TAX AVOIDANCE: THE ASPECT OF VALUE ADDED TAX[*]

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Abstract. Tax avoidance is probably as old phenomenon as the taxes themselves. The literature has disclosed that tax avoidance is a worrying problem facing not only the Baltic economies but also the global economy. Tax avoidance and VAT in particular, undoubtedly causes significant damage to the functioning of the public sector and to the financing of public expenditure, because the fiscal significance of this tax is very high. On the other hand, the VAT gap is a significant problem, as in Lithuania in the period of 2012 - 2018 it ranged from 200 to 300 million Euros; the Lithuania's budget lost so much money every quarter. The article aims to identify the factors influencing the VAT gap in the Baltic States. The study is performed using quantitative methods. The influence of optional factors on the VAT gap is determined by performing a correlation-regression analysis of the Baltic States. The study showed that the tax gap, migration and tax rate factors had the largest impact on the VAT gap in the Baltic States.

Keywords: taxation, tax behavioral, tax avoidance, Value added tax

1. Introduction

Taxes are the most important source of state's revenue. The goal of each country is to create a tax system that would promote the growth of the country's economy and ensure sufficient income to perform state functions. Tax revenue is an important factor influencing the efficient performance of state functions, on which not only the state's welfare but also the prosperity of its citizens depends. It is the behavior of taxpayers that determines what

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part of tax revenue will be collected to the budget and how efficiently the state will be able to perform its functions.

The main problem facing national governments is decision what and how to tax, what tax rates to apply in order to make the country's tax system fair, simple, efficient and elastic. An unsuitable tax system in a country encourages tax avoidance, which has enormous consequences for the state, because it hinders development of the country's economy and the future of the state.

OECD (2015), Keen (2012), indicate the importance of tax collection in developing countries. The loss of tax revenue estimated at more than $ 3.1 trillion, or about 5.1 % of world's GDP. It means that about 54.9 % of health care expenditure is lost due to the tax avoidance. The impact of tax avoidance is greater in developing countries than in developed countries. Tax justice network (2011) paid attention to the fact that because of tax avoidance 97.7 % of health care budget is lost in African countries and more than one hundred percent in South American countries.

The state provides security and public goods to the entities, and they in return, must pay taxes. However, there are always those who want to use the goods provided by the state without paying for them. This behavior of taxpayers unbalances the state budget as the tax revenue collected becomes less than the expenditure. This leads to a budget deficit, and the remaining gap is filled with borrowed funds. Therefore, the goal of each country in the field of taxation is to create a tax system that would promote economic growth and ensure stable state revenues.

Tax avoidance is one of the most important problems facing all countries in the world today and accounts for a large enough share of the unaccounted economy. Tax avoidance can be equated with a tax gap, which indicates how much of the potential tax revenue the state does not collect into the budget due to one or another behavior of taxpayers. Most of the revenue to the state budget is collected from value added tax (VAT), but on the other hand, this tax is one of the most vulnerable, as there are cases of fraud related to the development of VAT schemes, concealment of part of turnover and falsified VAT invoicing, all unaccounted for sums of money for goods or services sold in order to reduce the VAT obligation. Therefore, it is important to know why taxpayers assume such behavior, what factors may lead to it. Once identified, the factors and causes of VAT avoidance can reduce the amount of revenue lost by the state. The problem of VAT avoidance is valid not only in the European Union but also worldwide, and the issue has not been investigated in detail due to data limitations, changes in calculation methodologies and the identification of complex causality.

The problem of tax and VAT avoidance in the world has been studied by many researchers (Ivaškaitė - Tamošiūnė, 2014; Giriūnienė, 2014; Bikas, 2019; Medelienė et al., 2011; Novošinskienė et al., 2007; Šinkūnienė, 2005; Keen et al., 2014; Borselli et al., 2012; Simionescu et al., 2016; Sasongko et al., 2019). Researchers emphasized that VAT is one of the main parts of tax revenue to the state budget, therefore, its collection is very important for the welfare of the state, but unanimous opinions and detailed analyses of VAT avoidance, what affects the VAT gap, what factors shape this tax avoidance behavior is missing.

The aim of the article is to analyze the factors influencing the VAT gap in the Baltic States.

The analysis and systematization of scientific literature, legal acts and statistical data was performed during the while analyzing the avoidance of tax and VAT avoidance. Based on the collected data, the analysis of the factors influencing VAT collection in the Baltic States is performed. Regression models of the Baltic States have been developed, with the help of which the main factors influencing the VAT gap in the Baltic States are mathematically expressed.

2. Theoretical background

Without taxes, modern society would not be able to survive, but despite state laws and regulations, there are people trying to avoid paying taxes. The optimal level of public goods provided by public authorities is only achieved when each taxpayer is honest and pays a part of his or her tax liabilities (Batrancea et al., 2012; Čižo et al., 2020). Franzoni (2000) identifies four basic rules that a taxpayer must follow in order to execute tax laws honestly:

1. Notify the tax authorities of the actual tax base;
2. Calculate the tax liability correctly;
3. Return the tax declaration on time;
4. Pay the amounts of money on time.

If at least one of these rules is violated, the taxpayer becomes ineligible, and non-compliance with the requirements also leads to tax avoidance.

Vasiliauskas (2005) names the concept of tax avoidance as, an violation of rights in order to obtain a tax benefit, which is understood as tax reduction or non-payment of taxes (using tax law provisions or reliefs), trying to create special tax conditions, to simulate a business model and thus obtain tax benefits. According to Paulauskas (2006), this behavior is called the most intelligent violation of tax laws. A taxpayer consciously evades tax obligations or reduces taxes without violating established legal acts, but his actions are contrary to the meaning of the law. These concepts are also supported by Palijanskas (2003), who describes tax avoidance as a taxpayer's activity aimed at "circumventing" the provisions of the law by formally following the established procedures without violating them. The concept of tax avoidance is complemented by James et. al., (2002) that tax avoidance considered a legitimate act of taxpayers because it is the application of loopholes in legislation system to reduce taxes. Tax avoidance includes not only the reduction of the tax burden, but also obtaining other tax benefits: deferral of the tax payment term, increase of the overpaid (deductible) tax overpayment (difference) and shortening of the tax overpayment (difference) reimbursement of taxes (Paulauskas, 2006). It can be said that tax avoidance is the legal action of taxpayers to take advantage of loopholes in legislation to reduce or avoid paying taxes. Tax avoidance is the main problem faced by the state in order to collect as much tax revenue as possible to the budget.

The willingness to avoid taxes is widespread in all countries of the world. According to the European Commission, EU Member States lose billions of euros in VAT revenue every year due to tax fraud and an inadequate tax collection system. The VAT gap, which is the difference between the estimated VAT revenue and the VAT actually collected, anticipates the loss of revenue because tax fraud, tax evasion and tax avoidance, but also due to bankruptcies, financial insolvency or loss-free calculation. The VAT gap is calculated by comparing actual VAT receipts with theoretical VAT liabilities (Reckon, 2009).

Compared to other misuses, VAT avoidance and evasion causes the greatest financial loss. The damage done to the states is particularly significant when in companies avoid VAT being paid internationally, when dozens of companies are involved in criminal activities in different countries of the European Union. By making fictitious transactions between themselves, companies seek to avoid paying VAT in some countries and to recover it fraudulently from national budgets. The German Ministry of Finance (2018) complements the range of forms of VAT avoidance and evasion from undeclared and/or unpaid VAT to the unfair right to use deductible input tax, known as 'carousel' VAT fraud. When dishonest unscrupulous suppliers collect large amounts of VAT from their customers and disappear before the tax authorities check the taxes.

In addition, the EU's fight against VAT fraud and avoidance considered the most important objective in the development of new EU legislation. Walpole (2014) argues that VAT avoidance and evasion involves a number of activities that deprive the state's treasury of the revenue will need to be collected legally. Unlike other taxes, VAT has two distinct areas in which taxpayers can target their fraudulent activities: they cannot only manipulate their liability for VAT, but can also abuse the purchase of VAT recovery mechanism, which is a way of using public funds.

In order to combat VAT avoidance, it is appropriate to identify factors that may influence taxpayers' behavior. There are many studies in the scientific literature which provide different opinions and identify the main factors influencing tax avoidance in different countries, but there are only a few studies that analyze VAT avoidance. Kiri (2016) states that the tax rate, audit probability, and the amount of the fine are the main factors influencing the level of tax avoidance. In addition, analyzing secondary sources, the authors found out that in some countries, the rate of tax avoidance decreases with increasing tax rates, while in other countries the opposite effect may occur. The results of the research differ because each country has its own specific characteristics. A study conducted by Richardson (2006) who evaluated data from 45 countries showed that non-economic factors have the greatest impact on tax avoidance compared to economic factors. The regression analysis results indicated that the less complex the taxes are and the higher the education of taxpayers is, the lower is the level of tax avoidance in all countries. The dependence on the unemployment rate and tax avoidance is emphasized by Lisi (2012). The author points out that a company's decision to avoid taxes depends on trust in the institution of tax administration, and it influences one of the most important macroeconomic variables i.e. the unemployment rate. Pomnerehme et al. (1996) analyzed Swiss data in order to determine taxpayer avoidance responses to changes in tax rates. The authors attributed to the dependent variable the difference between the declared income of taxpayers and national accounts data. The authors attributed average marginal tax rates, audit probabilities, and other indicators as independent variables. The results of the regression analysis showed that the relationship between marginal tax rates and tax avoidance is positive and statistically significant. According to Fisman et al. (2001) 1 percentage point increase in tax rates leads to 3 percentage point increase in tax avoidance.

Therefore based on the analyzed scientific sources, it was observed that tax collection and VAT are analyzed by various quantitative and qualitative methods. Many Lithuanian and foreign authors studied different aspects of tax and VAT avoidance, therefore, the research methodology is based on the scientific publications and research made by the following authors: Keen (2012) - examined the importance of tax collection in developing countries, Marandul et al. (2015), Itashiki (2011) and Bame-Aldred et al. (2011) were, interested in taxpayers' behavior, their values and sought to find out the reasons and connections that determine people's choice to avoid taxes, Bikas et al., 2020 assessed the impact of some variables on the VAT gap in Lithuania. Keen et al. (2014), examined VAT tax and its collection in the European Union countries, Borselli et al. (2012) analyzed the factors which reduce the ability to collect as much VAT revenue as possible to the state budget.

Summarizing, it can be said that studies produced in different countries show, that taxpayers' behavior in tax avoidance affects different factors in each country. Studies reveal that in some countries the effects of certain factors differ from other countries. It only proves that it is very important to single out the main factors influencing VAT avoidance. Based on the analyzed scientific literature and methods, it was chosen to analyze the VAT tax gap in the Baltic States and to investigate the factors that influence the VAT tax gap.

3. Research objective and methodology

In order to assess the impact of individual macro factors on VAT collection and the gap, the method of correlation regression analysis was chosen. According to Pabedinskaitė (2009), this method is widely used in social, economic and physical sciences while investigating various phenomena. Correlation regression analysis helps to determine the relationship between the variables under consideration and their interaction. Correlation, in this case, describes the strength of a relationship between variables, and regression analysis helps to determine the nature of that relationship and to describe the dependence of the mean values of a dependent variable on one or more independent variables using mathematical formulas. The result of the research is a regression equation, which shows the relationship between the factors and answers the question of how the average value of the examined economic phenomenon changes due to the factors on which it depends.

Correlation regression analysis consists of several important steps. It is determined which independent variables have the greatest impact on the dependent. A regression analysis is performed, during which regression equations are formed, which describe the relationship of the dependent variable with each independent variable individually. Correlation regression analysis is performed, which covers all the most significant factors previously selected. A multiple regression equation is also mode, showing the direction and strength of the effects of the factors under consideration (Pabedinskaitė, 2009).

A linear multiple regression model was used to the study, as the influence of many factors on the phenomenon under study investigated. The sum of the effects of all these factors will form the total influence on the phenomenon under consideration, and the influence of each individual factor, which is called partial, will be determined assuming that the values of other independent variables are constant (Krikštolaitis, 2007).

Three Baltic countries are analyzed - Lithuania, Latvia, Estonia. The choice of these countries was determined by the similar economic and social level of the countries and their regional policy.

The constructed models belong to linear multiple regression models because they are dependence equations having more than one independent variable. The purpose of the regression model is to quantify the impact of selected factors on the VAT gap. The influence of factors is estimated on the basis of regression model coefficients, which are calculated during the modeling process. Thus, regression models for all three Baltic countries will be developed to mathematically assess the factors influencing the VAT gap. For the regression models, a 95% confidence interval for the interval estimates was chosen, which indicates that 5% error is possible.

In the regression equation, the independent variables were chosen based on the potential risks and impact on VAT. The selected factors are adapted to the Baltic market, i.e. the same factors are analyzed in Lithuania, Latvia and Estonia. Eight variables were selected for analysis and included in equation (1). The VAT rate was used only in the Latvian regression model, because only in Latvia did the VAT rate change during the period under review.

$$Y_{\text{VAT gap}} = \beta_0 + \beta_1 X_{\text{GDP}} + \beta_2 X_{\text{consumption}} + \beta_3 X_{\text{VAT rate}} + \beta_4 X_{\text{average wage}} + \beta_5 X_{\text{burden of taxes}} + \beta_6 X_{\text{inflation}} + \beta_7 X_{\text{unemployment rate}} + \beta_8 X_{\text{migration}} + \varepsilon, \quad (1)$$

The resulting equation is evaluated by the selected variables. One of the criteria is "ANOVA". This is a summary of the Stjudent t criterion for several independent samples. This indicator shows whether there is at least one statistically significant variable in the obtained model (Bekešienė, 2015). The ANOVA p-value must be less than

0.05. Stjudent's t criterion is applied to independent samples when we want to compare the average of independent groups. If the corresponding p-value is <0.05, it means that this variable must be eliminated from the equation. One of the most important characteristics of the suitability of the model is the coefficient of determination (R-square). It shows the part of the variation that is explained by the model. A regression model with R squared <0.25 is considered inappropriate. It also cannot said based on this coefficient, that the model is appropriate for the data available. However, the higher this coefficient is, the more accurately it is possible to calculate the dependent variable from the independent ones (Bekešienė, 2015).

The research method is used to examine the dependence of the VAT gap on its determinants, which will also reflect tax avoidance, and the factors that cause it. This will provide to answer to the main question of the study - what factors and what influence do they have on the VAT gap in the Baltic States? The data on the VAT gap in the Baltic States are collected and processed on the basis of the study on the VAT gap in the EU countries conducted by the European Commission CASE (2019). VAT data is the period of 2012 - 2018, on the basis of which the difference between the theoretically planned collections of VAT revenue collection the amount to the budget, i.e. VAT gap. Other data required for the survey are collected and processed using the database of Statistics Lithuania and the database of the Statistical Office of the European Union - Eurostat. It was chosen to study the quarterly data of 2012 - 2018 in order to obtain more representative survey results. The regression models of the Baltic countries were created applying Excel program.

4. Results and discussion

Three Baltic States - Lithuania, Latvia and Estonia were selected for the study. These countries were chosen because of the similar level of economic development of neighboring countries, similar statistical indicators and VAT rates (Table 1).

Table 1. Statistics of the Baltic States (2017)

INDICATOR	LITHUANIA	LATVIA	ESTONIA
Population	2 827 947	1 944 565	1 305 755
Area	65 300 km²	64 589 km²	45 226 km²
GDP (nominal)	$48 132 bn.	$20 101 bn.	$16 410 bn.
GDP (nominal) per capita	$16 709	$15 613	$20 170
Gini coefficient	36	37,7	34
Human Social Development Index (HDI)	0,862	0,855	0,86
VAT rate	21%	21%	20%

Source: Lithuanian Statistics database

Statistics from the Baltic States show that all countries are similar not only in terms of population and area, but also in economic indicators.

The object of research selected for linear regression analysis (dependent variable is: Y - VAT gap and eight independent variables X - Gross domestic product per capita, value added tax rate, average earnings (gross), household consumption from GDP, tax burden, inflation, unemployment in the country and migration, which can affect VAT gap.

The VAT gap is calculated by deducting from the planned amount of VAT to be collected the actual amount of VAT that has been collected to the state budget (2).

$$\text{VAT gap} = \text{VAT}_{\text{plan}} - \text{VAT}_{\text{fact}} \quad (2)$$

It should be noted that the largest VAT gap in the Baltic States in the period 2012 - 2018 was in Lithuania, it ranged from 200 to 300 million Euros (Figure 1). Lithuania lost such amounts of money on a quarterly basis in the period of 2012-2018. The smallest VAT gap prevailed in Estonia, from 25 to 80 million Euros, which is three times more than the VAT collected in Lithuania. The Latvian VAT gap compared to Lithuanian and Estonian results is average it ranged from about 60 to 160 million Euros. On this basis, it can be said that this is probably the most volatile fluctuation of the VAT gap, which started to decrease quite rapidly since the second quarter of 2012, and that more and more VAT was collected in each quarter of the period under review.
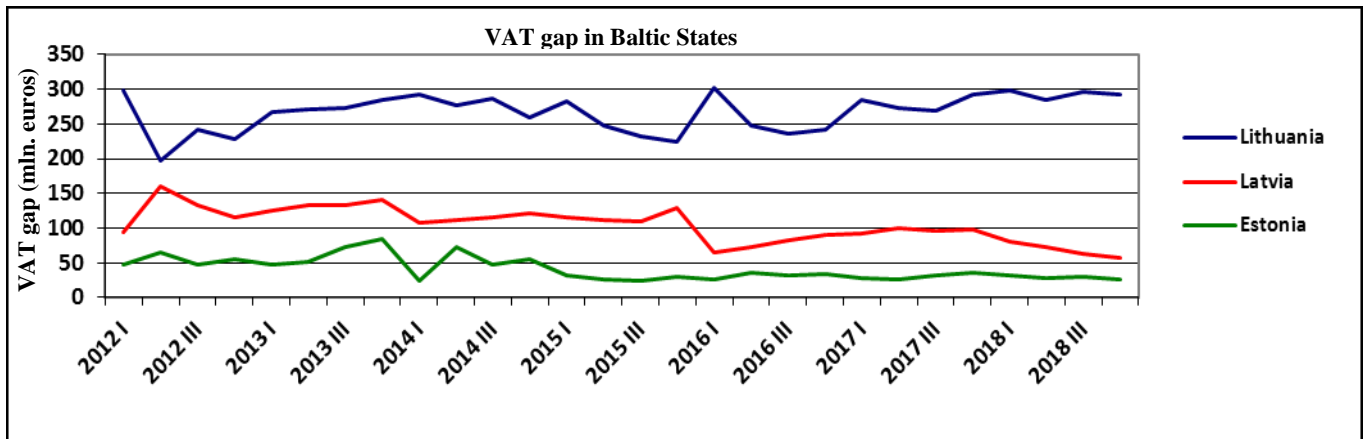

Figure 1. VAT gap in the Baltic States in 2012-2018 (compiled by the author based on the data of the EC survey (2019)

Lithuania is the first Baltic country chosen for the study. After systematizing all the quarterly data of the dependent variable and the independent variables for 2012–2018, the scattering of the values of the dependent variable is analyzed and the relationship between the variables is graphically represented before the initial regression equation is made. The values of the dependent variable are plotted on the vertical axis and those of independent factors are on the horizontal axis (Figure 2).
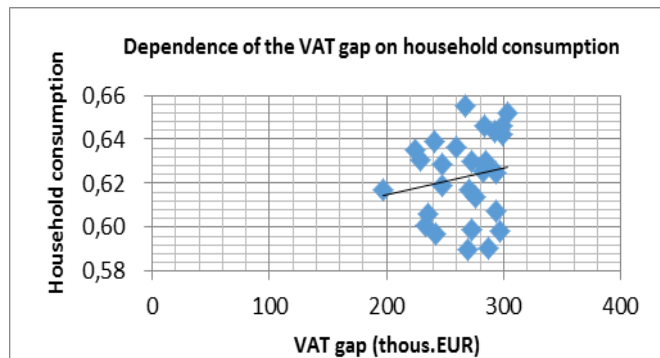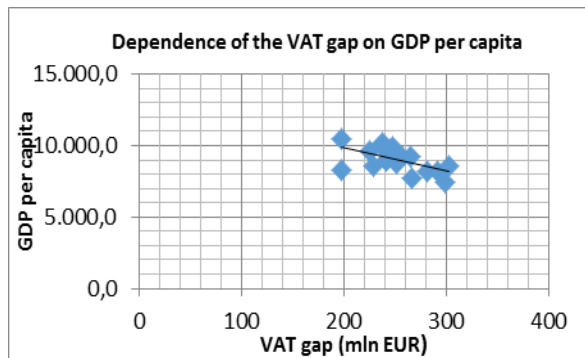
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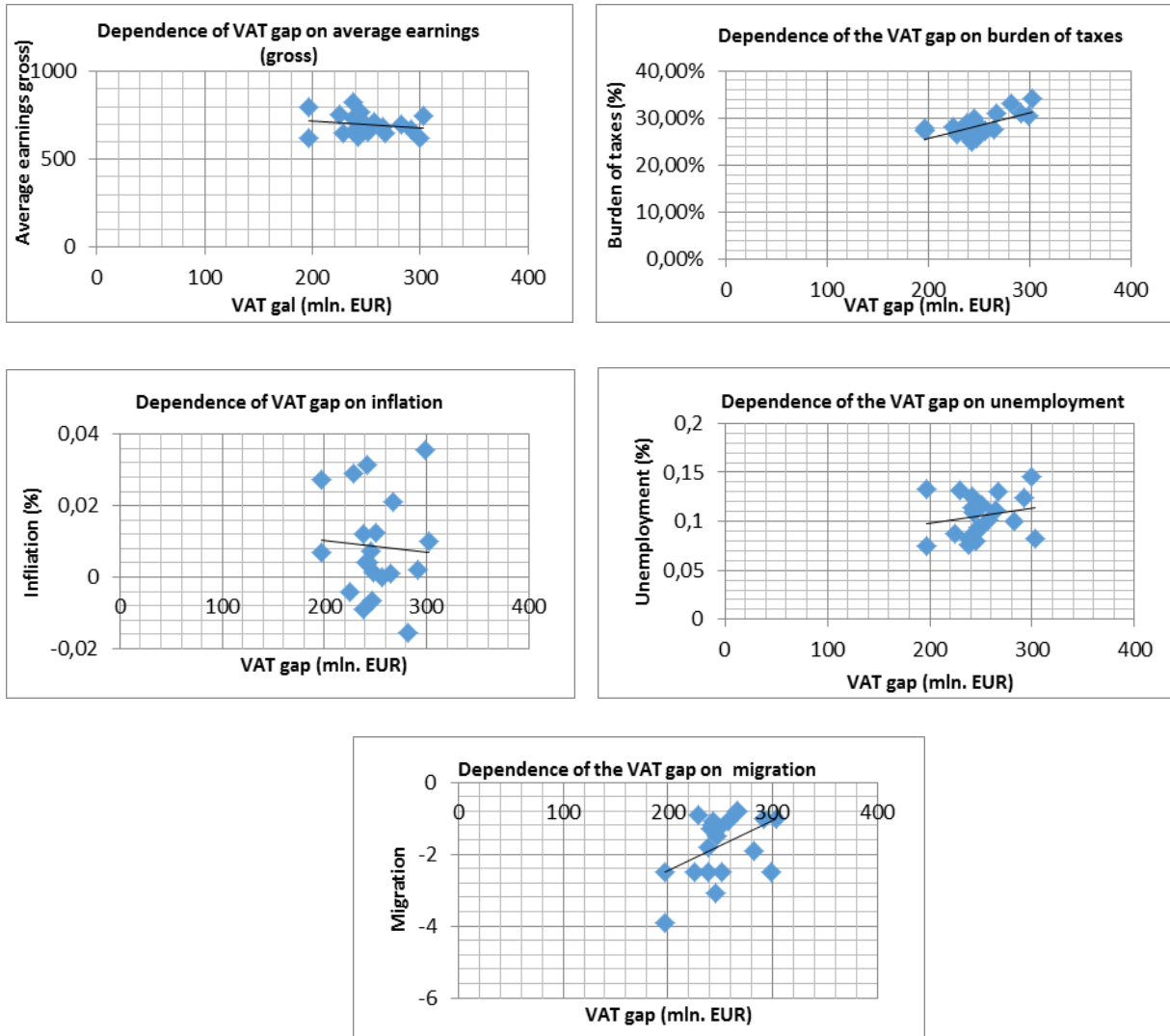

Figure 2. Dissemination of dependent and independent variables in Lithuanian

The obtained results showed that the increase of GDP per capita has a positive effect on the VAT gap in Lithuania, when the GDP increases, the VAT gap decreases and vice versa. The data are very unevenly distributed, so it can be concluded that household consumption does not affect the VAT gap. The average wage does not have a significant impact on the VAT gap, but the tax burden increases when the tax burden increases, and the VAT gap in Lithuania increases too. Inflation, like the unemployment rate, is not significant for the variable under discussion, and the data are unevenly distributed. However, migration is significant because the VAT gap narrows as migration increases. The initial regression equation (3) is constructed and obtained:

$$Y_{VAT\ gap} = 4,6910 - 0,0075X_{GDP} + 0,0543_{consumption} - 0,1714X_{average\ wage} + 9,7627X_{burden\ of\ taxes} + 0,3012X_{infliation} + 0,0920X_{unemployment\ rate} - 1,3635X_{migration} + \varepsilon \qquad (3)$$

The coefficient of determination is checked, which shows the percentage significance of the selected factors of VAT gap. The higher the value of this coefficient, is, the data fit the selected model better. The coefficient of determination of the initial regression model of Lithuania is 0,682467. It can be said that the significance of this regression model is sufficient for the analysis. The ANOVA p – value is also checked, it shows whether the value of at least one independent coefficient is statistically significant with the dependent variable Y. In the case of Lithuania, the value of p is equal to 0,009. If p <0.05, it can be stated that some factors exist which are related to the dependent variable in the model. In the model p = 0,009 <0.05, on this basis it can be said that at least one factor which make impact on the VAT gap.

Solving the regression analysis task the question arises whether the independent variable X influences the change of the dependent Y. Theoretical T (test) statistics calculated, according to which it can be assessed the significance of other factors and in order to eliminate the least significant factors for the VAT gap. The theoretical value of T is 2.0484, and comparing the theoretical value obtained with the calculated values obtained by constructing a regression model in order to exclude the least significant factors. If the theoretical value of t is greater than the calculated value of t, the factor is significant and we leave it, but if the calculated value of t is greater than the theoretical value of t, then the factor eliminated. The factors are eliminated from the smallest to the largest corresponding the equation: t theoretical > │t is calculated. Based on the values of the T statistics, the significant factors are selected and the correlation is calculated.

The least significant factors for the Lithuanian VAT gap are following: household consumption expenditure (-0,9854); average salary (gross) (-0,5444); unemployment rate in the country (0,0078); inflation rate (0,0619). Having rejected excluding insignificant factors, the coefficient of determination (R square) was rechecked again. After elimination of the factors, the value of the square of R is 0,6735. The correlation of the remaining factors determining the Lithuanian VAT gap was checked. The correlation between the variables did not change after rejected of the insignificant factors, therefore, based on the obtained data, it can be stated that correlation between the VAT gap and GDP (-0,5731), tax burden (0,6499) and migration (0,4599) factors is very strong. After checking the statistical indicators, the final equation of the linear regression of the Lithuanian VAT gap is presented (4):

$$Y_{VAT\ gap} = 11,8037 - 0,0047X_{GDP} + 7,0425X_{burden\ of\ taxes} - 1,4282X_{migration} + \varepsilon \qquad (4)$$

The obtained results of the research indicate that the tax burden had the greatest significance for the VAT gap in the period of 2012 – 2018 i.e. if it increases by one unit, the VAT gap increase by 7,0425 times. Migration in the country is also a very important factor, if it increases by one unit, the VAT gap in Lithuania decreases by 1,4282 times and vice versa, and an increase in GDP per capita by one unit will reduce the VAT gap by 0,0047 times.

The next Baltic country to be analyzed is Latvia. Although it is said that the economies of the Baltic States are similar and their economic problems are similar, their solutions are often different, so the factors influencing them can be very different. The Latvian regression model is supplemented by another factor - the VAT rate. To tentatively estimate the dependence of the VAT gap, the dissemination of the factors (independent variables) and the dependent variable are compiled before the initial regression equation is constructed (Figure 3.).

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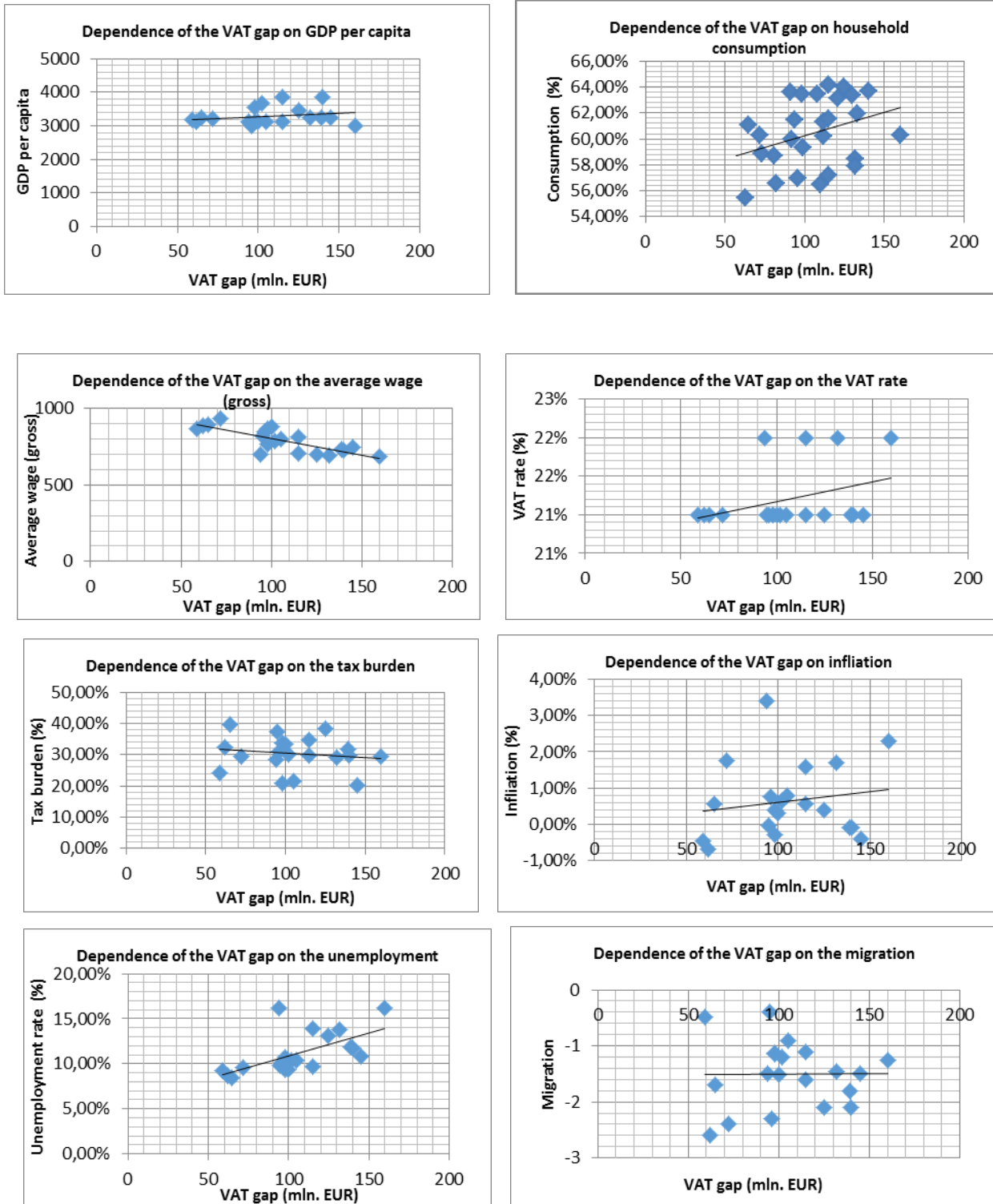

Figure 3. Dissemination of dependent and independent variables in Latvia

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The results show that in Latvia, GDP and migration indicators have a very small impact on the VAT gap. Household consumption has a minimal impact on the VAT gap, as the data are not trend-oriented. However, the growth of average wage has a positive effect on the VAT tax, the higher it is the smaller the VAT gap is. The relationship between the VAT rate and the tax burden is rather difficult to assess evaluate because of very uneven distribution of data. Inflation data are also very unevenly distributed, but there is the dependence which indicates that the higher the inflation is, the larger the VAT gap is. However, if the sufficiently even dependence of the VAT gap on the unemployment rate is, the higher is this indicator, and the wider is the VAT gap. The initial regression equation (5) is formed:

$$Y_{VAT\ gap} = 6,8840 - 0,0014X_{GDP} + 4,0865X_{consumption} - 0,2857X_{average\ wage} + 0,6708X_{tax\ burden} + 3,4048X_{inflation} + 2,8721X_{unemployment\ rate} - 3,4939X_{migration} + 1,7693X_{VAT\ rate} + \varepsilon \quad (5)$$

The coefficient of determination of the initial regression model of Latvia, R square, is slightly higher than that of Lithuania 0,8174. The ANOVA p - value is checked, it shows whether the value of at least one independent coefficient is statistically significant with the dependent variable Y. In the case of Lithuania, the value of p is 0,022. Thus, in our model $p = 0,022 < 0.05$, on this basis it can be stated that at least one factor influences the VAT gap. As in the Lithuanian regression model, there is need to check whether the independent variable X affects the dependent Y. At the initial level of the regression model, theoretical T (test) statistics is calculated, according to which the significance of other factors is evaluated and the least significant factors are eliminated. As the same error and the same amount of data applied to all countries, the theoretical value of t remains the same for all Baltic countries. Thus, the theoretical value of t is 2,0484. This theoretical value is compared with the calculated values and the factors are eliminated from the lowest to the highest value that do not satisfy this equation - t theoretical > │t. Based on the values of T statistics, the factors with the greatest influence are selected. The result shows that the tax burden, unemployment rate, inflation and migration have a minimal correlation with the VAT gap. After eliminating the insignificant factors, the coefficient of determination is checked again. The square of R is equal to 0,7954. The coefficient of determination decreased slightly with the removal of insignificant factors $0,7954 < 0,8174$. Based on the obtained data, it can be said that the strongest link between the Latvian VAT gap is with the average wage (-0,7909), the VAT rate (0,3494) and GDP (-0,2064). Final equation for linear regression of the Latvian VAT gap is (6):

$$\mathbf{Y_{VAT\ gap} = 7,4088 - 0,0054X_{GDP} - 0,3470X_{average\ wage} + 1,6070X_{VAT\ rate} + \varepsilon} \quad (6)$$

Summarizing, it can be stated that the Latvian VAT gap is influenced by GDP, average wages and the VAT rate. However, the VAT rate is of the most importance. If the VAT rate increases by one unit, the VAT gap will increase 1,6 times, if the average wage changes by one unit, the VAT gap changes by 0,3470 times, and if the GDP unit increases by one unit, the VAT gap decreases by 0.0054 times.

The next Baltic country under investigation is Estonia. This country in 2012 - 2018 had the smallest VAT gap from the Baltic States. Therefore, it is important to find out what factors are most important for the VAT gap in this country. Before constructing the initial regression model, we identify the dependences of the dispersion of the VAT gap on the factors are identified so their interdependence can be assessed tentatively (Figure 4).

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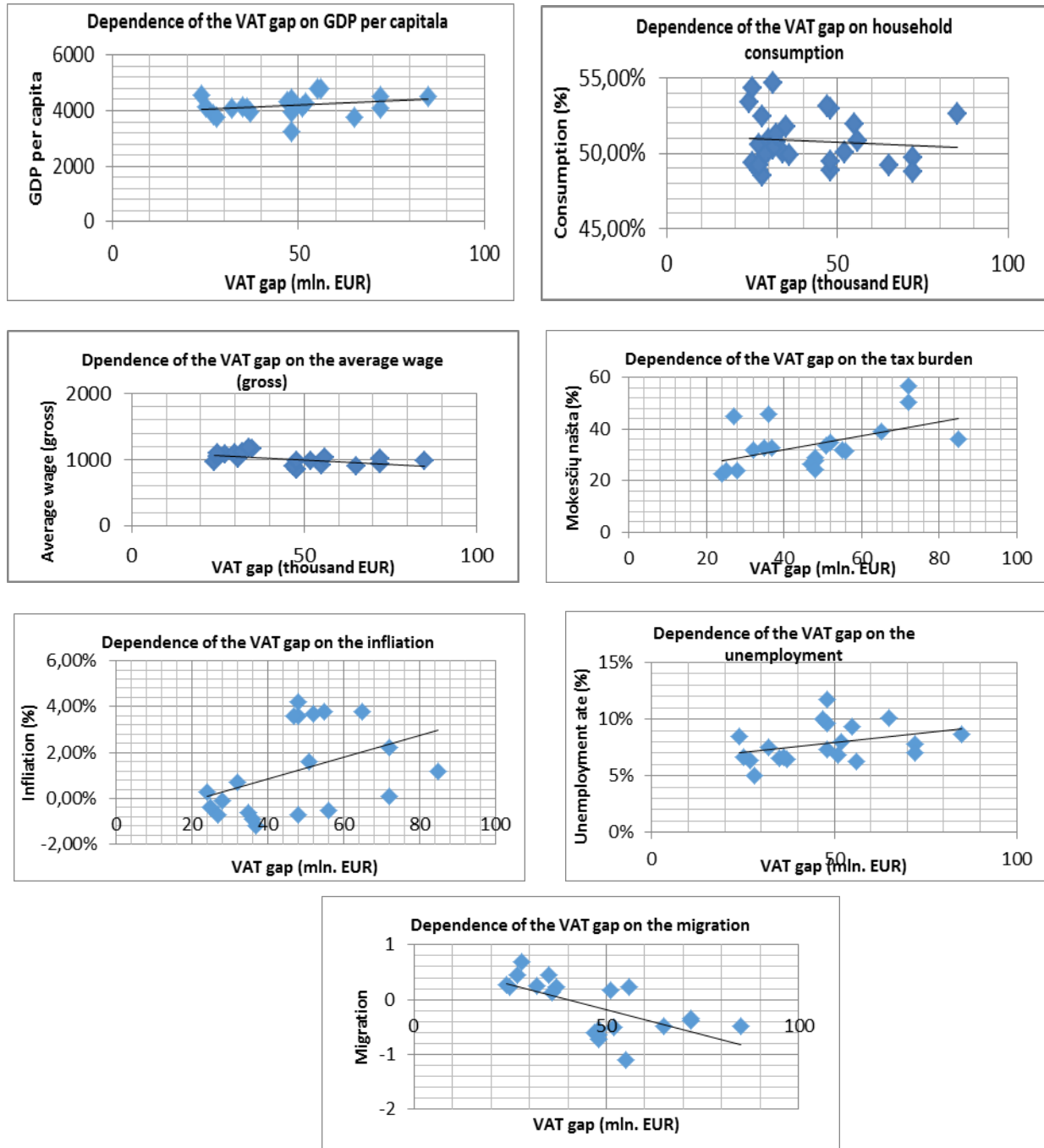

Figure 4. Dissemination dependent and independent variables in Estonia.

The results indicate that the dependence of GDP data on the VAT gap is very inconsistent. The GDP indicator does not make a significant difference to the VAT gap. The higher the average wage in Estonia is, the lower the VAT is, therefore, this factor may be significant for dependent variable. The increase in the tax burden, as well as in

inflation, widens the VAT gap. The VAT gap is negatively affected by the unemployment rate, and as it increases, the VAT gap increases too. The positive value of migration clearly reduces the VAT gap and the negative one increases it.

After the preliminary factor dependence analysis, the initial regression equation is formed (7):

$$Y_{\text{VAT gap}} = 17{,}6220 - 0{,}0097X_{\text{GDP}} + 2{,}4102X_{\text{consumption}} - 0{,}0277X_{\text{average wage}} + 0{,}8508X_{\text{tax burden}}$$
$$+ 1{,}5912X_{\text{infliation}} + 2{,}0864X_{\text{unemploydment rate}} - 1{,}6109X_{\text{migration}} + \varepsilon \quad (7)$$

The coefficient of determination (R square) is checked, which helps to find out the suitability of the data for our chosen model. The coefficient of determination of the initial model of Estonian regression is obtained at 0,7513, i.e. smaller than in Latvia, but similar to Lithuania. Based on the value of the coefficient of determination, it can be said that our data are suitable for this model and it will be significant enough. The ANOVA p – value is also checked, with the help of which is defined whether the value of at least one independent coefficient is statistically significant with the selected dependent variable Y (value added tax gap). In the case of Estonia, a p-value is 0,0002, i. p = 0,0002 <0,05, it can be said, that at least one selected factor influences the VAT gap. The theoretical T (test) statistics of the regression model is calculated, according to which the significance of other factors is evaluated and the least significant factors are eliminated. The theoretical value of T is 2,0484. Excluding insignificant factors, it can be said that the factors influencing the VAT gap in Estonia are as follows: average wages (gross), the tax burden in the country and migration. After eliminating the insignificant factors, the coefficient of determination is checked again, where the square of R is 0,7043. The R square factor decreased slightly to 0,7043 <0,7513. Correlation analysis shows that the strongest correlation between the VAT gap is with average wages (-0,5832) and migration (-0,6342). Thus, after examining the key indicators, the final equation for the linear regression of the Estonian VAT gap can be presented (8):

$$\mathbf{Y_{\text{VAT gap}} = 17{,}6168 - 0{,}0013X_{\text{average wage}} + 1{,}8300X_{\text{tax burden}} - 0{,}6521X_{\text{migration}} + \varepsilon} \quad (8)$$

As it has been mentioned, according to the data of the EC VAT gap survey (CASE, 2019), the largest VAT gap in 2012-2018 was in Lithuania and the smallest in Estonia. The data on the Latvian VAT gap is between Lithuania and Estonia, but the data was much closer to Estonia, which shows that the VAT gap was not as big as in Lithuania. From the obtained Baltic regression models it can be stated that the indicator of GDP per capita in the analyzed period had a significance only for the Lithuanian and Latvian VAT gap, but very insignificant, as the coefficients for these variables are very small 0,0047 and 0,0054, respectively. The average wage depended on VAT gap also to a very small extent only in Latvia and Estonia. There were two factors that had no effect on the VAT gap in all Baltic countries: inflation and the unemployment rate in the countries. The VAT rate was used as an independent variable only in the Latvian regression model, because only in Latvia there was a change in the VAT rate during the period under review. The study showed that the VAT rate is a significant factor in the VAT gap, and as the rate in Latvia increases, so does the VAT gap. And the last two factors that were among the most influential in Lithuania and Estonia during the period under review were the tax burden and migration in the country. As the tax burden increased, it also widened the VAT gap quite significantly. Similarly, when the migration rate was positive (with more arrivals than departures), the VAT gap narrowed, and when it was negative (with more departures than arrivals), the VAT gap widened.

Summarizing all the factors determining the VAT gap, it can be divided into significant, less significant and insignificant factors. The greatest significance of the Baltic VAT gap is the tax burden, migration, and VAT rate. Among the insignificant ones are GDP and average wages, and the factors that are insignificant for the VAT gap in

the Baltic States were inflation and the unemployment rate in the country. On the other hand, the study revealed that all Baltic States needs to review their common tax policy, assess the tax burden and the standard VAT rate in order to reduce the VAT gap and VAT evasion.

Conclusions

The VAT gap provides for a significant loss of revenue due to tax evasion. The Baltic States 2012 - 2018 lost 11.5 million euros during the period. VAT revenue due to tax avoidance, tax evasion and inadequate tax collection systems.

The study showed that the tax gap, migration and VAT rate factors had the largest impact on the VAT gap in the Baltic States. Less significant factors were average wages and gross domestic product, while insignificant factors were household consumption, unemployment in the country and inflation.

The study showed that in Latvia, the VAT rate is a significant factor in the VAT gap, as the tax rate increases, so does the VAT gap. In Lithuania and Estonia, a significant factor in the VAT gap is the tax burden. The growing tax burden poses problems for tax evasion.

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