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Effective Tax Rate in the Context of the Economic Determinants

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ABSTRACT

Corporate taxation is an important tool for an efficient tax system. That is an important source of revenue for the country's budget, also a factor influencing business decisions regarding capital mobility. In decision-making for foreign investors, it is important not only a macro view but also a micro view, that monitors the companies from a managerial field. The aim of this article is to quantify the effect of selected economic determinants of corporate taxation, which significantly affect the effective tax rate and indirectly affect the decision of companies about the location of businesses in the European Union. The linear regression was monitored by enterprises in the EU member states for the period 2008-2016. Two hypotheses were confirmed in the article. The results of the analysis point out the microeconomic indicators are all important determinants for effective corporate tax rate. The leverage effect, the capital intensity and the profitability of the company have a negative impact, and the nominal rate and R & D spending have a positive effect on the effective rate. In the macroeconomic model, the nominal rate and the gross domestic product are statistically significant. An increase of 1% in gross domestic product will result in an increase in the effective rate of 0.4869% and an increase of 1% in unemployment will result in an increase in the effective rate by 6.421%. On the other hand, the tax revenues of corporations have the negative impact. An increase of 1% cause a decline in the effective rate of 13.75%.

INTRODUCTION

In recent years, there are efforts leading to the harmonization of company taxation in the European Union. However, it is necessary to determine an indicator that would allow to identify the tax competition between countries and tax comparisons between them (Solík, 2007). On the one hand, the comparison based on the nominal tax rate is simple. On the other hand, it does not count on the other elements of taxation and does not capture the overall tax burden. A significant difference between the statutory rate and the actual corporate tax rate, is the reason for finding new ways to measure company taxation that would be objective. One option is to use an effective tax rate (Vartia, 2008).

The nominal tax rate is the simplest and most common option for comparing corporate taxation. In general, that is an important factor in deciding on new investments (Slemrod, 2004, Bakija

and Slemron, 2004). Nominal tax rates do not have comprehensive information capability because the effective rate may be much lower than the nominal rate. This is caused by specific tax legislation measures before nominal rates are applied to the taxable income. Legal persons may use advantageous depreciation or tax incentives to increase R & D investment to some regions to reduce profits (Vartia, 2008). The main aim of the country's tax strategy is to attract foreign investors. Research shows the foreign investments are very sensitive to changes in tax rates. The investments are influenced not only by the tax system of the country but also by the home country system (Gropp and Kostial, 2000).

1. DETERMINANTS OF THE EFFECTIVE CORPORATE TAX RATE

The efficiency of corporate taxation may be linked with many of company characteristics, such as the shareholders' framework, corporate structure, manager characteristics, business characteristics or size of the company. Only a few research studies focus on analyzing effective tax rate changes, depending on the nominal tax rate (Dias and Reis, 2018). Some authors (Gupta and Newberry, 1997; Richardson and Lanis, 2007) argue that if there is a gap between effective and nominal rates, the tax system is not effective. Some companies achieve the significant differences between high nominal rates and low effective rates, leading to undesirable consequences of the unequal tax system (Dyreng et al., 2008). Zimmerman (1983) suggests the larger companies are associated with higher effective rates than smaller firms. It explains the theory of political costs. However, the competitive theory (Dyreng et al., 2008; Richardson and Lanis, 2007) argues the larger companies have lower effective rates because they have more power and more resources to manage taxes. The analysis of British companies indicated the existence of mixed relations between indicators depending on the sector. Research results are not consensual and depend on the models used and the time period (Kraft, 2014).

The capital structure of the company is also an appropriate indicator for examining dependency on the effective tax rates. The way how companies manage their financial resources is important in terms of funding sources. Companies have two options to finance their activities, namely debt financing and equity financing. Equity financing is a cheaper alternative. On the other hand, the reward paid to investors is not usable as tax deductible items (Ribeiro et al., 2015). The depreciation and amortization are an important part of the cost of the company as well as deducting interest costs (Hanlon et al., 2010). There are several depreciation methods. The capital-intensive company can more easily manage tax by accelerating or postponing depreciation costs (Richardson and Lanis, 2007).

The decisive indicator is also the profitability of companies that express the positive dependence on the effective rate. If profitability determined on the basis of earnings before tax, it can be expected the higher wages will have higher profits and the company will have to pay higher taxes. On the other hand, the authors (Minnick and Noga, 2010; Armstrong et al., 2012) are of the opinion that profitable firms can benefit more effectively from tax exemptions, as well as tax deductions and concessions. Thus the companies evidence greater tax differences.

Effective tax rates may also be affected by macroeconomic indicators that influence investment decisions by companies. For multinational companies, lowering the nominal tax rate in another country may lead to a reduction in the effective tax rate by lowering foreign-income taxes. In addition, the declining statutory rate may increase the incentive for companies to move their busssiness activities to this country. This is one of the reasons why the companies are becoming more and more globaler (Lee and Gordon, 2005; Livermore, 2004). The significant positive impact of corporate taxes on economic growth was demonstrated by a panel analysis of the OECD data set. This research shows the increase in tax burden, as well as the deficit in the short and long term, are reducing economic growth (Fedeli and Forte, 2014). The studies (Gravelle, 1994) indicate the real tax burden on companies increases inflation, which reduces the real value of the tax

deductions. Now, the companies are able to deduct the full amount of nominal interest, they pay to reduce the company's real tax burden in the presence of inflation. Tax deformations result from the use of historical tax methods (Modigliani and Cohna, 1979). Some authors regard corporate tax as anachronism because corporate taxation ultimately leads to taxing individuals. Taxation of companies can ultimately lead to double taxation of business profits, as natural persons are also taxed on a personal level from dividends and capital revenue. It is often taxed preferentially and income from capital revenue is taxed only when it is realized, which allow tax exemptions (Gordon and Hines, 2002).

2. METODOLOGY AND DATA

The aim of the article is to empirically verify the impact of selected economic determinants of corporate taxation. These determinants significantly affect the effective tax rate and indirectly affect the decision-making of companies on the location of business activities within the European Union. The selected determinants of corporate taxation are divided into microeconomic and macroeconomic indicators. Their impact was assessed on the effective tax rate using a linear regression analysis in the R-commander's econometric program.

The analysis of the microeconomic determinants is aimed at finding dependencies between effective rate and nominal rate, leverage, capital intensity, company profitability, development and research spending. The indicators are calculated from input data from the financial statements of companies conduct the business activities in the Member States of the European Union. The data come from the Amadeus database (2018). The selection criterions are geographical location, the period 2008 to 2016, the company's profit and the subject of the business.

The analysis of macroeconomic determinants examines the dependence of the effective rate on the nominal tax rate, gross domestic product, inflation, corporation tax, foreign direct investment and unemployment in the European Union member countries. The input data are from the Eurostat database and tax revenue data from the Taxes in Europe database. The period under review is from 2008 to 2016.

The basis for the selection of the indicators was the theoretical findings of the authors: J. Teera and J. Hudson (2004), V. Tanzi (1996), A. Kemmerling (2003), B. Wigger and U. Wartha (2004), M. Tosun and S. Abizadeh (2005), G. Richardson and R. Lanis (2007), K. Minnick and T. Noga (2010), C. Armstrong et al. (2012), Gupta (2007) for the micro area. The authors investigated a number of determinants influencing the effective tax rate.

The basic hypotheses have been defined:

H1: The effective corporate tax rate mainly depends on profitability from a macroeconomic point of view.

H2: The effective corporate tax rate is mainly influenced by the nominal tax rate from a macroeconomic point of view.

The basis of the analysis is the model for micro determinants:

$$EF_{i,t} = \beta_0 + \beta_1 NOM_{i,t} + \beta_2 LEV_{i,t} + \beta_3 CAPIN_{i,t} + \beta_4 ROA_{i,t} + \beta_5 RD_{i,t} + \varepsilon_{i,t}$$

The variables:

- the explanatory (dependent) variable Y:
  $EF_{i,t}$ = the effective tax rate of the state i in the year t (in %)
- the explicated (independent) variables X:
  $NOM_{i,t}$ = the nominal rate of the state i in the year t, (in %)

$LEV_{i,t}$ = the leverage of the company from the state i in year t, (in %)

$CAPIN_{i,t}$ = the capital intensity of the company from the state i in the year t, (in %),

$ROA_{i,t}$ = profitability of the company from the state i in the year t, (in %),

$RD_{i,t}$ = the intensity of spending on R & D in the state i in the year t, (in %).

The other model variables:

- $\beta_0, \beta_1, \beta_2, \ldots \beta_5$ – the regression coefficients of the model explain the degree of sensitivity of the change of the explanatory variable to the explained variable Y,
- $\varepsilon_{i,t}$ – stochastic, the random model error includes all other non-systematic influences that may affect the explanatory variable Y.

Model for the macroeconomic determinants:

$$EF_{i,t} = \beta_0 + \beta_1 NOM_{i,t} + \beta_2 HDP_{i,t} + \beta_3 INF_{i,t} + \beta_4 TAX_{i,t} + \beta_5 PZI_{i,t} + \beta_6 UN_{i,t} + \varepsilon_{i,t}$$

The variables:

- the explanatory (dependent) variable Y:
  $EF_{i,t}$ = the effective tax rate of the state i in the year t (in %)
- the explicated (independent) variables X:
  $NOM_{i,t}$ = the nominal rate of the state i in the year t (in %),
  $HDP_{i,t}$ = the gross domestic product of the state i in the year t (in % - an annual growth rate in a local currency),
  $INF_{i,t}$ = the inflation of the state i v in the year t – (in % - the annual growth rate of implicit GDP deflator),
  $TAX_{i,t}$ = the tax revenues of corporations of the states i in the year t – (in % as share of corporation tax revenues to the state budget on GDP),
  $PZI_{i,t}$ = the foreign direct investment of the country i in the year t (in % as ratio of net inflow of foreign direct investment to GDP),
  - $UN_{i,t}$ = the unemployment in the country i in the year t (in % as a share of the available labor force, which is unemployed on the total labor force).

The other model variables:

- $\beta_0, \beta_1, \beta_2, \ldots \beta_5$ – the regression coefficients of the model explain the degree of sensitivity of the change of the explanatory variable to the explained variable Y,
- $\varepsilon_{i,t}$ – stochastic, the random model error includes all other non-systematic influences that may affect the explanatory variable Y.

3. RESULTS AND DISCUSSION

3.1 The analysis of microeconomic determinants

The first output of the model is the descriptive statistics (Tab. 1). The dependent variable has the lowest value at 8% in Belgium and the maximum is at 34% in Greece. The average is 19% and the number of all data is 252. The nominal values are higher. Higher values were expected because of the theoretical findings that indicate the effective rate as more advantageous one. The minimum nominal rate is 10% and a maximum is 35%. The median is 22%.

Table 1. Descriptive statistics of the microeconomic model

	EF	*NOM*	*LEV*	*CAPIN*	*ROA*	*RD*
Mean	0,2013	0,2267	0,1954	0,2133	0,0403	3481476
Standard Error	0,0040	0,0043	0,0089	0,0091	0,0086	581579
Median	0,19	0,22	0,163	0,219	0,026	0
Mode	0,17	0,25	0,096	0,6465	0,044	0
Standard Deviation	0,0636	0,0678	0,1419	0,1446	0,1370	9232290
Sample Variance	0,0040	0,0046	0,0201	0,0209	0,0188	$8{,}52e^{+13}$
Kurtosis	-0,6874	-0,8452	3,5006	1,4906	38,8481	11,0334
Skewness	0,2172	0,0233	1,6394	0,6120	5,4923	3,2155
Range	0,26	0,25	0,7122	0,87	1,546	54119791
Minimum	0,08	0,1	0	-0,0218	-0,359	0
Maximum	0,34	0,35	0,7122	0,652	1,187	54119791
Sum	50,72	57,13	49,2464	53,7495	10,146	$8{,}77e^{+08}$
Count	252	252	252	252	252	252

Source: own processing by Amadeus database (2018).

The lowest leverage of companies is 0. The value (0.09%) close to zero was reached in Malta in 2013. On the contrary, the highest value was 71.22% for companies in the Austria. In the case of capital intensity, the lowest value is -2.18%, which belongs to companies in Cyprus in 2016. The maximum value is 65.2% and is again measured in 2012 in Austria. The profitability of companies is the lowest in Greece in 2016, up to -35.6%. On the contrary, companies in Austria are at the highest level of profitability at 65.2% in 2010. Minimum spending on science and research is at zero level in Bulgaria, Croatia, Czech Republic, Estonia, Finland, Greece, Hungary, Italy, Lithuania, Latvia, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Malta. The highest spending on science and research is spent by Germany. The sum of the spendings of the 252 companies is at the level of approximately 877 million EUR from 2008 to 2016.

The linear regression analysis tested the dependence between the above-mentioned determinants and the effective tax rate. There are (Tab. 2) three statistically significant indicators and two statistically insignificant.

Table 2. Results of the regression analysis of the microeconomic model

	Estimate	*Std. Error*	*t value*	*Pr(>|t|)*	
(Intercept)	$1.835e^{-01}$	$1.610e^{-02}$	11.402	$2{,}00e^{-16}$	***
NOM	$7.038e^{-03}$	$5.848e^{-02}$	2.120	$1.904e^{-3}$	.
LEV	$-6.849e^{-05}$	$8.420e^{-03}$	-0.008	0.99352	
CAPIN	$-1.055e^{-02}$	$3.336e^{-02}$	-3.162	0.00176	**
ROA	$-2.451e^{-02}$	$7.424e^{-02}$	-3.301	0.00111	**
RD	$1.788e^{-05}$	$8.020e^{-06}$	2.229	0.02672	*
—					
Signif. codes: 0 '' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1***					

Source: the output from the R - commander program (2018).

The first variable is the nominal rate, which is statistically significant and has a positive effect on the effective rate. If the nominal rate increased by 1%, the effective corporate tax rate would increase by 0.7038% with a probability of 90%. A similar opinion said Dias and Reis (2018), who investigated the relationship between the effective rate and the nominal tax rate and found there

is a positive addiction. The result of their analysis, the effective rate is on average lower than the nominal rate. It has also been confirmed in our analysis. This is confirming by the other authors (Graham et al., 2016, Rego et al., 2009 et al.). They claim the companies have the ability to reduce the total tax to be paid through tax management.

On the contrary, the leverage of companies is statistically insignificant. Increasing the leverage by 1% will be reflected in the reduction of the effective tax rate by 0,006849%. Such a relationship between the leverage and the effective tax rate was reached by Kraft (2014). The capital intensity is statistically significant. The significance was also confirmed by the t-test, the absolute value is at 3,126. As a result, a 1% increase in corporative capital intensity will result in a reduction in the effective tax rate of 1,055% with a probability of 99%. The similar result was reported by Hanlon et al. (2010). The reduction in the effective rate will be even greater than the increase in capital intensity. The negative relationship between effective rate and capital intensity was also found by Richardson and Lanis (2007), who evaluated companies and the capital intensity in the context of profiting from depreciation. They have found the more capital-intensive businesses can more easily manage taxes by postponing depreciation costs.

As in the previous case, the impact of companies' profitability on the effective rate has also been negative. On the basis of our testing, we can say a 1% increase in profitability will result in a reduction in the effective tax rate of 2.451%. The impact of this indicator is most striking in professional studies. However, Gupta and Newberry (1997), Richardson and Lanis (2007), Minnick and Noga (2010), and Armstrong et al. (2012), claim the relationship is dependent between profitability and effective rate. The result of our regression analysis is the negative impact of the profitability on the effective rate. The same impact was appearing in the Manzon and Plesk study (2002). These authors claim the companies that are more profitable have lower costs associated with tax administration. Businesses have more resources to invest in tax planning that leads to a reduction in effective tax rates.

Statistically significant at a significance level of 0.05 with a p-value of 0.02672 is an indicator of R & D spendings. An increase in R & D spendings of 1% has the effect of increasing the effective tax rate by 0.001788%. It is only a very slight increase. Ribeiro et al. (2015) suggest the impact of the indicator on the effective tax rate should be positive, but the literature is not uniform. Our analysis has shown a positive dependence between research spending and effective tax rates. This may be due to the fact that not all countries offer tax exemptions for companies which spend the resources on research and development.

The H1 hypothesis was confirmed. The H1 hypothesis identified the company's profitability as the main variable affecting the effective corporate tax rate. Profitability is statistically the most significant among the microeconomic determinants we have chosen. The capital intensity is also a statistically significant determinant.

3.2 Analysis of macroeconomic determinants

The first test output is descriptive statistics, where are the basic characteristics of the analyzed data (Tab. 3).

Table 3. Descriptive statistics of the macroeconomic model

	EF	*NOM*	*HDP*	*INF*	*TAX*	*PZI*	*UN*
Mean	0,2012	0,2267	24613	0,0186	0,0277	0,2680	0,0615
Standard Error	0,0040	0,0042	995	0,0014	0,0009	0,0792	0,0018
Median	0,19	0,22	20700	0,015	0,02	0,03	0,05

Mode	0,17	0,25	10300	0	0,02	0,02	0,04
Standard Deviation	0,0635	0,0678	15796	0,0224	0,0145	1,2574	0,0295
Sample Variance	0,0040	0,0046	24952 2236	0,0005	0,0002	1,5811	0,0008
Kurtosis	-0,6874	-0,8451	2,957 7	6,8278	4,4854	49,396	2,4554
Skewness	0,2171	0,0233	1,45	1,8172	1,8836	6,8587	1,5624
Range	0,26	0,25	76900	0,17	0,09	11,08	0,15
Minimum	0,08	0,1	5000	-0,02	0,01	-0,44	0,02
Maximum	0,34	0,35	81900	0,15	0,1	10,64	0,17
Sum	50,72	57,13	62027 00	4,69	6,99	67,55	15,5
Count	252	252	252	252	252	252	252

Source: the output from the R - commander program (2018).

The dependent variable effective rate has the lowest value in Belgium at 8% and its maximum of 34% in Greece. Nominal rate values are higher, which is also expected due to the theoretical assumptions the mark the effective rate as more favorable. The minimum nominal rate is 10% and a maximum of 35%. The lowest share of GDP per capita was reached in Bulgaria in 2009. The highest share of GDP per capita is in Luxembourg. Ireland recorded the lowest inflation rate in 2009 at -2%. In this case, we talk about deflation. Latvia recorded the highest inflation rate of 15% in 2008. The negative level of foreign direct investment is typical for Cyprus in 2010 and the minimum value is -44%. The maximum value of 1 064% belongs to Luxembourg in 2015. The minimum of unemployment is at 2% and maximum at 17%. The average value of this indicator is 5%.

Table 4. Results of the regression analysis of the macroeconomic model

	Estimate	*Std. Error*	*t value*	*Pr(>|t|)*	
(Intercept)	$1.433e^{-01}$	$1.974e^{-02}$	7.263	$5.03e^{-12}$	***
NOM	$4.759e^{-02}$	$5.387e^{-02}$	2.083	$3.7e^{-03}$	.
HDP	$4.869e^{-07}$	$6.459e^{-08}$	7.539	$9.20e^{-13}$	***
INF	$1.434e^{-01}$	$1.625e^{-01}$	0.883	0.378	
TAX	$-1.375e^{-01}$	$2.645e^{-01}$	-0.520	0.603	
PZI	$1.139e^{-03}$	$2.967e^{-03}$	0.384	0.701	
UN	$6.421e^{-02}$	$1.313e^{-02}$	4.892	$1.81e^{-06}$	***
—					
*Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1*					

Source: the output from the R - commander program (2018).

The nominal tax rate is statistically significant at 90%. The assumption was the effective rate dependence on this indicator would be higher, but the opposite is true. Increasing the nominal rate by 1% will increase the effective rate by only 0.4759%. This dependence points to the speculative ability to manage a company that reduces its earnings even to the amount of tax paid. The most important variable is the GDP, which shows a positive dependence. Such positive dependence between economic growth and tax rates has been demonstrated by several authors, Clausing, 2007, Barrios et. of 2014, Kotlan et al. (2012), who explain the relative ease of the tax evasion.

Another indicator is inflation, which is statistically insignificant. The analysis result, the inflation is not an appropriate indicator for the company's decisions about the location of the investment

activities. The impact of inflation on effective corporate tax rates has not been confirmed by the study. The analysis did not reveal any statistical significance. This result is also found in professional literature. Namely, Modigliani and Cohne (1979), Durkalić (2016) and Mazák (2018) criticize the impact of inflation on corporate taxation. The inflation is the reason for the deduction of nominal interest costs, that reduces the real tax burden on companies. This compensates for tax deformations caused by inflation.

Tax revenues from corporations are also insignificant. The result agrees with the assertions of Markusen (1995), Matei et al. (2009) and Mendoza et. al. (1994). They found the raising tax rates could reduce corporate tax revenues because it would reduce business activity or move businesses to the fiscally more profitable state. The value of the correlation coefficient is -0.1375, that means if the tax revenues of corporations increase by 1%, the effective tax rate will decrease by 13.75%. The effective tax rate is independent of corporation tax revenue. This result may be due to companies seeking to pay the lowest corporate tax, even though tax rates will increase. In this case, companies may attempt to illegally reduce their tax liability. Another statistically insignificant indicator is foreign direct investment, which has almost no impact on the change in the effective tax rate. The impact of foreign direct investment on the effective tax rate was not also confirmed. Benassy-Quéré et al. (2005) in their study about the impact of foreign direct investment on corporate taxation, highlight a number of literature-based reasons why the relationship between FDI and the tax rate is not observable or misleading.

The latest macroeconomic indicator entering the model is unemployment is statistically significant. The increase in unemployment affects the effective tax rate. The effect is positive. Increasing unemployment by 1% should increase the effective corporate tax rate by 6,421%. The effective tax rate is dependent on unemployment. This relationship is positive. Fedeli and Forte (2012), Mura et. al (2017) state the persistence of unemployment can be caused by excessive taxation. This result was confirmed by our regression analysis.

The hypothesis H2 states the effective tax rate is affected by the nominal tax rate. This hypothesis has been confirmed. However, the nominal tax rate is the least significant indicator. There is an impact on the effective rate, but not as significant as it could be expected. If the nominal rate increases, companies start to make more efforts to reduce the tax base and there is also a significant risk of tax evasion.

CONCLUSION

The analysis point out how the investors choose the location of their investments in terms of the effective tax rate. The investors take into account first of all the characteristics of the company and its results. The results of the analysis show the microeconomic determinants of corporate taxation have a greater impact on the effective tax rate as a macroeconomic determinant. More significant is the microeconomic view of managing the effective tax rate. Almost all of the selected microeconomic indicators were significant in the model, namely the nominal tax rate, the capital intensity, the company profitability, and development and research spending. On the other hand, only nominal rates, GDP and unemployment were significant in macroeconomic models. The country's GDP is important for the company, because this determinant is the basic indicator in the country's macroeconomic environment, as well as the performance of the economy and its wealth. Unemployment is the second indicator from which the effective corporation tax rate is dependent. For multinational companies, it is particularly relevant in terms of the factors of the production. In conclusion, it is also important to note the nominal tax rate plays a role, because it also affects the effective corporate tax rates.

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