages in household income net of social security contributions when determining the share of individuals (WSE). The labour income of self-employed persons, including social security contributions (WSE + 2300), is also deducted from capital income in the denominator. These changes are reflected in the revised equation and τ_k for the AETR from capital (Carey, Tchilinguirian, 2000).

$$\alpha = \frac{W - 2100 + WSE}{OSPUE + PEI - 2300 + W - 2100} \quad (9)$$

$$\tau_k = \frac{\tau_h * (OSPUE + PEI - WSE - 2300 - \beta * 2400) + 2300 + \beta * 2400 + 1200 + 4100 + 4400}{OS - WSE - 2300} \quad (10)$$

Creating a comprehensive and comparable consumption tax base with other tax bases

Mendoza et al. exclude government consumption expenditure on wages (CGW) from the consumption tax base on the grounds that it is not subject to indirect taxation. However, many of the services provided by the government sector, such as education and healthcare, are not subject to indirect taxation, even if they are provided privately. As a result, not including government wages in the tax base would result in an overestimation of the AETR in countries where these services are labor-intensive compared to the AETR in countries where they are provided publicly. To increase comparability across countries, the consumption AETR is calculated using total final consumption expenditure as the base. The second change is to express the tax base in gross terms (i.e., including indirect taxes). This increases comparability with other AETRs. This is particularly important because the relevant tax burden affecting labor supply decisions includes taxes on both labor and consumption (Carey and Tchilinguirian, 2000).

$$\tau_c = \frac{5110 + 5121}{CP + CG} \quad (11)$$

When interpreting AETR estimates based on consumption based on τ_c before modification or τ_c after modification, it should be borne in mind that these terms include indirect taxes on capital goods in the numerator. For VAT, this occurs in the case of VAT-exempt industries that supply inputs for the production of capital goods. Neither the purchasers of these inputs, nor the suppliers themselves who supply exempt goods, can

claim back the VAT paid on inputs to VAT-exempt industries. This problem mainly concerns the financial industry, which is generally exempt from VAT due to the difficulties of measuring value added; on the contrary, it does not affect the government or non-profit sector, as their outputs are classified as final consumption in national accounts. For general indirect taxes other than VAT (such as turnover tax and sales tax), which are levied in only a few countries, the problem is more straightforward, as these taxes may apply to investment expenditure more generally. However, it is not possible to adequately address this problem in general in τ_c after modification. Data on VAT paid by exempt sectors that supply inputs are not generally available or that produce capital goods that are inputs to the production of a capital good. As for other general indirect taxes, data on their share are not available in the simple form of a tax on consumption goods. Allocating such taxes to consumption and investment in proportion to their share of GDP is unlikely to be a satisfactory solution, since rates are generally lower for capital goods. τ_c after modification overstates the AETR on consumption by including indirect taxes on investment in the numerator. However, the degree of overestimation is unlikely to be large, especially for countries that use either VAT or other indirect taxes, but not both (Carey and Tchilinguirian, 2000).

4 Effective rate analyses according to the Mendoza-Razin-Tesar methodology

From the point of view of tax evasion, the weakness of the value added tax system is the possibility of applying the input tax deduction by the taxable person. The currently valid legislation generally does not take into account whether the input tax was actually paid by the taxable person and thus would allow the input tax deduction by the taxable person, who may never have to pay the tax. Therefore, one of the objectives of the work is to determine whether the turnover tax could be a full-fledged substitute for the value added tax in order to minimize tax evasion. Of course, there are other forms of tax evasion, which were analyzed in the chapter Analysis of the Status of Value Added Tax.

Based on the chosen theoretical basis - the Mendoza - Razin - Tesar Methodology, we will apply available data from the Institute of Financial Policy of the Ministry of Finance of the Slovak Republic. The data in question are publicly available on the website of the Institute of Financial Policy of the Ministry of Finance of the Slovak Republic.

Each variable that we will work with in our calculations is presented in Chapter 5 of this work.

5 Calculation of the effective value added tax rate

For the purpose of comparing value added tax and turnover tax, we will base ourselves on the effective rate of each tax using the modified Mendzoa-Razin-Tesar methodology, which examines the effective tax rate from the perspective of the government sector.

Based on the chosen methodology and the database of the Institute of Financial Policy of the Ministry of Finance of the Slovak Republic, it is possible to determine the average effective VAT rate for each year of the monitored period.

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Table 2 Selected indicators determining the effective VAT rate

VAT according to the tax declarations										
Year	TTL to be paid (EUR)	ED (EUR)	ED deducted from TTL (EUR)	VAT customs (EUR)	VAT according to tax returns (EUR)	Legislative adjustment and PPP (EUR)	VAT at a reduced rate (10%) (EUR)	Adjustment for PPP legislation and reduced VAT rate (EUR)	VAT adjusted (EUR)	tax base (EUR)
2005	6 077 693 692	3 710 108 199	195 862 026	1 389 205 340	3 952 652 859	108 611 655	-127 528 246	-18 916 591	3 933 736 268	22 594 328 450
2006	7 033 896 924	4 758 814 660	239 674 257	1 828 694 556	4 343 451 077	118 340 366	-140 136 945	-21 796 579	4 321 654 499	25 647 612 790
2007	7 679 966 539	5 668 917 456	295 193 965	2 169 478 700	4 475 721 749	227 605 020	-144 404 521	83 200 499	4 558 922 248	27 872 087 000
2008	8 348 643 592	6 170 967 732	341 320 313	2 364 161 479	4 883 157 652	252 503 894	-157 550 018	94 953 876	4 978 111 528	30 991 511 820
2009	7 432 753 978	4 794 338 468	261 599 906	1 610 792 307	4 510 807 723	267 643 692	-145 536 534	122 107 158	4 632 914 881	31 575 327 410
2010	7 581 920 528	5 597 252 539	278 625 600	2 187 882 266	4 451 175 855	328 795 014	-143 612 574	185 182 441	4 636 358 295	32 194 097 440
2011	8 373 997 862	6 401 217 766	332 117 332	2 553 510 230	4 858 407 659	-96 313 421	-156 751 485	-253 064 906	4 605 342 753	32 533 445 520
2012	7 950 942 446	6 282 459 088	284 353 693	2 695 346 515	4 648 183 566	-35 083 155	-149 968 823	-185 051 978	4 463 131 588	33 520 867 010
2013	8 257 086 105	6 124 132 021	259 583 345	2 672 772 619	5 065 310 048	0	-163 426 976	-163 426 976	4 901 883 071	33 487 125 280
2014	8 324 644 582	5 788 759 923	235 395 723	2 616 648 354	5 387 928 736	0	-173 835 934	-173 835 934	5 214 092 802	34 208 676 310
2015	9 170 467 114	6 244 895 485	290 789 134	2 563 027 195	5 779 387 957	0	-186 465 960	-186 465 960	5 592 921 998	36 437 708 700
2016	8 867 913 756	5 800 120 860	232 079 205	2 503 459 223	5 803 331 324	0	-89 914 798	-89 914 798	5 713 416 526	36 191 427 520
2017	9 661 017 736	6 217 163 571	200 233 408	2 677 834 744	6 321 922 317	0	-97 949 667	-97 949 667	6 223 972 650	38 335 932 110
2018	10 201 154 121	6 507 227 927	213 315 205	2 673 092 093	6 580 333 492	0	-101 953 400	-101 953 400	6 478 380 093	40 915 881 060
2019	10 686 964 799	6 659 099 832	242 774 288	2 694 441 767	6 965 081 022	0	-82 096 111	-82 096 111	6 882 984 912	43 042 363 810

Source: Institute of Financial Policy of the Ministry of Finance of the Slovak Republic, 2021

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Based on the above available data obtained from the Institute of Financial Policy of the Ministry of Finance of the Slovak Republic, it is possible to evaluate the growth of value added tax collection, whether by customs or tax administration, over the period under review. In addition to the growth of tax collection by customs and tax administration, it is also possible to observe a significant growth in the volume of taxable supplies by taxpayers, which is confirmed by the column capturing their own tax liability. The last column captures the development of household and state consumption in the form of the tax base, or tax macro base. In general, it can be said that the development of all indicators is growing, except for the indicators of adjustment for legislation, PPP and reduced VAT. The indicator of adjustment for legislation and PPP records the necessary correction of the dataset for the former VAT rate of 19% as well as for PPP projects. Since 2013, the indicator has been equal to 0 euros. With a reduced VAT rate (10%), it is interesting that it is the only indicator with a decreasing trend, even though household and state consumption grew in the monitored period. The periods from 2009 to 2010 and 2012 are the only periods when there were fluctuations in tax collection in the period we monitored. The years 2009 and 2010 were the years when the Slovak Republic was dealing with the financial crisis of 2008, which resulted in a decrease in VAT collection. The most noticeable decrease was recorded by the customs administration in 2009. In the collection of value added tax, the year 2012 is characterized by the collapse of the information system of the financial administration, which had a negative impact on the collection of VAT by the tax administration.

From the perspective of the efficiency of value added tax, based on the chosen methodology and dataset, we receive specific values of the effective VAT rate for a given year.

Table 3 Average effective VAT rate

Year	Average effective VAT rate (in %)
2005	17,47 %
2006	16,84 %
2007	16,36 %
2008	16,06 %
2009	14,67 %
2010	14,43 %
2011	14,20 %
2012	13,35 %
2013	14,66 %
2014	15,28 %
2015	15,39 %
2016	15,79 %
2017	16,23 %
2018	15,84 %
2019	15,99 %

Source: Prepared based on the Financial Policy Institute of the Ministry of Finance of the Slovak Republic

In connection with the above values, we present Figure 2, which captures the development of the values of average effective VAT rates for the monitored period.

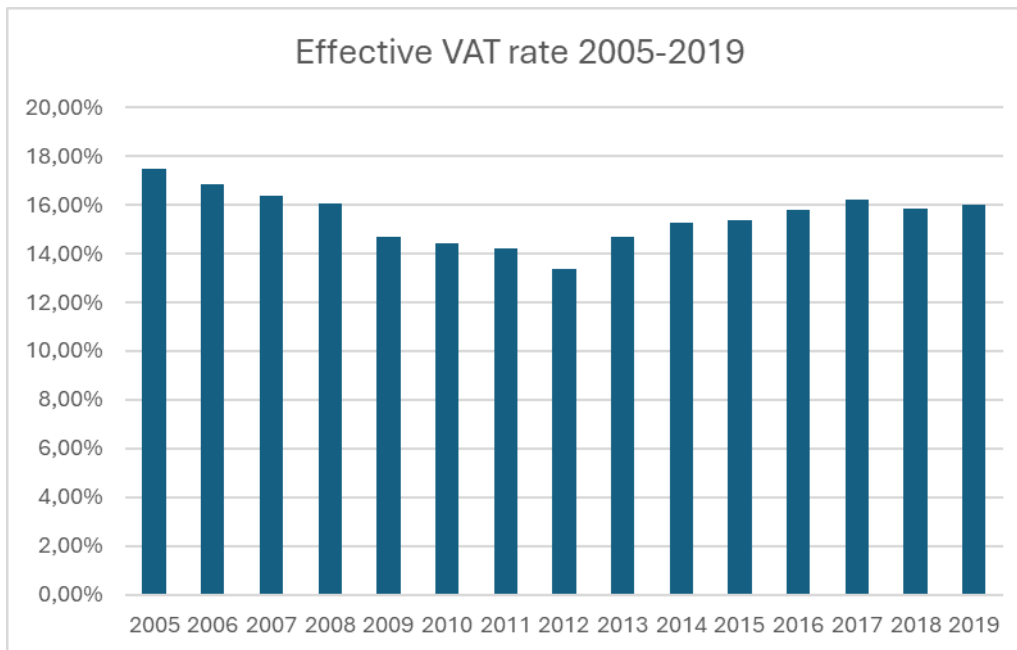


Figure 2 Average effective VAT rate 2005-2019

Source: Own processing based on the Institute of Financial Policy of the Ministry of Finance of the Slovak Republic

Based on the attached Figure 2, it is possible to assess that over the period under review, the average effective VAT rate oscillated in the interval from 13.35% to 17.47%. The worst year can be considered 2012 with the lowest average VAT efficiency. One of the possible reasons why 2012 achieved the worst result in the period under review is the collapse of the information system of the Financial Administration of the Slovak Republic (Financial Administration, 2013). The most successful year can be considered 2005, when the average effective VAT rate reached its maximum to date - 17.47%. There are several reasons. The most important determinant can be considered the tax reform carried out in 2004, as well as the subsequent entry into the EU, when in 2005 the basis for a more uniform application of common EU rules was established, which led to the harmonisation of VAT at the EU level (European Parliament, 2020). The other years can be considered stable in the sense that the average effective VAT rate oscillated around 16%, especially in the last five years of the monitored period.

The development of effective VAT rates in question points to the fact that if each tax entity fulfilled its obligation in full and without fraud, then instead of the 20% VAT rate, a VAT rate of approximately 15% to 16% would suffice for the entire monitored period. Such a phenomenon could positively stimulate the economy, since the state budget would collect as much tax as it planned and at the same time goods would be cheaper for final consumers, which would lead to consumer savings and a possible increase in further consumer consumption.

Discussion

Within the framework of the Mendoza-Razin-Tesar methodology, the latest available data are up to 1997. In the study in question, the OECD evaluated the effective VAT rates for the V4 countries we selected. For the Czech Republic, it was 19.20%, for Hungary 20.20% and for Poland 16.80%. The average for EU countries at that time was 19.30%. Statistics are not available for the Slovak Republic in this study (OECD, 2000). After this period, the OECD chose a new methodology for calculating the effective VAT rate, which is the Devereux-Griffith methodology. As we have already justified in the work, we did not apply this methodology. However, the methodology also examines the effective VAT rate, and therefore, as the only current analogue of our methodology, we will compare the results obtained by us for our monitored period. The latest available OECD study is for the period up to 2018. For the V4 countries, the average VAT rate has changed significantly since 1997, when the previous methodology was used. The Czech Republic achieves an effective VAT rate of 12.60%, Hungary 14.80% and Poland 12.10%. According to the OECD, the effective VAT rate for Slovakia is 11.60%. Our results indicate an effective VAT rate of around 15.50% on average, which can be considered a significant difference. The reason will be mainly the difference in the chosen methodologies. While the OECD applies a methodology based on the choice of the private sector where to place its production, our methodology looks at the effective VAT rate from the perspective of the "state", which was our goal. In any case, the other V4 countries have deteriorated compared to the turn of the millennium, as efficiency has decreased. Even though their effective VAT rate has decreased, it is important to note that according to the OECD, we are the worst among the V4, as we have the lowest effective VAT rate according to the OECD. Evaluating our results and the results according to the OECD, it is necessary to say that the effective VAT rate for the Slovak Republic is truly insufficient (OECD, 2020). Also in view of the given results, it is appropriate that the Financial Administration of the Slovak Republic is proactively trying to introduce new control systems and systems designed to combat tax evasion (e-Cash Register, e-Invoice, control statement, etc.).

Conclusion

Value added tax affects every economically active entity, whether the final consumer, a business entity, or even the public administration. It is a tax that is vital for the public administration, i.e. the "state", since thanks to this tax the state achieves significant income, thanks to which it finances public goods. Therefore, the need for the existence of a tax that helps finance public goods is essential today.

On the other hand, this tax is full of contradictions. Apart from its desirable effects, namely the financing of public goods, this tax is extremely complex, administratively demanding, with various legislative exceptions, or additional obligations, which also results in its negative perception. By the term negative perception, we can understand the perception from the perspective of abnormal administration of this tax, whether from the perspective of taxpayers or from the perspective of the tax authority. Also, the second negative perception of this tax is mainly tax evasion, which we can encounter practically on a daily basis.

It is precisely because of the complexity of the tax and its defects that we decided to examine this tax from the perspective of tax efficiency. In our work, we proceeded in accordance with the selected methodologies, based on which we were able to determine what affects the efficiency of VAT.

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