ESTIMATING THE DETERMINANTS OF TAX EVASION USING EMPIRICAL DATA

Summary: Over the past several decades, tax evasion has shown a tendency for growth in all countries. Analogically to its presence in all tax systems, the tax evasion phenomenon is increasingly present in numerous theoretical, empirical and experimental works. The subject of this paper is the assessment of the basic determinants of tax evasion in the Republic of Serbia. We analyzed the economic and psychological factors, first through the literature review, and then empirically.

By the method of multiple regression analysis, we investigated several potential variables related to tax evasion: the number of tax inspectors, the number of controls, the rate of value added tax, and the number of controls with irregularities. The empirical analysis of the annual data of the Ministry of Finance was conducted for the period 2005-2016. The results show that the number of tax inspectors and the number of controls with irregularities have a positive, statistically significant impact on the volume of tax evasion in Serbia. The number of controls, as a variable of economic character, showed a negative, statistically significant influence on the evasion. The influence of the selected independent variable, the rate of value added tax, is not statistically significant.

If we complement the effects of all factors, this study contributes to the literature that explores the factors of tax evasion. The aim of our research is to draw the tax policy makers' attention to the importance of the analyzed factors and to contribute to the fight against this inevitable and general problem.

Keywords: tax evasion, economic factors, psychological factors, regression analysis.

JEL classification: H26

1. INTRODUCTION

Tax evasion or illegal evasion of taxation has been an essential subject of the tax system analysis of all countries in recent years. The evasion has been reported and explored since the introduction of taxes. However, "little research has focused on the underlying determinants of tax evasion" (Richardson 2006, 150). Such a statement was the starting point for our research in the field of tax evasion in the Republic of Serbia.

Tax evasion is, as some authors define it, "illegal free riding in contributions to public goods" (Hillman 2009, 280). As such, it creates a very unfavorable business environment and poor conditions for economic growth and development of the country. "Tax evasion impairs the distributional quality of the tax system, skews the allocation of resources towards less productive activities in the economy, decreases tax revenue and, consequently, undermines fiscal and monetary policy" (Mannasan 1989, 168). As a phenomenon which reflects the dissatisfaction of the residents of a country with a valid tax system, evasion of taxes has also became an international problem. This international character of tax evasion additionally aggravates the struggle of national economies with this problem. In case of tax evasion within the national framework, the money will ultimately be invested in the domestic economy. Within international framework, money explicitly goes out of the country.

In Serbia, evasion creates a balance of negative effects, and the most serious ones can be seen in an unfavorable business environment and insufficient tax revenues to finance public spending. For this reason, the identification of all tax evasion determinants is inherent in the importance of reducing the capital consequences of this phenomenon. The primary factors for tax evasion are economic factors. Undoubtedly, economic factors are very important indications that tax evasion really exists. The avoidance of tax payments is largely attributed to the "complexity of the tax system, the level of income information, penalties for tax evasion, tax audit probability and the level of tax rates" (Devos 2014, 14). Analogically, psychological factors, which analyze the internal perceptions of taxpayers, also have inevitable reflections. In order to point out the effect of both groups of factors, the research included the variables that reflect the productivity of tax authorities' work and the value added tax rate as economic factors. Work productivity of tax authorities is indicated by the number of controls and the number of employees. Tax organization is inherently important and "tax policy design in developing and transitional countries must therefore take the administrative dimension of taxation carefully into account" (Bird 2004, 134). There are several reasons for the analysis of another factor, the economic character. Value Added Tax is the main source of public spending in Serbia. Also, there are indications that an increase in the value added tax rate has contributed to an increase in tax evasion in Serbia (Ristić 2017). In 2012, the Government of Serbia introduced a package of measures aimed at stabilizing public finances and economic recovery (Đurović-Todorović and Đorđević 2015, 111), including the increase of the value added tax rate from 18% to 20%.

We will analyze the number of controls with irregularities as a factor with psychological character. "Taxpayers' stance is influenced by many factors, including their disposition towards public institutions, the perceived fairness of the taxes, prevailing social norms, and the chances of noncompliance being detected and punished" (Franzoni 1991, 52). We have assumed that the existence of a large number of irregular controls can increase the amount of tax evasion, if most taxpayers make decisions based on the behavior of others. Social and psychological factors have become the focus of research in the 1950s "(Onu and Oats 2014, 4), and since then these factors have been greatly influenced by tax compliance.

In this paper, we will investigate whether the variables that indicate the productivity of tax authorities, the amount of value added tax and the number of controls with irregularities affect the amount of tax evasion.

2. LITERATURE REVIEW

"Tax evasion can reflect a feeling of injustice that taxes are too high, given the benefits received through public spending. People, also, might feel that taxes take too much of their earned incomes and deliver too little in return. Analogically, tax evasion may reflect distrust of government" (Hillman 2009, 281). As a phenomenon of illegal tax evasion, tax evasion has raised many issues. In order to
find the mechanisms to combat this problem, one of the most important is the identification of factors that influence the volume of tax evasion.

The study in the field of evasion, which bolded its significance, was a study carried out by Allingham and Sandmo (1972). These theorists emphasized the importance of benefits for taxpayers through the analysis of evasion of income tax. The income to be reported by taxpayers is in correlation with the maximum expected benefit that a taxpayer will have. The expected usefulness depends on the level of income, the probability of the authorities detecting tax evasion, the tax rate, and the penalty rate. Therefore, the volume of tax evasion will be determined by these factors. This model is also the first model to investigate factors that influence tax evasion. Implicitly, the application of this model in different countries initiated certain corrections, so that this model created the basis for the exploration of the new factors that would solve the problem of evasion. Pommerehne and Weck-Hannemann (1995) tested a standard model of evasion in 25 Swiss cantons for certain years. According to their empirical research, the model needs to be expanded by two omitted factors: inflation and the level of budget control by citizens. Anciūtė and Kropienė (2010) decided to apply the traditional model on the example of Lithuania (1972). The application of the model was however limited, as some of the assumptions differed from the tax system of Lithuania. Also, the authors consider that the tax probability should be written as "a function comprising the parameters such as the accuracy of detection" (Anciūtė and Kropienė 2010, 64).

A research carried out by Jackson and Milliron (1986) was also a good basis for numerous studies in the years that followed. The authors examined the significance of factors that could influence tax evasion, among which are: the source of income, profession, the complexity of a tax system, fairness, tax audit probability, penalties and tax rates, tax administration. In subsequent research, the highest attention was paid to tax authorities and tax institutions. Bird points out in detail the importance of the tax administration, as well as its connection to the tax policy (Bird 2004). Tax administration and the tax authorities’ work efficiency can significantly affect the level of tax evasion in one country.

There has been a struggle against this harmful phenomenon in the countries of Southeast Europe. According to Balliu (2014), there are several ways to reduce tax evasion in Albania. The most important factor, which influences the reduction of evasion, is the increase of the quality of tax authorities’ audit. The answer to the question “what will happen to economy if the problem of tax evasion is not represented, was given by Grgic and Terzic (2014) on the example of Bosnia and Herzegovina. According to these authors, the factors that affect tax evasion most are related to the expertise of tax inspectors and tax administration. Savić and associates (2015) examined the performance of tax administration in 13 European countries using the DEA (Data Envelopment Analysis) measure of efficiency and the method of regression analysis. The results obtained by the regression model indicate a significant influence of tax administration efficiency on the gray economy in the analyzed countries. "Countries with more efficient tax administration have a lower level of gray economy" (Savić et al. 2014, 1146). Using the experimental method, Alm and McKee (2006), among other factors, questioned how the probability of control and information on the productivity of tax authorities affected taxpayers. They found that tax compliance was higher if a control by the tax authorities was announced.

There are also authors who consider that morality can significantly determine the volume of tax evasion (Sipos 2015; Hillman 2009, 279-288; Randelović 2016). Richardson's (2006) research, based on an analysis of 45 countries, found that non-economic determinants have a stronger impact on tax evasion compared to economic determinants. Richardson analyzed 10 key factors that influence tax evasion. These include: older taxpayers, gender, education, income source, income derived from agriculture, marginal tax rates, perception of fairness, complexity, self-assessment, tax morality. The results of OLS regression analysis have shown that complexity, education, income source, fairness and tax morality are the most important determinants of tax evasion. The importance of the tax system's complexity is emphasized by Saad (2014) who examines the complexity by examining taxpayers. The results of his research show that the complexity of the tax system is one of the most important factors affecting the non-compliance behaviour. Taking into account various tax systems, at the Institute for Empirical Economic Research in Zurich, Professor Frey emphasizes, in most of his works, morality as a human predisposition that can influence current behavior. Frey and Torgler (2007), in their survey, which included 30 countries of Western and Eastern Europe, pointed out the significant connection between tax evasion and tax morality. Also, the results of the models they obtained showed a strong positive correlation between the quality of political institutions (government effectiveness) and tax morality.
Numerous extensive theoretical studies followed specific empirical events. The results of the research obtained by Schneider, Raczkowski, Mróz (2015), which included European Union countries, do not provide the basis for optimism. In a large number of European Union countries, the government losses resulting from tax evasion exceed 20 percent. The situation in Denmark in 1992 developed a model that emphasizes the importance of the tax structure. The results of Gordon and Nielsen’s model (1996) show that it is very important to look at the terrain where the possibility of evasion is greatest. Namely, Denmark is a country with very high value added tax rates. Tax evasion will be reduced if the value added tax rates are lower than the income tax rates. Watrin and Ullmann (2008) questioned the standard theory that a mix of direct and indirect taxes does not influence tax evasion. The results of their experiment show that tax evasion is considerably higher with indirect taxes than direct taxes. In their research, Misman, Noor, Omar and Aziz identified the factors associated with the consumption tax evasion, i.e. excise evasion. Their research area was imported cars market. The authors examined the following factors using the method of multiple linear regression: tax rate, penalty, car brand, company size. The results of the model have shown that the tax rate and penalties can significantly increase excise evasion. Alm, Jackson and McKee (1992) have proven that high tax rates influence significantly the low level of tax compliance. In their research, based on laboratory experiments data, they indicate that tax compliance grows with the growth of income and the rate of audit, and it falls with the growth of the tax rate.

In Serbia, the greatest amount of evasion is caused by the value added tax evasion. Djordjevic (2014) pointed to potential problems that would arise from further increase in consumption tax in Serbia. In her research, she states that high tax rates can diminish equity and increase tax evasion. According to Đurović-Todorović and Đorđević (2015), the share of indirect taxes in Serbia, in total public revenues, reaches „the highest level in Europe“ (Đurović-Todorović and Đorđević 2015, 115). The imperfect structure of the tax system, in line with the country’s development, indicates a significant share of tax evasion in the field of indirect taxes in Serbia. Randjelovic (2017) emphasizes that the evasion of taxes in Serbia depends on the fundamental factors: level of taxes, penalties and probability of detection, but also of other factors that may influence the willingness of taxpayers to pay taxes, while Ristić (2017) emphasizes the effect of economic and psychological factors. Starting from the supposed relationship between prisoner dilemma and tax evasion, the author presented the application of the game theory to the problem of tax evasion in order to bold the psychological factors.

3. METHODOLOGY AND DATA

The impact of tax evasion on the economy is of crucial importance. Tax evasion reduces the government revenue and the tax system efficiency (Manasan 1988). The consequences of the global financial and global economic crisis in transition countries, including Serbia, have contributed to an increase of the problem of evasion. On the other hand, the struggle with the phenomenon of tax evasion is hampered in developing countries. The main reason for this are potential opportunities for the development of mechanisms that will prevent the problem of evasion.

Public revenue movement in the post-crisis period, as a GDP percentage, has a tendency to decline (Đurović-Todorović and Đorđević 2014, 113). The answer to the captious question of why public incomes are falling is due to the tax rates increase for most of the tax, can be found in the graph below.

Graph 1. Dynamics of tax evasion as a percentage of BDP (%)

Source: Ministry of Finance RS 2017 (Authors calculation)
"The consequences of tax evasion growth are the reduction in government revenue, and the effects on capital and the efficiency of tax policy objectives" (Manasan 1988, 167). Graph 1 shows the trend of tax evasion growth in Serbia in the observed period (2005-2016). The effects of tax evasion on tax revenues can be seen in Table 1 and Graph 2.

Table 1. Estimated gap of total tax evasion (in millions of dinars)

<table>
<thead>
<tr>
<th>Years</th>
<th>Potential tax revenues</th>
<th>Collected tax revenues</th>
<th>Evaded income</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>686,531.9</td>
<td>669,371.9</td>
<td>17,160</td>
</tr>
<tr>
<td>2006</td>
<td>822,171.8</td>
<td>792,163.8</td>
<td>30,008</td>
</tr>
<tr>
<td>2007</td>
<td>936,428.5</td>
<td>912,749.5</td>
<td>23,679</td>
</tr>
<tr>
<td>2008</td>
<td>1,077,667.1</td>
<td>1,051,717.1</td>
<td>25,950</td>
</tr>
<tr>
<td>2009</td>
<td>1,082,586.3</td>
<td>1,054,588.3</td>
<td>27,998</td>
</tr>
<tr>
<td>2010</td>
<td>1,135,670.3</td>
<td>1,111,492.3</td>
<td>24,178</td>
</tr>
<tr>
<td>2011</td>
<td>1,214,701.9</td>
<td>1,191,078.9</td>
<td>23,623</td>
</tr>
<tr>
<td>2012</td>
<td>1,341,635.4</td>
<td>1,292,564.4</td>
<td>49,071</td>
</tr>
<tr>
<td>2013</td>
<td>1,391,528.4</td>
<td>1,366,595.4</td>
<td>24,933</td>
</tr>
<tr>
<td>2014</td>
<td>1,454,128.2</td>
<td>1,439,037.2</td>
<td>15,091</td>
</tr>
<tr>
<td>2015</td>
<td>1,486,592.1</td>
<td>1,463,590.1</td>
<td>23,002</td>
</tr>
<tr>
<td>2016</td>
<td>1,605,277.9</td>
<td>1,585,766.9</td>
<td>19,511</td>
</tr>
<tr>
<td>Total</td>
<td>14,234,919.8</td>
<td>13,930,715.8</td>
<td>304,204</td>
</tr>
</tbody>
</table>

Source: Ministry of Finance RS 2017 Authors' calculation.

Graph 2 shows the gap between the actual tax revenues, expressed in current prices, and the tax revenues that would have been realized if the problem of tax evasion was annulled. We can see that there is a significant difference between taxes that are collected (tax revenues collected) and taxes that could be charged (potential tax revenues).

Graph 2. The gap between realized and potential tax revenues (in millions of dinars)

Source: Ministry of Finance 2017 Authors' calculation.

The subject of the study in this paper are the factors that have influenced the increase in tax evasion in Serbia in the observed period and the factors which may be the result of reduced tax revenues. The dependent variable in this study is tax evasion. The main difficulty in our empirical research is the absence of detailed and reliable information on the analyzed factors. "People are very susceptible to hiding information about tax evasion. This concealment makes the empirical work quite difficult "(Alm, Jackson and Michael 1992, 107).

We need to emphasize that our research is corroborated by variables, whose estimations are based on tax authorities' analyses. Namely, in developing countries, it is very difficult to access data, which additionally complicates the interpretation of the results. Analogously, the phenomenon of tax evasion is impossible to estimate in real terms. Disclosure of hidden income, therefore, has to be done with a certain degree of biased assessment of tax evasion, in other words, the analysis has to be assessed with caution. The tax evasion in Serbia will be reflected in the newly revealed public revenues in the field controls performed by the tax authorities. The dependent variables presented in the survey are: the number of employees in the tax administration, the number of controls with irregularities, the number of controls of tax authorities, the rate of value added tax. The movement of the standard VAT rate in the analyzed period was observed.
Table 2. The movement of the standard VAT rate

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Standard rate</td>
<td>18%</td>
<td>20%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Source: International VAT and GST rates, 2018

Table 2 shows the movement of the standard rate (2005-2016). Serbia introduced the increase in the standard tax rate (Law on Amendments and Supplements to the Law on Value Added Tax 2012, 25). Since value added tax is the main source of income in Serbia (the average share of revenues from value added tax in public revenues is 25.25%, 2005-2016), we decided that VAT rate is one of the dependent variables.

We will use the number of employees and the number of controls as the labor productivity indicators of tax authorities. The number of controls with irregularities is a psychological factor that can affect the taxpayers’ behavior. In order to examine the impact of these factors, we will use the available data from the Ministry of Finance which are of public importance, obtained on the request for the purpose of scientific research. We will perform the research by the method of linear multiple regression.

A prediction model of linear regression was established by analyzing the individual relationships of each of the predictors with a dependent variable. To investigate tax evasion determinants, the following basic model of linear regression is estimated:

\[ U = \alpha + \beta_1 BI + \beta_2 BKN + \beta_3 VR + \beta_4 \ln BK + \varepsilon \]  

where \( U \) stands for tax evasion; \( BI \)-number of inspectors; \( BKN \)-number of control with irregularities; \( VR \)-VAT rate; \( \ln BK \)-income logarithm of the total number of controls and \( \varepsilon \) standard statistical error.

Table 3. Predictive power of the model

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>111051438.807</td>
<td>4</td>
<td>27762859.702</td>
<td>8.679</td>
<td>.030b</td>
</tr>
<tr>
<td>Residual</td>
<td>12795015.415</td>
<td>4</td>
<td>3198753.854</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>123846454.222</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Tax Evasion  
b. Predictors: (Constant), number of inspectors, number of control with irregularities, VAT rate, \( \ln(\text{total number of controls}) \).

Source: Authors calculation

This model explains 89.7% of the total tax evasion variance, and the model as a whole has a statistically significant prediction potential. (Sig. 0.030).

Table 4. Estimated regression coefficients*  

<table>
<thead>
<tr>
<th>Variables</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>199931.356</td>
<td>40853.445</td>
<td>4.894</td>
<td>0.008</td>
</tr>
<tr>
<td>Number of inspectors</td>
<td>35.416</td>
<td>9.617</td>
<td>3.683</td>
<td>0.021</td>
</tr>
<tr>
<td>Number of control with irregularities</td>
<td>1.721</td>
<td>0.321</td>
<td>3.319</td>
<td>0.006</td>
</tr>
<tr>
<td>VAT rate</td>
<td>1921.087</td>
<td>1301.277</td>
<td>1.476</td>
<td>0.214</td>
</tr>
<tr>
<td>Ln(Total number of controls)</td>
<td>-56650.957</td>
<td>10100.692</td>
<td>-5.609</td>
<td>0.005</td>
</tr>
</tbody>
</table>

*Dependent variable: Tax Evasion  
Source: Authors calculation
Estimated values of regression coefficients, shown in Table 4, can be expressed in the following equation:

\[ U = 19931.356 + 35416 \times \text{Number of inspectors} + 1.721 \times \text{Number of controls with irregularities} + 192.057 \times \text{VAT rate} - 55650.557 \times \ln(\text{Total number of controls}) \]  

(2)

The results of the estimated model show that three independent variables in the model statistically significantly influence the dependent variable. Based on the estimated results of the regression model, we can conclude that there is a positive effect of the two analyzed factors on tax evasion (the number of inspectors and the number of controls with irregularities), and the negative effect of one factor (number of controls). Value Added Tax (VAT Rate) is not a predictor with significant impact.

The estimated value of the beta coefficient for an independent variable, which represents the number of inspectors in Serbia, can be interpreted in the sense that the increase in the number of inspectors in Serbia causes an average increase in tax evasion by 35,416 dinars (\(p=0.021\)). Another factor, the number of controls with irregularities, also has a positive effect on tax evasion. If the number of controls with irregularities is increased by one extra control, it causes an average increase in tax evasion by 1,721 dinars (\(p=0.006\)). The number of tax evasion controls has a negative effect. Tax evasion will be reduced by 56650,957 dinars (\(p=0.005\)), if \(\ln(\text{Number of controls})\) is increased by 1, i.e. if the number of controls increases by about 2.7 times. VAT depends on more another factors, and we must emphasize that the results we found out must be very conditional. VAT depends more of demand and absorption, but estimating analyzed factors is also very important.

4. CONCLUSIONS

Our research approach allowed us to respond to the subject of research, despite the poor database. Our research examines the economic and psychological variables that could have repercussions on tax evasion. The problem approach has, hopefully, opened up other theoretical and empirical topics for tax evasion research.

On the basis of the conducted regression analysis, we found that labor productivity indicators of the tax administration authorities have a very significant impact on tax evasion in Serbia. Economic factors that could influence tax evasion are expressed on the basis of the value added tax rate, the number of controls and the number of tax inspectors in Serbia. The results of the obtained model pointed to the positive and statistically significant effect of the number of tax inspectors on tax evasion and the negative statistically significant effect of the number of controls on tax evasion. The obtained results point to the reduction of the number of tax inspectors. Namely, qualified tax administration staff is of crucial importance for better work efficiency and a smaller percentage of working hours loss. The reduction in the number of inspectors, therefore, must be accompanied by the increase in number of qualified staff who will have better supervision. The results of the model indicate that the structure of tax authorities is very important for the functioning of the tax system. According to the Field Supervision Work Plan for 2017\(^1\), where a smaller number of tax inspectors is planned in comparison to their number in 2016 (decrease in the number of inspectors by 134), we can conclude that the structure of employees in the tax administration is improving. We assume that reducing the number of inspectors is related to retired employees. In this way there is an increase in the qualified workforce. Analogously, the electronic VAT filling system in Serbia (which has been operating since 2014\(^2\)) has contributed to creating greater order and discipline among taxpayers and reducing tax evasion. The results of the empirical research show that it is necessary to increase the total number of supervisions of tax authorities, and they are completely coherent with theoretical tax evasion research.

\(^1\)Tax Field Control Annual Plan for the year 2017 is designed in accordance with the Tax Regulations Compliance Plan for 2017. According to Article 118 of the Law on Tax Procedure and Tax Administration and the assessment of the tax authority and taxpayers’ tax risk, based on the Analysis of the field control results for the period January 1 to September 30, 2016 and the analysis of VAT trends for the period October 1, 2015 to September 30, 2016, as well any other official data available to the Tax Administration.

\(^2\)Law on tax procedure and tax administration, Official Gazette of RS, no. 68/2014, Article 38.
A greater number of supervisions, which will be announced, will have positive repercussions in the fight against the evasion phenomenon. "Those subjects who know that they will be controlled will pay taxes" (Alm and McKee 2006, 814). The third examined variable, selected in the regression analysis, the value added tax rate, did not show statistical significance. However, indications that an increase in rates may affect a larger volume of evasion are not excluded. Our analysis, therefore, has created the basis for incorporating this economic factor into new empirical models. In this paper we confirmed the positive effect of psychological factors on tax evasion. Namely, if the number of controls with irregularities increases, taxpayers will be explicitly led by the view that the tax should not be paid. The reflection of psychological factors on the volume of tax evasion has a special significance in the analysis of evasion. "When a sufficient number of people avoids tax, tax evasion becomes a social norm" (Hillman 2009, 281). The behavior of an individual who avoids paying taxes is, in such circumstances, no different from the behavior of other taxpayers.

Depending on the model, various conclusions can be drawn and used in the design of a relevant anti-tax evasion strategy in each country. We hope that by analyzing certain factors, we have partly shed light on the puzzle which factors determine the volume of tax evasion in Serbia.

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