MINISTERUL EDUCAȚIEI NAȚIONALE
ROMÂNIA
UNIVERSITATEA DE MEDICINĂ, FARMACIE, ȘTIINȚE ȘI TEHNOLOGIE „GEORGE EMIL PALADE" DIN TÂRGU MUREȘ

sciendo

ACTA MARISIENSIS, SERIA OECONOMICA
Online:ISSN 2668-3989, ISSN L 2668-3148
Print:ISSN 2668-3148, ISSN L 2668-3148

doi:10.2478/amso-2021-0004

VAT Efficiency in Developing Countries of the European Union

Maria-Alexandra POPA[1,2*]
Alexandra BOTOŞ[2]

[1] "George Emil Palade" University of Medicine, Pharmacy, Sciences and Technology of Târgu Mureș, 38 Gheorghe Marinescu Street, Târgu Mureș, 540139, Romania
[2] "1 Decembrie 1918" University of Alba Iulia, 5 Gabriel Bethlen Street, Alba Iulia, 510009,Romania

Abstract: *Value added tax (VAT) is an important source of income for European Union countries. The developing countries of the European Union are encouraged to step up their efforts to comply with European legislation for the purpose of sustainable economic development. Knowing that these states are susceptible to corruption, this paper investigates the relationship between the efficiency of VAT collection, the VAT gap and the level of the corruption index in the developing countries of the European Union.*

Keywords: VAT *gap, tax efficiency, value added tax, developing countries, European Union*

JEL classification: M40

© 2021 Published by ACTA MARISIENSIS, SERIA OECONOMICA, University Press Târgu Mureș, on behalf of the George Emil Palade University of Medicine, Pharmacy, Science and Technology of Târgu Mureș, Romania.

[*]*Corresponding author: Maria-Alexandra Popa*
email: maria.popa@umfst.ro

1. INTRODUCTION

An efficient tax system is often characterized by a high efficiency of tax collection compared to a given collection cost. Standard tax efficiency measures compare the actually increased revenues (actual amounts of revenue) with those that could be collected if they were perfectly applied (theoretical amounts of revenue). Tax efficiency in this regard is measured using indicators for the three main taxes: value added tax, corporate tax and income tax.

Value added tax(VAT) is regarded as an indirect consumption tax because the consumer bears the cost of any sales tax when purchasing goods and services. (Erero, 2021; Toth et al, 2021). A unitary VAT system is applied in the European Union, based on European legislation adopted at national level (Kowal & Przekota, 2021). An effective tax system contributes to economic development and living standards. In general, value added tax is an important source of public revenue and is susceptible to tax fraud.

Streamlining VAT collection is a priority for European authorities (Zídková. & Šťastná, 2019), with various actions being taken to stimulate the collection and to discourage non-compliance with legislation in areas, but which involve high compliance costs, thus influencing the level of investment and the shadow economy (European Commission, 2010). A main cause of the shadow economy (including tax evasion) is the level of corruption (Kurauone et al, 2021), a phenomenon that exists especially in Eastern and Central European countries, most of which are part of the former communist bloc, which today are in a transitional economical stage.

In this paper we aim to measure the efficiency of VAT in the developing countries of the European Union (EU) and to determine potential correlations between VAT efficiency, the shadow economy and the corruption perception index for the period 2010-2019 in five developing countries in EU: Czech Republic, Poland, Hungary, Romania and Bulgaria.

2. DATA AND METHODOLOGY OF RESEARCH

In order to achieve the objective proposed in this paper, we collected data on: VAT revenues, VAT revenues relative to gross domestic product (GDP), standard VAT rate, final consumption, corruption perception index (CPI). The data were collected for the period 2010-2018 (9 years) by accessing the Eurostat database and transparency agency. In the study we included developing countries in the EU, including: Bulgaria, Romania, Poland, the Czech Republic and Hungary. We structured the data using a worksheet in Microsoft Excel. The data collected are cross-sectional (panel-type). Their processing was carried out with the help of the Eviews software.

VAT EFFICIENCY

VAT efficiency is long studied by various researchers (Arnold, 2008; Đurović-Todorović et al., 2019; Babici, 2019; Keen, 2013; Ueda, 2017, et al.). In recent years, research on VAT efficiency in the European Union has been linked to the model developed by Keen (2013). It determines efficiency by relating real VAT revenues to theoretic VAT revenues (final consumption x standard VAT rate). In other words, it determines efficiency with the help of the mathematical formula:

$$E = \frac{VAT\ revenue}{Final\ consumption\ x\ VAT\ rate}$$

MINISTERUL EDUCAȚIEI NAȚIONALE
ROMÂNIA
UNIVERSITATEA DE MEDICINĂ, FARMACIE, ȘTIINȚE ȘI TEHNOLOGIE „GEORGE EMIL PALADE" DIN TÂRGU MUREȘ

sciendo

ACTA MARISIENSIS, SERIA OECONOMICA
Online:ISSN 2668-3989, ISSN L 2668-3148
Print:ISSN 2668-3148, ISSN L 2668-3148

Moreover, based on the data collected, the fiscal efficiency coefficient (denoted in the literature with C) can also be calculated according to the following mathematical formula:

$$C = \frac{\frac{VAT\ revenue}{GDP}}{standard\ VAT\ rate}$$

SHADOW ECONOMY

After calculating these indicators/coefficients, we also determined the VAT gap, as the difference between the achievable VAT income (theoretical) and the real VAT income in order to identify an increase/decrease in time of it, through the VAT gap rate. This variable, according to the literature, shows the level of the shadow economy (European Commission, 2016; Borselli, 2011, Reckon, 2009).

Table 1 contains descriptive statistics of the results obtained at sample level.

Table 1 Descriptive data statistics

	Is	C_efficiency_ratio	VAT_gap	VAT_gap_ratio
Mean	0.627091	0.358966	9474.698	0.372909
Median	0.634655	0.345000	5334.152	0.365345
Maximum	0.755237	0.465000	27381.41	0.494811
Minimum	0.505189	0.304348	1686.920	0.244763
Std. Dev.	0.077369	0.046373	8606.709	0.077369
Observations	45	45	45	45

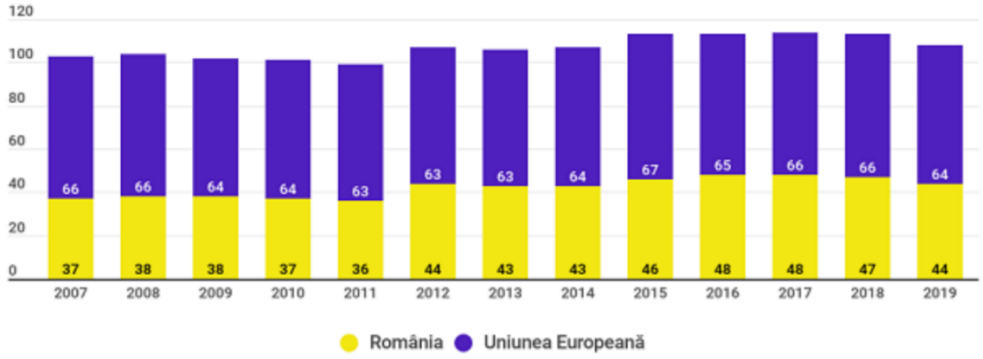
Source: Own processing using Eviews software

Corruption Perceptions Index

Over time, even before accession to the European Union (EU), Eastern countries have faced major problems related to corruption, especially in the public system, but also in the private system. With the accession to the EU, they adopted a series of anti-corruption measures that are intended to drastically decrease corruption, but which in the case of certain countries included in the study proved to be insufficient to eradicate this phenomenon. This fact is confirmed by the level of the black economy in these countries, which is very high compared to the EU average, but also by the measurements carried out by the competent authorities, part of the European Commission. This authority also measures corruption through the eyes of the population by applying a questionnaire to a representative sample of the population in the EU Member States, resulting in a corruption perception index.

In Figure 1 we find illustrated the level of Romania's corruption perception index compared to the EU average, presented for the period 2009-2019,which is well below the EU average. An index close to 100 indicates that the population considers the state to be a little corrupt, while a low index indicates a high perception of corruption. Similar data on the perception index of corruption were collected and used in our study for the other countries analyzed.

Figure 1 Perception index of corruption in Romania towards the EU



Source: https://www.transparency.org.ro/ro/tironews/indicele-de-perceptie-corup%C8%9Biei-2019

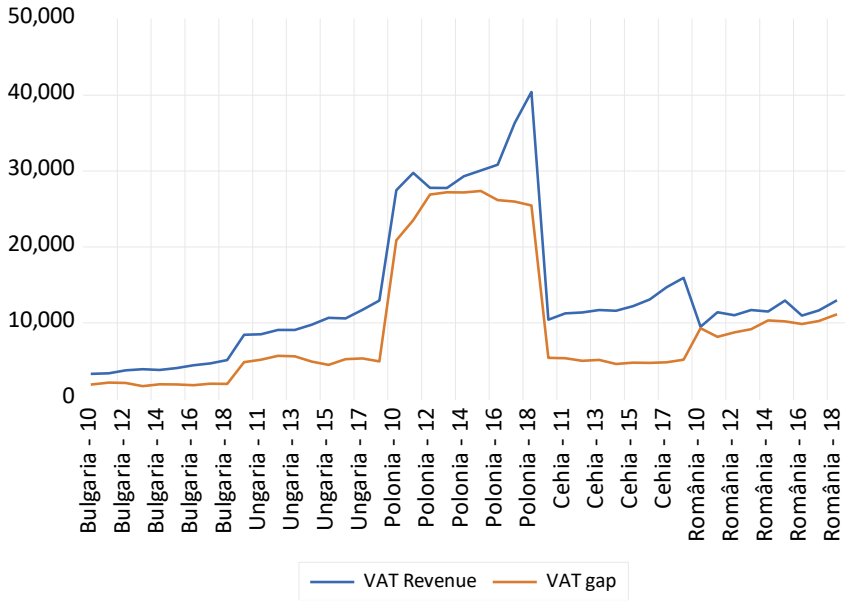
The data collected on the efficiency of VAT, the VAT gap and CPI were analyzed through matrices of correlations in order to study the potential influence of CPI on VAT efficiency.

3. RESEARCH RESULTS

According to the method used, the results show us that the efficiency of VAT (E) is quite low in the case of the countries analysed (see descriptive statistics). Comparatively, we have also calculated the percentage of VAT gap in the total achievable VAT revenues.

In Figure 2, the evolution in VAT revenues and the VAT gap are presented for all five countries analyzed between 2010 and 2019.

Figure 2 Evolution of VAT revenue and VAT gap for the countries under review



Source: Own processing using the Eviews software based on data found on the Eurostat website.

MINISTERUL EDUCAȚIEI NAȚIONALE
ROMÂNIA
UNIVERSITATEA DE MEDICINĂ, FARMACIE, ȘTIINȚE ȘI TEHNOLOGIE „GEORGE EMIL PALADE" DIN TÂRGU MUREȘ

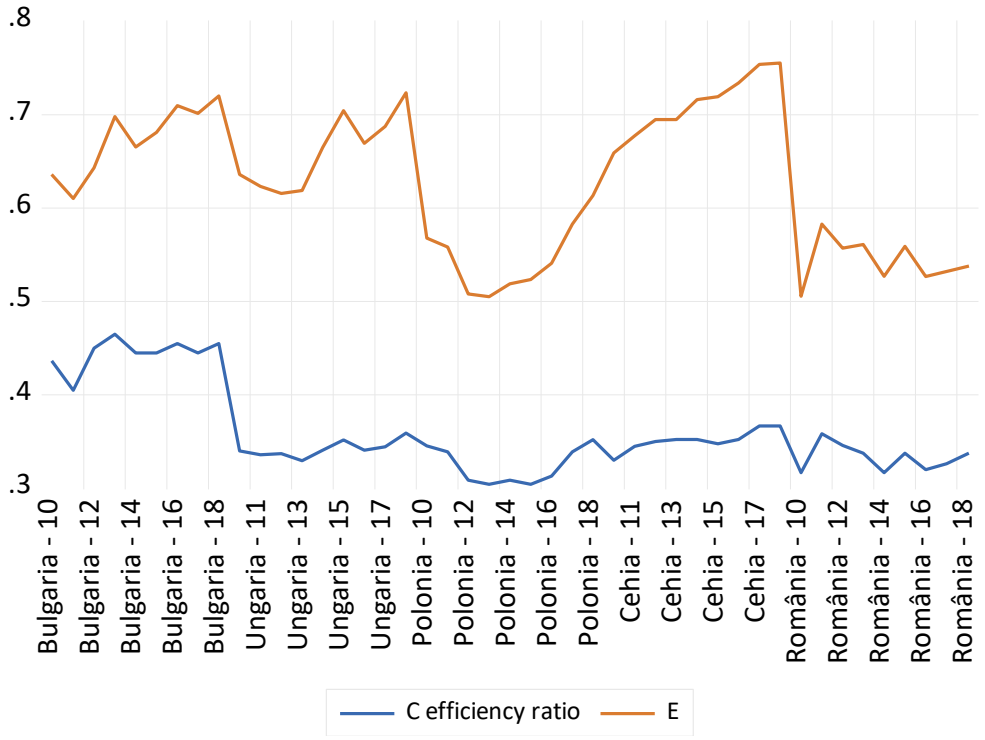
sciendo

ACTA MARISIENSIS, SERIA OECONOMICA
Online:ISSN 2668-3989, ISSN L 2668-3148
Print:ISSN 2668-3148, ISSN L 2668-3148

According to Figure 2,we note that the VAT gap changes once and in the same way as the VAT revenues. We find that in Romania, Hungary and Bulgaria there is an increase in the VAT gap in recent years, while in Poland and the Czech Republic there is a slight decrease in the VAT gap compared to the registered tax revenues.

In Figure 3,we find the evolution of VAT efficiency and the tax efficiency coefficient (VAT) in the case of the states analyzed in the period 2010-2018.

Figure 3 Evolution of tax efficiency for the countries analyzed in the period 2010-2018



Source: Own processing using the Eviews software based on data found on the Eurostat website.

As we see in Figure 3, the efficiency of VAT collection fluctuates every year for all the countries analyzed. In Romania, the efficiency coefficient is very low compared to the other countries analyzed, but still it is higher than in Poland. Figure 3 shows that VAT efficiency has increased in recent years in all countries included in the study.

Next, we will determine the correlation matrix between the indices of perception of corruption and fiscal efficiency. Table 2 contains the related correlation matrix.

Table 2 Correlation matrix between the efficiency of VAT collection and the CPI

Variables	(1)	(2)	(3)
E (1)	1	-	-
C_EFFICIENCY_RATIO (2)	0.554056	1	-
CPI (3)	-0.131235	-0.557624	1

Source: Own processing using Eviews software

A positive correlation of medium intensity is identified between the efficiency coefficient and the efficiency of VAT revenue collection. We find a negative link between the efficiency of collection (both expressed by E and C) and the perception index of corruption.

Between the fiscal efficiency coefficient and the corruption perception index we identify a negative correlation of medium intensity, and between the efficiency expressed by E and the CPI we notice a negative correlation of low intensity. This result is an expected one, which demonstrates that the efficiency of tax collection also depends on the level of corruption. Otherwise described, when the corruption perception index is high, the efficiency of VAT collection is low, or vice versa, when the real VAT revenue relative to the theoretical income is low, the corruption perception index is high.

Table 3 shows the correlations identified between efficiency, the VAT gap and the perception index of corruption.

Table 3 Correlation matrix for efficiency, VAT gap and CPI

Variables	(1)	(2)	(3)	(4)	(5)	(6)
CPI (1)	1	-	-	-	-	-
VAT_GAP (2)	-0.6790	1	-	-	-	-
VAT_GAP_RATIO (3)	-0.1312	0.6924	1	-	-	-
THEORETIC_VAT_REVENUE (4)	0.2432	0.9840	0.5790	1	-	-
VAT_REVENUE (5)	0.7810	-0.9424	-0.4599	0.9868	1	-
E (6)	-0.1312	-0.6924	-1.0000	-0.5790	-0.4599	1

Source: Own processing using Eviews software

According to the results presented in Table 3, a negative correlation of high intensity between the perception index of corruption and the VAT gap is identified. As the corruption perception index is low in the countries under review (indicating a high level of corruption), this result confirms the evidence of other similar research (Majerova, 2016; Timofte et al, 2020; Okumuş, 2021), according to which the level of corruption determines / influences tax evasion.

VAT Efficiency is negatively correlated with the VAT gap at a rate of 69.24%, depends 100% on the VAT gap rate (when the VAT gap rate is high, efficiency is minimal) and decreases when the theoretical value of VAT revenues is high.

We note that both theoretical and actual revenues are influenced by tax evasion in a significant proportion, but in the opposite direction. When tax evasion is high, we see that theoretical revenues are high and real revenues are low.

4. CONCLUSIONS

According to the case study addressed in this paper, the efficiency of VAT revenue collection is influenced by corruption (measured by the perception index of corruption), but also by the VAT gap. The results are expected and are in line with several studies conducted by researchers and listed throughout this work. However, it is not unitarily influenced (100%) by a single variable, which may be a limitation of research.

The limits of the research consist in the analysis of a relatively small number of years, the relatively small number of data included, but also the subjective character of some variables

sciendo

ACTA MARISIENSIS, SERIA OECONOMICA
Online:ISSN 2668-3989, ISSN L 2668-3148
Print:ISSN 2668-3148, ISSN L 2668-3148

included in the study. In the future, we will try to develop the method, to introduce several variables in the study, especially related to tax evasion.

5. ACKNOWLEDGEMENTS

Project funded by the "George Emil Palade" University of Medicine, Pharmacy, Sciences and Technology in Târgu Mureș within the Internal Competition for Scientific Research Grants, contract no. 10128/17.12.2020.

Bibliography:

Arnold, J. (2008). Do tax structures affect aggregate economic growth? Empirical evidence from a panel of OECD countries (OECD *Economics Department Working Paper* 643). Paris: Organization for Economic Co-operation and Development.

Babich, G., Crivelli, E., & Marinkov, M. (2019). *Tax Administration Strength and Tax Efficiency in Emerging Europe: Lessons for Romania. International Economic Journal, 33(4), 741–756.* http://doi.org/10.1080/10168737.2019.1689283

Borselli, F. (2011). Organised VAT Fraud: Features, Magnitude, Policy Perspectives. Quest. Econ. Finanza. Bank Italy Econ. Res. Int. Relat. Area , 106.

European Commission. (2010). Green Paper. on the Future of VAT Towards a Simpler, More Robust and Efficient VAT System; European Commission: Brussels, Belgium.

Cnossen, S. (2021). The C-inefficiency of the EU-VAT and what can be done about it. Int Tax Public Finance https://doi.org/10.1007/s10797-021-09683-0

Đurović-Todorović, J., Đorđević, M. & Ristić, M. (2019). C Efficiency Ratio As A Measure Of Vat Efficiency In Eu Developing Countries And Serbia. *Novi Ekonomist*, Vol 13(2), ISSN 1840-2313 (Print) 2566-333X (Online).

Erero, J. L. (2021). Contribution of VAT to economic growth: A dynamic CGE analysis. *Journal of Economics & Management*, 43, 22-51. https://doi. org/10.22367/jem.2021.43.02

Keen, M. (2013). The Anatomy of the VAT. *National Tax Journal*, 66(2), 423–446.

Kowal A, Przekota G. (2021). VAT Efficiency—A Discussion on the VAT System in the European Union. Sustainability. 13(9):4768. https://doi.org/10.3390/su13094768

Kurauone, O., Kong, Y., Sun, H., Famba, T. and Muzamhindo, S. (2021), "Tax evasion; public and political corruption and international trade: a global perspective", *Journal of Financial Economic Policy*,Vol. 13 No. 6, pp. 698-729. https://doi.org/10.1108/JFEP-04-2020-0067

Majerova, I. (2016). The Impact of Some Variables on the VAT Gap in the Member States of the European Union Company. Copernican Oeconomy 7(3):339, https://doi.org/10.12775/OeC.2016.020

Okumuş, K. (2021). Analysis of VAT gap in the EU. Master Thesis, Prague University of Economics and Business.

Reckon (2009). Study to Quantify and Analyse the VAT Gap in the EU-25 Member States; Reckon: London, UK

Timofte (Coca), C., Mates, D., Coca, D.-A., & Tanasa (Brinzaru), S.-M. (2020). The Relationship between Tax Evasion and Corruption. A Cross-country Examination. In A. Grigorescu & V. Radu (vol. ed.), Lumen Proceedings: Vol. 11. 1st International Conference Global Ethics - Key of Sustainability (GEKoS) (pp. 173-181). Iasi, Romania: LUMEN Publishing House. https://doi.org/10.18662/lumproc/gekos2020/18

Tóth, P.; Cupák, A.; Rizov, M. (2021). Measuring the Efficiency of VAT Reforms: A Demand System Simulation Approach, *Oxford Economic Papers*, ISSN 1464-3812, Oxford University Press, Oxford, Iss. Advance articles (Article No.:) gpaa052, http://dx.doi.org/10.1093/oep/gpaa052

Ueda, J. (2017). The Evolution of Potential VAT Revenues and C-Efficiency in Advanced Economies. *IMF Working Paper* No. WP/17/158.

Zídková, H. & Šťastná, A. (2019). VAT Collection Methods. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, Mendel University Press*, vol. 67(3), pages 883-895.

https://www.transparency.org.ro/ro/tironews/indicele-de-perceptie-corup%C8%9Biei-2019