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ASSESSMENT OF FACTORS DETERMINING VAT GAP: A CASE STUDY OF LITHUANIA

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**Abstract.** The article deals with the VAT gap, its split by causes and determinants, the problem of dependencies. The article also reveals the main ways of calculating the VAT gap - their advantages and disadvantages, summarizes the research done by theoreticians and evaluates the research results. After the theoretical analysis and presentation of the research methodology, the aim is to find out the variables that influence the VAT gap in Lithuania. Using the regression analysis model, the factors determining the VAT gap and their significance, as well as their impact on the decrease / increase of the VAT gap in Lithuania, were identified.

**Keywords:** value added tax; VAT Gap; tax avoidance; tax evasion

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**JEL Classifications:** E60, G18, H20, H26, H29

## 1. Introduction

Tax avoidance and evasion is one of the most relevant problem for states in their revenue collection (Sasongko et al., 2019). Most of the revenue to the state budget comes from value added tax (VAT), which accounts for about 45% of the Lithuanian budget revenue. However, this tax is also one of the most vulnerable, as the state is still facing fraudulent practices involving VAT schemes, part-turnover evasion and the issue of false VAT invoices to reduce VAT liability. These problems are relevant not only in Lithuania, but also in the European Union, which each year initiates a special study to calculate and assess the VAT gap in the European Union countries (Čizo et al., 2020). The national accounts of each country determine the theoretical VAT liability which is compared with the VAT revenue actually collected. This difference, or VAT gap, is 12.3% in the European Union, which means that European Union countries lost 147,1 billion euros of income in 2016. The gap in Lithuania was more than double the EU average of 25% and the state budget lost as much as 983 million euros in 2016 (CASE; 2018). Such evaluation of Lithuania has remained stable for the last 3 years. Relatively low budget revenues, low progressivity of the tax system, a variety of tax forms and exemptions limit public resources and make the tax system less equitable and deficiency in the budget expenditure planning system reduce the efficiency of public spending (Commission, 2020). On the one hand, it shows the relevance and significance of the topic, and on the other, states must have an interest in improving their tax and regulatory framework, increasing the efficiency of tax collection and preventing possible cases of fraud. It is worth pointing out that in the case of Lithuania this is a particularly significant problem as the state is losing millions. While at first glance it seems that the VAT gap is only due to tax evasion and avoidance, some of the gap is attributable to the application of reduced rates and other exemptions from VAT by the State. Thus, in order to reduce the VAT gap, it is necessary to analyze the reasons, identify the factors and calculate the dependencies that influence the occurrence of the VAT gap, which would allow minimizing the VAT gap.

Although fraud cases involving VAT evasion and avoidance have existed since its inception, scientists have not focused much on addressing the VAT gap, and research into this topic has only intensified in the last decade. The Scandinavian countries, the United Kingdom, regularly publish reports on the current VAT gap. Lithuania also published VAT gap figures for 2017 VAT return data from municipalities and the type of activities in 2018 (VMI, 2018). Knowing the causes and the result of tax evasion the measures can be provided to improve VAT collection and, in particular, to adjust taxpayers' behavior. It is wise to combat tax evasion and avoidance, and to know what behavior taxpayers choose to act under one or the other statutory provisions of the tax.

The problem of the VAT gap is very delicate not only in the European Union but also worldwide, because of limited data, changes in calculation methodologies and complex causation, this topic has not been studied in detail.

The relevance of the topic is based on the fact that analyzing the reasons why businesses (VAT payers) try to avoid VAT and what factors determine the VAT gap can reduce the amount of revenue lost by the state and adjust the behavior of taxpayers.

The aim of the article is to analyze the concept of the VAT gap, to evaluate which of the selected variables influence the VAT gap and to provide opportunities to reduce the VAT gap.

Working methods: comparative analysis of scientific literature, analysis and interpretation of statistical data, evaluation of macroeconomic indicators and regression analysis and evaluation.

## 2. Theoretical aspects of the VAT gap

With the growth of illegal sources of income and the loss of VAT revenue by states, the concept of the VAT gap was introduced, which is defined as the difference between the VAT revenue actually collected and the theoretical VAT liability. However, there is no single concept of the VAT gap in the scientific literature, as the VAT gap is not only related to the possible evasion and avoidance of the tax, but also to the benefits and exemptions applied in the country. The Organization for Economic Development and Cooperation (OECD, 2008) suggests looking at the tax gap as a three-part component:

- discrepancies in filing reports and returns related with failure to declare a tax reimbursement, non-refunding of taxes due to crime or failure to present declaration;
- reporting discrepancies or revenue cuts;
- payment discrepancies related to unpaid taxes, difference between actually declared amounts and liabilities.

In most cases, the VAT gap is divided into two types: the regulatory gap and the compliance gap. In the literature, the concept of VAT gap is presented with respect to the type of gap (Table 1).

**Table 1.** Definitions of the VAT gap

Author	Year	Definition of VAT Gap
Armstrong Ch.S., Blouin J.L., Larcker D.F.	2011	Accounting tax difference is defined as the difference between comprehensive income and total taxable income.
Zidkova H.	2014	The VAT gap is the difference between the theoretical VAT liability and the VAT accrued.
State tax inspectorate	2017	The VAT gap is the amount of the VAT liability that may not have been deliberately declared by the VAT in order to withhold part of the income and avoid part of the tax.
Bank of Lithuania	2018	The VAT gap is the difference between theoretical and actual revenue collected.
CASE	2018	The VAT gap is the difference between planned and received VAT revenue, which reflects more than tax evasion and fraud, but also statutory regulations.

Source: Compiled by authors based on the sources listed in the table

It can be seen that the CASE definition combines both compliance and a regulatory gap, while other authors focus more on the compliance gap. The policy gap arises from VAT relief and VAT exemptions. The regulatory gap is usually defined as the additional VAT revenue that the State could theoretically collect if all services and goods were taxed at the same rate. This gap is further subdivided into relief tariffs and exemption gaps, which account for losses resulting from reduced VAT liability because of reduced rates and exemptions (Bank of Lithuania, 2018). The regulatory gap in Lithuania based on 2016 was 34.54%, consisting of 4.42% of preferential tariffs and 30.12% of exemptions (CASE, 2018), which were further divided into affected and unaffected (public and financial services and national leasing) (Bank of Lithuania, 2018). Impact of the exception gap in Lithuania in 2016 was 8.23%, unaffected - 21.88% and affected regulatory gap - 12.65% (CASE, 2018). However, it is appropriate to note that eliminating all reliefs and exemptions the regulatory gap will be reduced by only one third.

The compliance gap is linked to VAT evasion and avoidance, fraud schemes, willful bankruptcies and so on. This gap in Lithuania is one of the largest in the EU - 24.52%. The state budget lost 983 million euros in 2016. Wider match gap in 2016 was calculated only in Romania (35.88%), Greece (29.22%), Italy (25.9%) and Slovakia (25.68%) (CASE, 2018). It should be emphasized that the VAT gap may happen because of legal tax evasion, business insolvency / bankruptcy and incomplete or incorrect filling in of national accounts data. Most often, the compliance gap is split into acquisition fraud and carousel fraud (Bukhsh et al., 2015; Osipov et al., 2018). However, Keen and Smith (2006) widen this distinction by identifying more possible ways of VAT fraud:

- non-fixed income;
- ghost firms;
- misclassification of products in order to avoid higher VAT taxation (this problem is most often encountered in EU countries with VAT relief for certain types of food products or their categories);
- false VAT reimbursement, which aim is to recover a much larger proportion of VAT on goods purchased and imported.

Not only its significance or causes, but also the methods of its calculation, which may determine its size and the results obtained, are relevant to the analysis of the VAT gap. The VAT gap is defined as the difference between the amount of VAT ( $VAT_c$ ) actually collected and the VAT total tax liability ( $VAT_t$ ) in absolute or percentage terms (formula 1).

$$VAT\ Gap = VAT_t - VAT_e \quad (1)$$

The ( $VAT_c$ ) is an estimate of the amount of VAT revenue that could be collected (in the absence of tax evasion and fraud and / or tax collection mechanism) (Parliamentary ..., 2015). Simply put, this is the difference between the VAT actually collected and the amount of tax expected to be collected.

The methodology for calculating the VAT gap is based on two approaches:

- top-down;
- bottom-up.

The first approach is to identify the VAT gap and the second - to identify the economic activities with the highest VAT gap. The first method is used to calculate the actual VAT gap and the second one to identify the areas where the VAT gap is the greatest. Therefore, the analysis of the VAT gap should be based on the results of both approaches, which are complementary and provide a better understanding of the VAT gap. On the other hand, a bottom-up or microeconomic approach draws on corporate and personal data from tax returns. The results obtained are applicable to all population groups, companies or groups of taxpayers with the same characteristics (Institute ..., 2012). It also uses data from some unofficial sources collected by financial institutions. Because of the complexity of access to data, this research method is commonly used by financial institutions, and due to the availability of data, this type of research is complicated.

It is not meaningful to determine the actual VAT gap if the underlying factors are not analyzed. I.Majerova (2016) used three variables to investigate the determinants of VAT gap in EU countries:

- corruption index;
- GDP growth rate;
- the standard VAT rate.

The author analyzed the EU countries during 2001 – 2011 and regression analysis showed that:

1. the corruption index was the most significant of all three selected variables, with the increase in the corruption index narrowing the VAT gap;
2. GDP growth rates have little impact on the VAT gap and these results did not confirm the expected impact of GDP growth on the VAT gap;
3. The standard VAT rate does not affect the size of the VAT gap. It is worth noting that although there is no direct relationship between these variables, companies may choose another country for activities, where lower rates are applied to certain products or businesses.

This study revealed the significance of the corruption index for the size of the VAT gap, but denied the significance of the other two variables. However, it should be noted that regression analyzes were performed for each variable separately and the general regression equation for all variables was not investigated.

H. Zidkova (2014) analyzed the significance of fifteen variables for the VAT gap. This study was divided into two parts, which sought to explain the VAT gap in 2002 and 2006 and the factors that determine it. In 2002 only four variables had a significant impact on the VAT gap - final consumption from GDP, the standard VAT rate, the size of the shadow economy and VAT revenue. The other part of the study dealt with 2006. The data showed that in this year the VAT gap was mainly influenced by the share of the country in gross trade, final consumption from GDP, VAT revenue from GDP, the number of VAT rates and household consumption related to restaurant and hotel services. In contrast to 2002 the standard VAT rate and the share of the shadow economy did not influence the VAT gap in 2006. On the other hand, the model in 2006 indicated that the larger the country's share of intra-EU trade, the smaller the VAT gap is. The other three significant variables indicate the same effect, with the VAT gap narrowing as these ratios increase.

However, not only regression models can help to identify the variables that affect the VAT gap, but also the multiple indicators and multiple causes (MIMIC) model. The MIMIC model is a special type of structural equation model that indicates the causal relationship between the observed variables and the latent variable, in this case the VAT gap (Kasnauskienė et al., 2015). In this study, two models were developed - representing short term and the long-term periods. The results of the long-term MIMIC model showed that only two of the five variables have a significant impact on the VAT gap - public expenditure and inflation. Similarly, it indicated that the VAT gap only affects VAT revenue - as revenue gap increases the VAT revenue decreases, but its impact on gross domestic product per capita and cash and cash equivalents was not statistically significant. In the short period of time, it has been found that inflation and household deposits have an impact on the VAT gap - with the rise of inflation and household deposits, the VAT gap is widening. It is worth mentioning that household deposits do not influence the VAT gap in the long run. In addition, the work of F. Schneider and A. Buhn (2007), which revealed that the VAT gap in Lithuania according to statistics, significantly depends on business freedom and fiscal freedom indices and inflation, are analyzed in article.

In conclusion, it is difficult to determine the factors determining the VAT gap due to the different influence of the factors depending on the chosen calculation period. It may also be noted that certain variables that are irrelevant in some studies become significant variables in others. However, all three generalized models indicated that the main variables affecting the VAT gap are the corruption index, final consumption from GDP, the standard VAT rate, the size of the shadow economy, VAT revenue, public expenditure, inflation and household deposits. The MIMIC model was the only one of the analyzed models that dealt exclusively with the VAT gap in Lithuania and its determinants. Also, this model revealed the impact of the VAT gap on VAT revenue - as the VAT gap widened, there was a decline in VAT revenue, but this model did not evaluate inverse link - increasing VAT revenue should reduce the VAT gap.

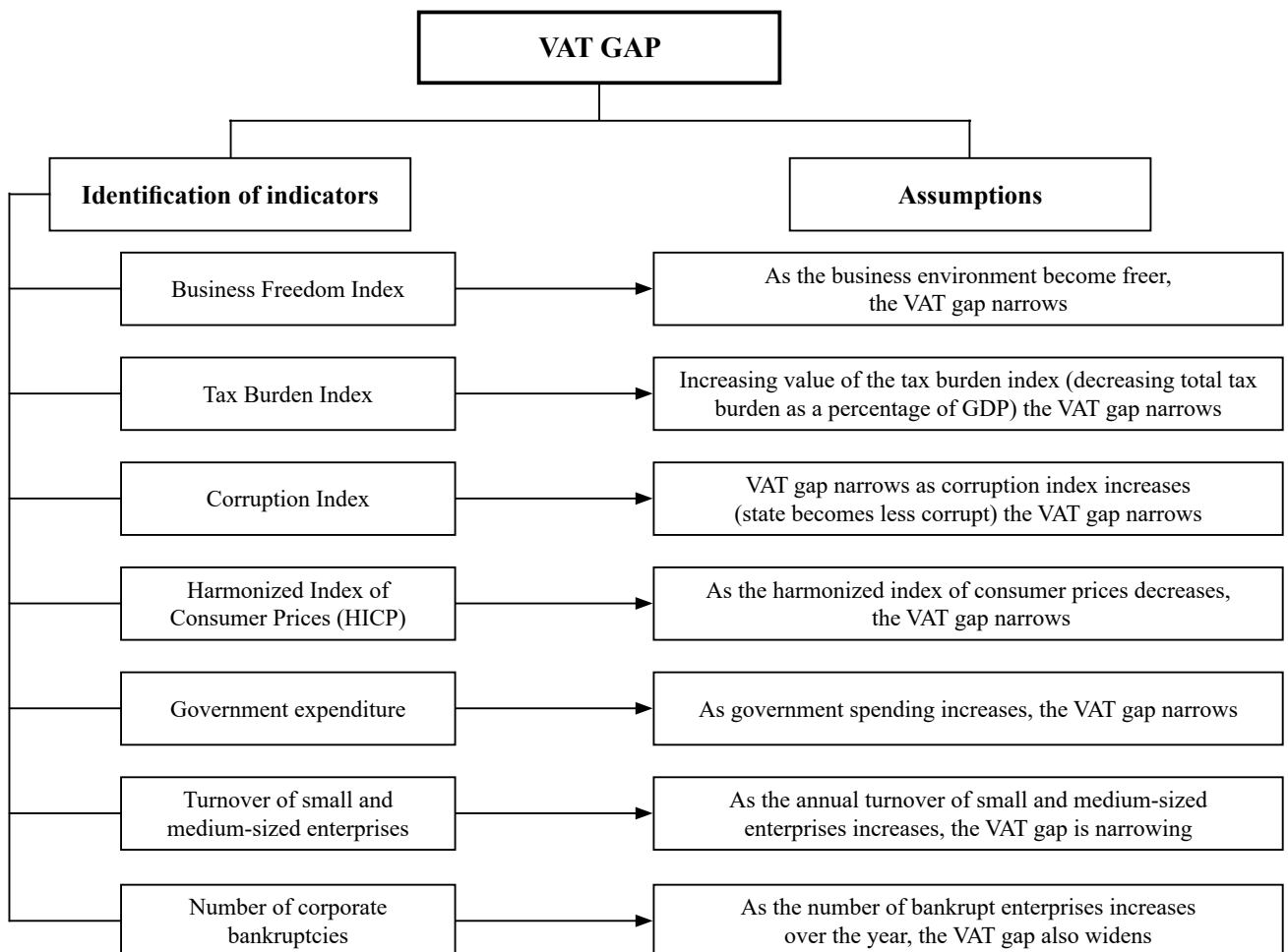
### 3. Methodology

In order to determine the factors influencing the VAT gap in Lithuania, a research model has been developed, which consists of several components - indicators identification, assumptions and choice of research methods. The model of regression analysis was made based on the research carried out by H. Zidkova (2014) and I. Majerova (2016) on the determinants of VAT gap. Using the regression analysis model, variables influencing the VAT gap were identified and the Lithuanian VAT gap analysis was performed. The results of the survey allowed to identify and evaluate the impact of significant indicators on the VAT gap, is based on the investigated results therefore it is possible to determine the strategy of reducing the VAT gap in Lithuania.

Before the study, the following study limitations were defined:

1. The VAT gap data is annual, which reduces the data line under investigation.
2. Data series includes the period - 2006 – 2016.
3. Only the VAT compliance gap will be analyzed, dissociating departing from the regulatory VAT gap.
4. Linear relationship of independent variables with dependent variable was investigated.
5. The method of regression analysis was chosen based on the researches and results of other scientists.

The research consists of three parts: identification of indicators, making assumptions and choice of research methods (Fig. 1).



**Figure 1.** Indicators identification scheme. Compiled by authors based on Business freedom, (2019), Fiscal freedom, (2019), Corruption perception Index, (2018)

It is important to define the first three selected variables more broadly:

- Business Freedom Index, reflects the overall effectiveness of business regulation. A business freedom score can range from a very loose (0) to a very free (100) business environment. This index is calculated based on the following factors: (I) Starting a business - number of procedures; (II) Start of business - number of days of establishment; (III) Cost of establishing a business (as a percentage per capita income); (IV) Starting a business - minimum capital requirements (as a percentage per capita income); (V) Obtaining licenses - number of procedures; (VI) Obtaining licenses - number of days; (VII) Obtaining licenses - cost (as a percentage per capita income); (VIII) Business closure period in years; (IX) Business closing price - percentage of assets; (X) Business recovery rate. All factors are converted to a scale from 0 to 100, and then the average of the converted values is derived.
- The tax burden index, measures the tax burden as a percentage of GDP. This index combines the following elements: (I) the maximum marginal individual income tax rate; (II) maximum marginal corporate tax rate; (III) total tax burden as a percentage of GDP. In terms of fiscal freedom, each component represents a third part of the index. The higher the value of this index is, the smaller is the total tax burden as a percentage of GDP.
- Corruption index, which can range from 0 (highly corrupt environment) to 100 (non-corrupt). This index is based on expert and opinion polls and reflects the abuse of public power for private gain.

Regression analysis was performed to determine the factors determining the VAT gap. The essence of the model is to determine the coefficients and significance levels of the variables and create a model where all the variables are statistically significant. The linear multiple regression model was used in the study as this model will investigate the influence of many factors on the phenomenon under consideration (2).

$$Y_i = f(X_1 ; X_2 \dots X_k) + \varepsilon_i \quad (2)$$

where: Y is the actual observation value (dependent variable) of the observed economic phenomenon;  
X1, X2 ... Xk - factors influencing the economic phenomenon (independent variables);  
 $\varepsilon_i$  - regression error.

The sum of the effects of all these factors will form the cumulative effect on the phenomenon under consideration, and the influence of each individual factor, which is called partial, will be determined assuming that the values of the other independent variables are constant (Krikštolaitis, 2007).

This regression model shall comprise the following elements (3):

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} \dots \beta_k X_{ki} + \varepsilon_i \quad (3)$$

The independent variables X and dependent variable Y are known data that will be used to compute and estimate the coefficients  $\beta_0, \beta_1, \beta_2, \beta_k$ , and  $\varepsilon_i$ .

Linear multiple regression model was applied to determine the determinants of the VAT gap. In this equation, independent variables were selected based on the studies discussed in the theoretical section and the potential risks were indicated:

1. Business freedom index was selected based on G. Kasnauskienė et al. (2015), which examined the determinants of the VAT gap as one of three variables that was statistically significant.
2. The tax burden index has not been chosen in any of the articles discussed above, but it is one of the indicators of state fiscal freedom and is likely to influence tax collection.
3. Corruption Perception Index - the significance of this variable was demonstrated in a study by Majerova (2016).
4. The Harmonized Index of Consumer Prices has been chosen as an alternative to inflation and its changes in price volatility may have a strong impact on the VAT gap. The significance of inflation in the long period was investigated and proved by G. Kasnauskienė et al. (2015).

5. General government expenditure - this variable was also analyzed by G. Kasnauskienė et al. (2015) in a MIMIC long-term model study which indicated that public spending had a significant impact on the VAT gap. Also, the theoretical literature suggests that, especially in times of crisis, government spending has a positive impact on the narrowing of the VAT gap.

6. Annual number of business bankruptcies - in the scientific literature, and in particular the possible cases of VAT evasion, it has been noticed that carousel companies are set up and then go bankrupt. Another reason for not collecting VAT income is bankrupt companies which do not have enough assets to cover their VAT liabilities. Based on these assumptions, it was decided to include this variable in a regression analysis model and to test its potential significance for the VAT gap.

7. Annual turnover of small and medium-sized enterprises - one of the hypotheses, when examining the causes of the VAT gap and possible ways of evading VAT, was that small businesses with a turnover of up to € 45,000 could deliberately hide their income without having registered as VAT payer. Also, the State Tax Inspectorate uses only bottom-up VAT returns to calculate the VAT gap. Therefore, it was decided to include this variable in the regression analysis based on these hypotheses.

Main data sources - Department of Statistics to the Government of the Republic of Lithuania, EUROSTAT, The heritage foundation, Transparency International.

Normalized values for all indicators were calculated according to the formula (4) provided by I. Deksnys (2010):

$$I_{it}n = \frac{I_{it} - \min(I_i)}{\max(I_i) - \min(I_i)} \quad (4),$$

where:  $\min(I_i)$ ,  $\max(I_i)$  - the minimum and maximum values of the indicators acquired during the period under consideration  $t$ .

After the data was normalized, a regression analysis was performed to determine which of the variables affect the VAT gap and identify their significance levels. In order to form a suitable regression model, variables were selected based on t-statistics - if the value of t-statistic is less than -2 or more than 2, then the variable is considered significant, if  $-2 < t < 2$ , the variable is considered insignificant. When constructing a regression model, irrelevant variables were eliminated from the model gradually, starting with the least significant.

#### 4. VAT gap evaluation in Lithuania

Regression analysis was used to construct the model. In the first model, all variables were included in the regression equation. The adjusted R-squared value of the regression analysis is 0.8738, which means that 87.38% of the variation in the VAT gap can be explained by the variation of the selected indicators (Table 2).

**Table 2.** The results of regression analysis of the first model - statistical coefficients

Indicator	Coefficient	t - statistics	p (> t )	Standard error
Business Freedom Index	0.02299	0.170	0.9223	0.13560
Tax Burden Index	0.36239	1.365	0.8762	0.26556
Corruption Index	0.99895	2.605	0.2657	0.38352
Harmonized index of consumer prices	0.96905	-2.046	0.0801	0.47356
Government expenditure	1.57865	3.971	0.1332	0.39754
Number of bankrupt enterprises per year	0.60938	-1.527	0.0285	0.39899
Turnover of small and medium-sized enterprises	1.26335	-4.421	0.0215	0.28575

Source: Compiled by authors based on regression analysis

Based on the values of the t-statistic, the business freedom index had the smallest impact on the VAT gap, so another model was developed by eliminating this indicator from the regression equation.

The adjusted R-squared value of the second model regression analysis is 0.9044, which means that 90.44% of the variance of the VAT gap can be explained by the variation of the selected indicators. Although the R-squared value is quite high, not all variables met the requirements (Table 3).

**Table 3.** The results of regression analysis of the second model - statistical coefficients

Indicator	Coefficient	t - statistics	p (> t )	Standard error
Tax Burden Index	0.35155	1.567	0.192	0.22428
Corruption Index	1.02932	3.488	0.025	0.29510
Harmonized index of consumer prices	-1.00632	-2.757	0.051	0.36500
Government expenditure	1.60262	4.957	0.008	0.32331
Number of bankrupt enterprises per year	-0.62993	-1.904	0.13	0.33078
Turnover of small and medium-sized enterprises	-1.25363	-5.146	0.007	0.24360

*Source:* Compiled by authors based on regression analysis.

Based on t values, the tax burden index had the smallest impact on the VAT gap, therefore third model was developed to eliminate this indicator from the regression equation. In this model, all t-statistic values are greater than 2 or less than -2, which means that in this model, all variables are statistically significant and meet the requirements (Table 4).

**Table 4.** The results of regression analysis of the third model - statistical coefficients

Indicator	Coefficient	t - statistics	p (> t )	Standard error
Corruption Index	1.17659	3.701	0.01398	0.31790
Harmonized index of consumer prices	-0.75382	-2.025	0.09870	0.37220
Government expenditure	1.44517	4.138	0.00901	0.34922
Number of bankrupt enterprises per year	-0.76525	-2.109	0.08874	0.36286
Turnover of small and medium-sized enterprises	-1.04517	-4.507	0.00636	0.23192

*Source:* Compiled by authors based on regression analysis.

The adjusted R-squared value of this regression analysis is 0.8766, which means that 87.66% of the variance in the VAT gap can be explained by the variation of the selected indicators. The regression model satisfies the constraints raised, i.e. variables were selected based on t-statistics - if the value of t-statistics is less than -2 or more than 2, then the variable is considered to be significant, if  $-2 < t < 2$ , then the variable is considered to be insignificant.

Based on the carried out analysis, it is possible to identify the indicators and to determine how the change in each variable will influence the variation of the VAT gap.

Corruption index - if this index increase by 1 point and other indicators would remain the same, the VAT gap would increase by 1.18%. The results of the regression analysis indicate that as the value of this index increases, the VAT gap also widens.

The Harmonized Index of Consumer Prices - the impact of this index on the VAT gap differs from the analysis of the previous variable. If Harmonized Index of Consumer Prices increase by 1 percentage point and other indicators will remain the same the VAT gap will decrease by approximately 0.75%. In the research methodology, the predicted effect of this variable was opposite. However, as this index increases, the purchasing power of buyers decreases and the VAT gap is the result of corporate but not of private entities VAT evasion, therefore,



this index can have a positive effect (narrowing the VAT gap). Similarly, with the rise of the Harmonized Index of Consumer Prices, corporate income also decreases as the purchasing power of the population decreases, therefore, the monetary value of VAT evasion is lower.

General government expenditure - with the increase of general government expenditure by 1 point and the other indicators remain unchanged, the VAT gap increases by as much as 1.45%. As government spending on GDP increases, which implies a rise in their monetary value, the fixed income of enterprises decreases, leading to decline in consumption (as enterprises do not record all their income). Therefore, the results of the regression analysis suggest that the widening of the VAT gap as government spending on GDP increases identifies declining expenditure in other sectors, which may happen because of the evasion of some income.

Number of bankrupt enterprises per year - this indicator has been shown as one of the possible identifiers of VAT evasion schemes, because in this situation many fictitious companies are created which go bankrupt and thus do not pay taxes. The results of the regression analysis state that the number of bankrupt enterprises increased by 1 point per year, while others did not change, the VAT gap decreased by 0.76%.

Turnover of small and medium-sized enterprises – when the turnover of small and medium-sized enterprises increases by 1 point, while the other indicators remain unchanged the VAT gap is reduced by as much as 1.05%. The result of this regression analysis is that with the tightening of the law, the introduction of cash registers and the announcement of a fiscal voucher lottery, the introduction of a smart tax administration system have reduced the hidden income of small and medium-sized businesses, which contributed to positively to the VAT gap. Thus, the predicted effect of the variable on the VAT gap was confirmed.

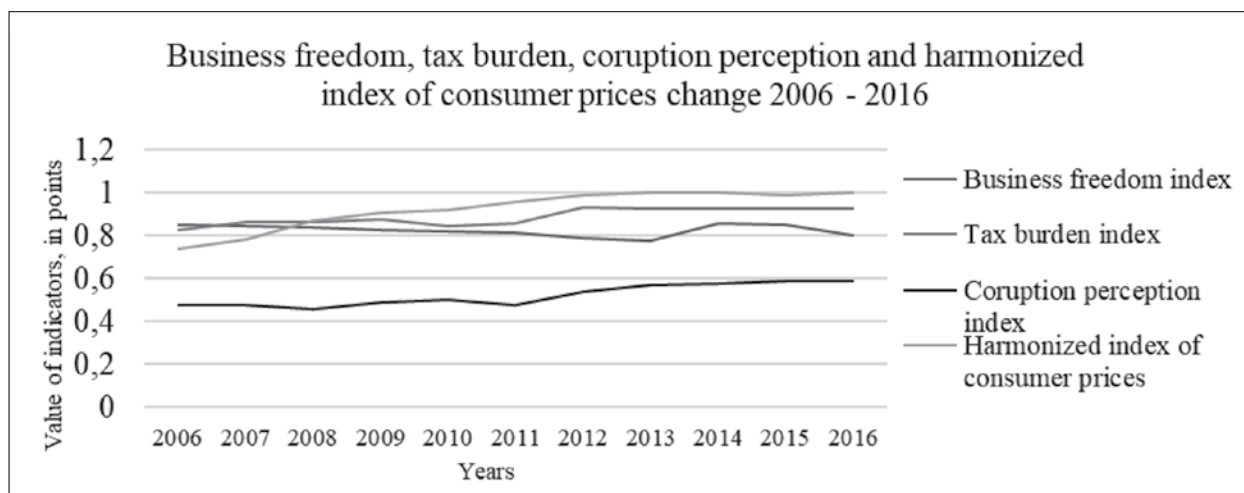
In summary, according to the third model of regression analysis, as many as three indices - the Harmonized Index of Consumer Prices, the number of enterprise failures per year and the turnover of small and medium-sized enterprises - have a positive effect on the VAT gap, as these indicators increase, then VAT gap narrows.

In order to examine the effect on the VAT gap in more detail, all variables (irrespective of their significance in the VAT gap) were divided into two groups:

1. a set of indices which consists of Business Freedom, Tax Burden, Corruption Perceptions and Harmonized Indices of Consumer Prices;
2. the group of remaining variables consisting of government expenditure, number of bankruptcies of enterprises during the year and annual turnover of small and medium-sized enterprises.

By dividing the variables into two groups, graphs of change were drawn. It should be noted that non-normalized data was taken from the plots.

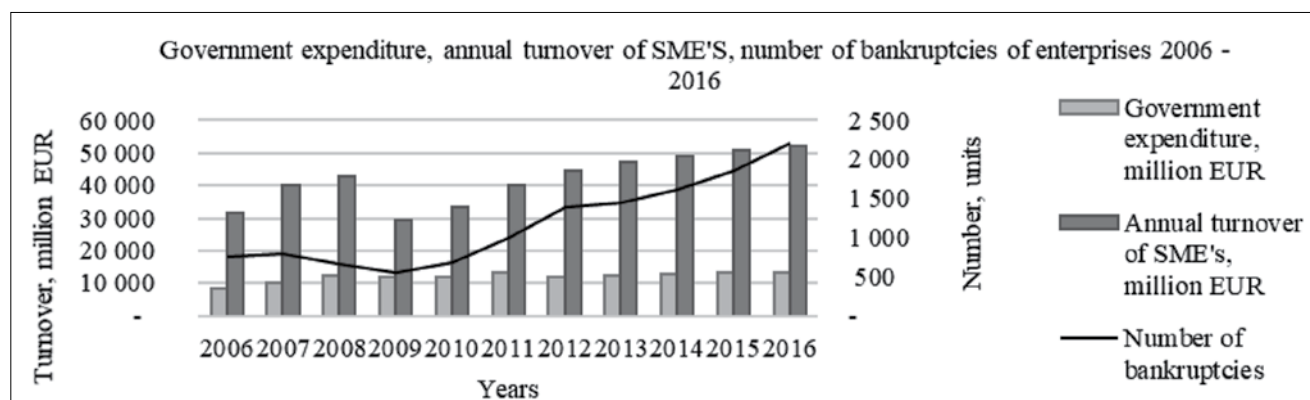
Analyzing the results of calculated indices, it can be stated that the values of almost all indices did not change significantly over time (Figure 2).



**Figure 2.** Changes in indices in 2006 - 2016 (compiled by authors based on Business freedom..., (2018), Corruption..., (2018), Harmonized Index..., (2018). Tax burden..., (2019)).

The biggest change could be seen in the volatility of the Business Freedom Index, which rose sharply in 2014, but returned back to 2013 situation, in 2016. The change of this indicator is not relevant, because it is not included in the selected regression analysis model, however, it can be noted that even with a significant change of the values of this index its variations did not influence the VAT gap.

The next chart of changes reflects the evolution of the remaining variables in the period of 2006 - 2016 (Figure 3).



**Figure 3.** Changes in government spending, SME's turnover and corporate bankruptcy in 2006 - 2016 (compiled by authors based on Relevant..., (2017), Turnover..., (2017), Government finance..., (2019)).

Analyzing the results of the survey, it can be seen that government expenditure remained almost stable over the period under review and there was no drastic change despite the financial crisis which started in the US in 2007 and Lithuania was mostly affected in 2008 – 2009. This is in contrast to the theoretical aspects of the financial crisis, where government spending is expected to increase significantly as a result of increased benefits to the population. Similarly, in order to revive the economy, government spending should increase in order to increase consumption, thereby corporate income would increase, the number of the unemployed people would reduce and the economy would recover. However, it can be noted that namely in 2009 the financial crisis had a major impact on business income, which decreased by one third. Contrary to what was expected, during the financial crisis in 2009 the number of corporate bankruptcies was the lowest during the whole period under review. This means that while corporate earnings were declining, companies were in no hurry to complete bankruptcy proceedings in anticipation of higher turnover and growing demand for goods / services in the post - crisis period. Turnover of small and medium-sized enterprises in 2010 - 2016 underwent growing tendencies, however, with the increase in turnover, the number of corporate bankruptcies was also increasing (Figure 3).

In summary, it can be said, that the variation of the variables of the model explains 87.66% of the variation of the VAT gap. Likewise, two variables - Business Freedom and Tax Burden Indices - were not included in the regression analysis equation based on the results of regression analysis and the t least statistic, and these variables were eliminated from the final model design.

## Conclusions

After analyzing the factors determining the VAT gap, a regression model was developed and 7 variables potentially affecting the VAT gap were selected. Out of the 7 variables selected, two variables - Business Freedom and Tax Burden Indexes - were excluded from the final regression model. According to the regression analysis data, as much as 87.66% of the variation in the dependent variable, the VAT gap, can be explained by the variation of the independent variables. The model accurately reflects the evolution of the VAT gap and identifies variables that have a significant impact on the VAT gap.

According to the results of the regression analysis, among the variables examined, the general government expenditure is the largest contributor to the VAT gap change, therefore if the expenses increase by 1 point, while the other variables remain unchanged, the VAT gap increases by 1.45 percentage points. The widening of the VAT gap as government spending on GDP increases is identified by the concealment of part of the revenue.

The next variable, the Corruption Index, would increase the compliance of VAT gap by approximately 1.18 percentage points if the Corruption Index increased by one point and the other indicators remained unchanged.

Finally, the turnover of small and medium-sized enterprises would increase by 1.05 percentage points if the turnover of small and medium-sized enterprises increased by one point and the other independent variables remained unchanged.

It can be stated that three independent variables - the Harmonized Index of Consumer Prices, the number of enterprise bankruptcies per year and the annual turnover of small and medium-sized enterprises - have a positive impact on the VAT gap.

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