

## **The development of corporate tax revenues in the Slovak Republic from a change in tax rate point of view**

### **Abstract**

Taxes represent crucial part of source of public finance in the market economy of each country. They are one of the most important public revenues for country's economy and well-being, and as well as they are inseparable part of tax policy and tax system. Our contribution deals with the development of tax revenues influenced by corporate tax rate in the Slovak Republic in period of 1995-2016. Based on regression analysis, we quantify an effect of selected macroeconomic indicators on the total tax revenues in Slovakia. The results show two significant variables which are high positively dependable on volume of corporate tax revenues: the first variable is GDP per capita, and the second variable is foreign direct investments. Based on our results, an annual rate growth of GDP causes an increase in tax revenues by 0.6809%, and foreign direct investments increase tax revenues by 0.0419%.

**Keywords:** tax rate; public revenue; macroeconomic determinants; corporate tax.

## **Rozwój przychodów z podatku od osób prawnych w Republice Słowackiej po zmianie punktu podatkowego**

### **Abstrakt**

Podatki stanowią zasadniczą część struktury finansów publicznych w gospodarce rynkowej każdego kraju. Są one jednym z najważniejszych źródeł dochodów publicznych dla gospodarki i dobrobytu państwa, stanowiąc jednocześnie nieodłączny element polityki podatkowej i systemu podatkowego. W artykule zbadano rozwój wpływów podatkowych według stawki podatku dochodowego od osób prawnych w Republice Słowackiej w latach 1995-2016. Na podstawie analizy regresji określony ilościowo został wpływ wybranych wskaźników makroekonomicznych na całkowite dochody podatkowe na Słowacji. Wyniki badań pokazują dwie istotne zmienne, które są dodatnie i wysoko zależne od wielkości dochodów z tytułu podatku dochodowego od osób prawnych. Pierwszą z tych zmiennych jest PKB na mieszkańca, zaś drugą zmienną – bezpośrednie inwestycje zagraniczne. Na podstawie uzyskanych wyników stwierdza się, że roczna stopa wzrostu PKB powoduje wzrost dochodów podatkowych na

poziomie 0,6809%, podczas gdy bezpośrednio inwestycje zagraniczne zwiększają wpływy z podatków o 0,0419%.

**Słowa kluczowe:** wysokość podatku; dochody publiczne; determinant makroekonomiczne; podatek od osób prawnych.

**JEL:** D1, J11.

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## **Introduction**

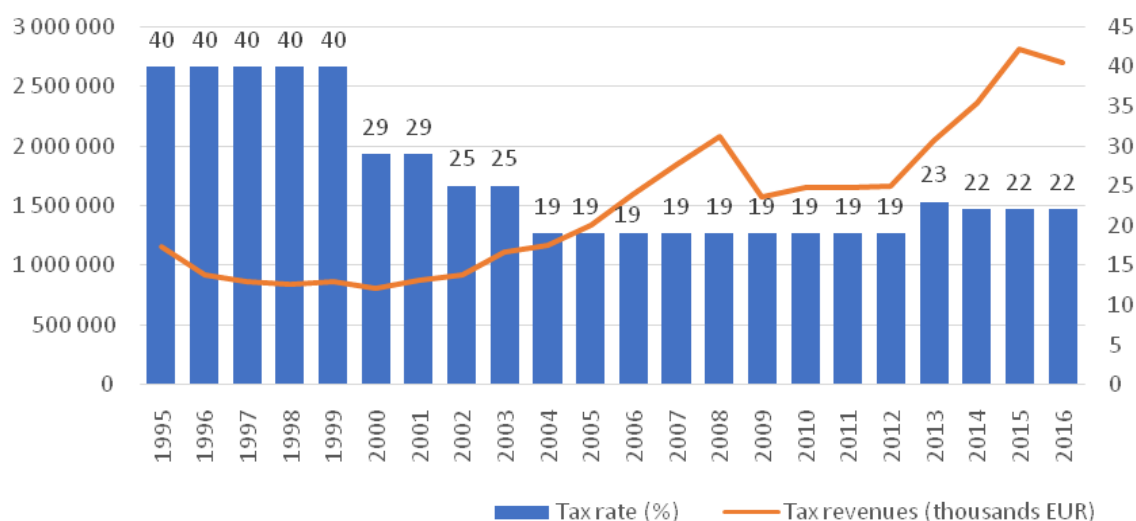
Every individual government tries to maintain a certain volume of public revenue which the most crucial part represents tax revenue. A very worrying thing in tax question is a distortion of corporate tax because it causes serious economic disruptions and damages, as well as inappropriate decisions by economic entities. To set up a correct tax system for business entities, it should be taken into consideration a volume of corporate investments, type of investment projects, decisions about sources of financing the enterprise, selecting the legal form of business, location of the business enterprise, or decisions about mergers and acquisitions. Therefore, there is still actual discussion about complex tax reforms which should diminish distortion of corporate tax, respectively eliminate wholly, and so there would be secured higher tax revenue in a state's budget (Rosen, 1992, pp. 238-269; Johansson Heady, Arnold, Brys, & Vartia, 2008, pp. 2-82). A level of tax revenues is significantly influenced by many indicators, such as economic, social, political, legal and demographic indicators. Also some studies such as Castro and Camarillo (2014, pp. 35-59) and Piancastelli (2001, pp. 1-18) claim that total volume of tax revenues depend on many determinants. The decisive indicator is tax rate. In tax praxis, we differentiate various tax rates such as, fixed percentage and combined tax rate, nominal, effective and average tax rate (Bánociová, Gál, Mihóková, & Pavliková, 2014). Almost in all states, corporate tax rate is determined as proportional tax rate. There are various methods for determining effective tax rate (Devereux & Griffith, 2003, pp. 275-292). Kubátová and Říhová (2012, pp. 451-470) states that effective tax rate is divided into fictitious (microeconomic tax rate EATR and EMTR) and real effective tax rate. Clausing (2007, pp. 115-135), Devereux, Griffith and Klemm (2004) deal with dependence between tax rate and tax revenues, and they point out that higher tax rate improves tax revenue. Another study by Kubátová and Říhová (2009, pp. 451-470) analyses also this dependence, and examines an influence of tax rate and square tax rate on tax revenues. This study also claims that higher tax

rate improves tax revenues however, it points out that at the certain level of tax rate will corporate taxable profit decrease. Because of excessive taxation slows economic activity business entities will either more optimize their profits, or completely avoid paying tax.

### **The development of corporate tax rates and tax revenues in the Slovak Republic**

In the analysed period 1995-2016, the development of corporate tax revenues was influenced by various indicators which had also effect on total tax revenues. To those indicators belong changes in tax rates, opportunities of tax concessions, changes in tax depreciation, or state's regulation of tax losses. We divided our analysed time period into three stages based on development of corporate tax rate: the first stage included period 1995-2003, the second and the most important stage lasted in 2004-2012, and the last third stage was focused on years from 2013 to present. In the macroeconomic development of Slovak Republic (SR) was a significant milestone year 1996 when tax entities (legal persons) were not willing to pay their tax obligations, and also showed insufficient tax discipline. As a consequence, in 1996 tax revenues dropped dynamically by 20%. The following year 1997 brought lowering tax obligation what should have represented an effort of the restructuring of the Slovak economy and increasing its competitiveness. This policy brought many serious defects into Slovak economy, such as economic slowdown, high unemployment rate and rising inflation rate, as well as tax concessions and tax holidays for selected business entities. The economic disruption continued also in 1999. In December 1999, corporate tax rate was decreased from 40% to 29% what should have contributed to shifting tax burden from direct taxes to indirect taxes. From another point of view, we can assess year 1999 positively because tax revenues started to ascend. In the following year 2000, the government approved an amendment to Income Tax Act that was valid until the end of 2003. In 2003, was approved some other measures, including expansion impulses for the future development of Slovak economy. In 2002, there was a decrease in tax rate by 4 percentage points (from 29% to 25%). This tax cutting caused that in 2003 was recorded the largest increase in tax revenues by 20% (see Figure 1). Since 2004 has occurred important tax reform which was influenced by the entry of SR to the European Union. This tax reform included a shift of tax burden from taxation of production to consumption, and its key role was to set up equal taxation at the level of 19%. Equal taxation improved the productive capacity of the Slovak economy through inflow of foreign direct investments, and also caused that SR as the second post-communist country adopted new currency Euro. With this tax reform, Slovakia became one of countries with the highest economic growth. The positive effect

on tax revenues had also payment of tax advances in December 2008 which was associated with Euro conversion in 2009. However, in the end of 2008 Slovak economy was influenced by the global economic and financial crisis which caused the largest fall in tax revenues by 24% in 2009. The development of corporate tax revenues in 2010 was negatively influenced by high amortization of tax losses from the previous year and year-to-year development of attributable and deductible items of tax base. In 2013, it was cancelled equal taxation, and therefore there was an increase in tax rate to 23%. In the following year corporate tax rate dropped again by 1% (22%), and currently is corporate tax rate at the level of 21%. Although corporate tax rate has fallen by half from 1995, many Slovak companies choose for their business activities neighbour countries (such as Hungary, Czech Republic or Bulgaria) where corporate tax rate is significantly lower in comparison to Slovakia.



**Figure 1. The development of corporate tax revenues and tax rates in Slovakia (1995-2016)**

Source: own proceeding.

### Data and methodology

The aim of our contribution was primary to assess development of Slovak corporate tax rates and their influence on tax revenues. We chose a linear regression methodology to quantify an effect of selected macroeconomic indicators on total tax revenues. There are many determinants which have an influence on corporate tax in the real life. In our contribution, we selected seven macroeconomic indicators and we tested their influence on the level of corporate tax rate in the Slovak Republic. The analysis was made in statistical programme R for time period 1995-2016. We gained data from Statistical Office of the Slovak Republic. Since the analysis used data from 1995, we had to convert domestic currency into common currency Euro. We used official

exchange rate of Slovak crown against Euro set by National Bank of Slovakia at level 30 1260 SKK/EUR.

Our simple linear regression model defines how independent variables X influence on dependent variable Y. It is written in the following form:

$$y = \beta_0 + \beta_1 \text{EATR} + \beta_2 \text{NTR} + \beta_3 \text{FDI} + \beta_4 \text{GDP/capita} + \beta_5 \text{INF} + \beta_6 \text{UNE} + \beta_7 \text{DEBT} + u_t, \quad (1)$$

where:

- a) explanatory (dependent) variable Y: *Revenues gained from corporate tax into state budget (Corporate Tax Revenue)* – expressed in percentage as a share of revenues from corporate tax on GDP;
- b) explainable (independent) variable X:
  - *effective average tax rate (EATR)* – expressed in percentage;
  - *nominal tax rate (NTR)* – expressed in percentage;
  - *foreign direct investments (FDI)* – expressed in percentage as a share of net foreign direct investment inflow on GDP;
  - *gross domestic product per capita (GDP/capita)* – expressed in percentage as annual growth rate, based on local currency;
  - *inflation (INF)* – expressed in percentage as annual growth rate of implicit GDP deflator;
  - *total unemployment (UNE)* – expressed in percentage as a share of available but unemployed labour force on total labour force;
  - *government debt (DEBT)* – expressed in percentage as a share of total consolidated gross government debt on GDP.

There are some other variables in the model, such as:

- $\beta_0, \beta_1, \beta_2, \dots, \beta_7$  – regression coefficients which explain sensitivity rate of particular explainable variable X on explanatory variable Y;
- $u_t$  – stochastic random variable (random error) which includes all other non-systematic influences that can change explanatory variable Y.

For our analysis of tax revenues, we chose the methodology based on theoretical experience by Bellak and Leibrecht (2009, pp. 2691-2703), Mooij and Nicodème (2008, pp. 478-498). These studies used a general dynamic equilibrium model. The first model that explained international tax relations with Econometrics was model by Lotz and Morss (1967, 478-499). The selection of macroeconomic indicators was determined by theoretical findings of these authors: Guziejewska, Grabowski and Bryndziak (2014, pp. 253-271), Swank and Steinmo

(2002, pp. 642), Gupta (2007), Kubátová and Říhová (2009, pp. 451-470). They analysed various determinants which have significant influence on volume of tax revenue.

Before analysis, we created some aggregate models in programme R and instrument *Data analysis*. This analysis included correlation analysis that measured strength of correlation between variables (*Multiple R coefficient*), determination coefficient *R Square* that explained variability of dependent variable Y, and adjusted determination coefficient *Adjusted R Square* that observed number of examined variables as well as number of observations relating to individual variables. There are also some other determinants, for example determinants to calculate standard error, or to observe regression model (Table 1). The regression analysis also contained output that describes analysis of variance ANOVA. In the analysis of variance, we found out significance of our model through *Significance F* coefficient (Table 2). The last part of regression analysis is presented in Table 3 and it explains regression coefficients of variables. The value  $\beta_0$  represents *Intercept* in the regression function, while the other coefficients are matched to particular independent variables. *P-value* was a key figure when statistical significance was tested, and we compared it with significance level  $\alpha = 0.05$  (5%).

**Table 1. Output of regression analysis – the first part**

Regression Statistics	
Multiple R	0.7915
R Square	0.6265
Adjusted R Square	0.4958
Standard Error	0.7273
Observations	28

Source: authors' own elaboration.

**Table 2. Output of regression analysis – the second part**

ANOVA					
	df	SS	MS	F	Significance F
Regression	7	17.7499	2.5357	4.7929	0.0026
Residual	20	10.5809	0.5290		
Total	27	28.3308			

Source: authors' own elaboration.

**Table 3. Output of regression analysis – regression coefficients**

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	5.9893	1.1691	5.1231	0.0001	3.5507	8.4280
EATR	-0.0200	0.0868	-0.2310	0.8197	-0.2011	0.1610
NTR	-0.0408	0.0765	-0.5337	0.5994	-0.2005	0.1188
FDI	0.0419	0.0095	4.4212	0.0003	0.0221	0.0617
GDP/capita	-0.6809	0.2164	-3.1465	0.0051	-1.1324	-0.2295
Inflation	0.0100	0.0553	0.1806	0.8585	-0.1054	0.1254
Unemployment	0.0323	0.0613	0.5267	0.6042	-0.0956	0.1603
Governmentdebt	-0.0148	0.0081	-1.8237	0.0832	-0.0318	0.0021

Source: authors' own elaboration.

### Macroeconomic determinants through regression analysis

We set nil hypothesis  $H_0$ : The selected variable is not statistically significant, and the alternative hypothesis  $H_1$ : The selected variable is statistically significant. To assess hypothesis, we tested statistical significance through *p-value* and compare it with significance level  $\alpha = 0.05$ . As can be seen in Table 3, *p-value* of independent variables is statistically significant only at effective corporate tax rate EATR. According to these results, we can conclude that the other variables do not explain variability of dependent variable sufficiently.

The value of correlation coefficient is 0.7915 what reflects that between analysed variables is lower correlation. Determination coefficient is at level 0.6265 what means that our research model explains variability of dependent variable at 62.65%, and the rest 37.35% represents unexplained variability that is random occurrence, or other undetermined effects. Analysis of variance ANOVA shows the value of statistical significance at level 0.00267. If we compare this value with significance level  $\alpha = 0.05$ , then we reject nil hypothesis what means that the model is appropriate for analysis. We can write regression function as following:

$$y=5.9893-0.0200x_1-0.0408x_2+0.0419x_3-0.6809x_4+0.0100x_5+0.0323x_6-0.0148x_7 \quad (2)$$

The coefficient of dependent variable (5.9893) expresses that the value of nominal corporate tax rate will be at that level if independent determinants are nil. Other coefficients express that if *effective corporate tax rate* increases by 1% (other explanatory variables remain unchanged), then budgetary revenue from corporate tax in the European countries will reduce by 0.02%. An augmentation of *nominal corporate tax rate* by 1% (if other explanatory variables remain unchanged) causes a decline of budgetary revenue in the EU states by 0.0408%. In corporate tax research studies, regression analysis was used in Garrett, Mooij and Ederveen (2001, pp.

145-177), Bretschger and Hettich (2002, pp. 695-716), Swank and Steinmo (2002, p. 642), Slemrod (2004, pp. 877-899), and Winner (2005, pp. 667-687), to describe an effect of tax rates and other indicators including capital mobility in specific country. Next, our regression analysis showed that if *foreign direct investments* go up by 1%, then corporate tax revenue in state budget will also rise by 0.0419%. If *GDP per capita (annual growth rate in percentage)* limbs up by 1%, then tax revenue will fall down by 0.6809%. A positive influence on corporate tax revenue was recorded at inflation because if annual inflation rate rises up by 1%, corporate tax revenue will increase by 0.0100%. The very similar findings can be found in studies by Bartelsman and Beetsma (2003, pp. 2225-2252) or Ferreira and Hitchcock (2009, pp. 1925-1949) which through panel analysis in 16 countries found out that an increase in inflation rate by 1% causes a reduction in tax revenue by 1.5 percentage points. The last analysed indicators in our model were *unemployment rate* and *government debt*. If unemployment rate increases by 1%, then corporate tax revenue will rise by 0.0323%. If government debt increases by 1%, corporate tax revenue will goes down by 0.0148%. When we examine correlation between macroeconomic indicators, we should not forget to analyse other quantitative indicators which have influence on development of corporate taxation and total tax revenue, as well. According to Tanzi (1989, pp. 633) and Mintz (1990, pp. 81-102), to those indicators belong geographical location of state which influences various tax-legal characteristics. Only within EU Member States exist two different legal systems (continental and Anglo-American) what can have important influence on corporate taxation construction.

## **Conclusion**

The government is a crucial authority in taxation question because it approves shifting of national financial sources from household ownership to ownership of business entities in favour of maintaining public goods. Money gained from taxation represent main engine through which financial sources are transformed from private goods into public goods. Results of our analysis pointed out that tax revenue are significantly influenced by nominal and effective tax rate, and also by some macroeconomic indicators (either positively, or negatively). Our regression model interpreted variability of dependent variable at 62.65%. The value of correlation coefficient was at the level of 0.7915. A significant positive influence on tax revenue had two variables in the model: *GDP per capita* (0.6809%) and *foreign direct investments* (0.0419%). To conclude, we can state that corporate taxation is in the current times very discussed topic at the national as well as international level.



## Bibliography

- Bánociová, A., Gál, M., Mihóková, L., & Pavliková, Ľ. (2014), *Zdaňovanie subjektov v slovenskej praxi*. Košice: Elfa.
- Bartelsman, E. J., & Beetsma, R. M. W. J. (2003). Why pay more? Corporate tax avoidance through transfer pricing in OECD countries. *Journal of Public Economics*, vol. 87(9-10), pp. 2225–2252.
- Bellak, C., & Leibrecht, M. (2009). Do low corporate income tax rates attract FDI? – Evidence from Central- and East European countries. *Applied Economics*, vol. 41(21), pp. 2691–2703.
- Bretschger, L., & Hettich, F. (2002). Globalisation, capital mobility and tax competition: Theory and evidence for OECD countries. *European Journal of Political Economy*, vol. 18(4), pp. 695–716.
- Castro, G. Á., & Camarillo, D. B. R. (2014). Determinants of tax revenue in OECD countries over the period 2001-2011. *Contaduría y Administración*, vol. 59 (3), pp. 35–59.
- Clausing, K. A. (2007). Corporate Tax Revenues in OECD Countries. *International Tax and Public Finance*, vol. 14 (2), pp. 115–135.
- Devereux, M. P., & Griffith, R. (2003). The Impact of Corporate Taxation on the Location of Capital. *Economic Analysis and Policy*, vol. 33(2), pp. 275–292.
- Devereux, M. P., Griffith, R., & Klemm, A. (2004). Why has the UK corporation tax raised so much revenue? (IFS Working Papers W04/04). The Institute for Fiscal Studies. Retrieved 21.09.2018 from <https://www.ifs.org.uk/wps/wp0404.pdf>
- Ferreira, L., & Hitchcock, D. B. (2009). A comparison of hierarchical methods for clustering functional data. *Communications in Statistics – Simulation and Computation*, vol. 38(9), pp. 1925–1949.
- Garrett, G., & Mitchell, D. (2001). Globalization, government spending and taxation in the OECD. *European Journal of Political Research*, vol. 39(2), pp. 145–177.
- Gupta, A. (2007). *Determinants of tax revenue efforts in developing countries*. (IMF Working Paper No. 07/184). Retrieved 11.09.2018 from [https://www.imf.org/~media/Websites/IMF/imported-full-text-pdf/external/pubs/ft/wp/2007/\\_wp07184.ashx](https://www.imf.org/~media/Websites/IMF/imported-full-text-pdf/external/pubs/ft/wp/2007/_wp07184.ashx).
- Guziejewska, B., Grabowski, W., & Bryndziak, S. (2014). Tax competition strategies in corporate income tax – the case of EU countries. *Business and Economic Horizons*, vol. 10(4), pp. 253–271. doi:10.15208/beh.2014.21.

- Johansson, Å., Heady, C., Arnold, J., Brys, B., & Vartia, L. (2008), *Taxation and economic growth*. (OECD Economics Department Working Papers, No 620).  
doi:10.1787/241216205486.
- Kubátová, K., & Říhová, L. (2009). Regresní analýza faktorů ovlivňujících výnosy korporátní daně v zemích OECD. *Politická Ekonomie*, vol. 57(4), pp. 451–470.
- Lotz, J. R., & Morss, E. R. (1967). Measuring “tax effort” in developing countries. *Staff Papers*, vol. 14(3), pp. 478–499.
- Mintz, J. M. (1990). Corporate tax holidays and investment. *The World Bank Economic Review*, vol. 4(1), pp. 81–102.
- Mooij, R., & Nicodème, G. (2008). Corporate tax policy and incorporation in the EU. *International Tax and Public Finance*, vol. 15(4), pp. 478–498.
- Piancastelli, M. (2001). *Measuring the Tax Effort of Developed and Developing Countries: Cross Country Panel Data Analysis – 1985/95 (September 2001)*. IPEA Working Paper No. 818. DOI: 10.2139/ssrn.283758.
- Rosen, H. S. (1992). *Public Finance* (3rd ed.). Boston: Irwin.
- Slemrod, J. (2004). The economics of corporate tax selfishness. *National Tax Journal*, vol. 57(4), pp. 877–899.
- Swank, D., & Steinmo, S. (2002). The new political economy of taxation in advanced capitalist democracies. *American Journal of Political Science*, vol. 46(3), pp. 642.  
doi:10.2307/3088405.
- Tanzi, V. (1989). The impact of macroeconomic policies on the level of taxation and the fiscal balance in developing countries. *IMF Staff Papers*, vol. 36(3), pp. 633–656.
- Winner, H. (2005). Has tax competition emerged in OECD countries? Evidence from panel data, *International Tax and Public Finance*, vol. 12(5), pp. 667–687.