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IDENTIFICATION OF CAUSES OF DIFFERENCES IN STATUTORY AND EFFECTIVE RATES OF CORPORATE TAXES

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Abstract

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Although the existence of the corporate tax itself is a subject of controversy, it has been currently implemented in all EU countries except of Estonia where only distributed profits are taxed. The statutory (nominal) rate of the corporate tax itself does not say very much about the size of the corporate tax burden. This rate currently (on 31/10/2011) differs by 25% in the EU countries (10% in Bulgaria, Cyprus vs. 35% in Malta). For at least approximate determination of the effective (real) corporate tax burden, effective rates of corporate taxes are being used. The differences between the statutory and effective rates are affected by many factors. It can be assumed that a significant deviation of the nominal rate from the effective (real) one can be caused mainly by the existence of different methods and time of depreciation, possibility of group taxation, investment incentives or losses compensation, amount of property taxes and property transfer taxes, application of VAT on input, possibilities of costs deduction and other various tax exemptions and credits. The paper identifies and quantifies some of these influences by using analysis, synthesis, comparison and deduction.

corporate tax, statutory (nominal) rate, effective (real) rate, effective average rate, effective marginal rate, European Union

The existence of the corporate tax has been a subject of controversy since the very beginning. Although the corporate tax is one of the youngest in tax systems, no other tax provokes so different views in the economic theory. The views concern the fundamentals of the tax itself as well as the reasons for its place in tax systems; however the fact is that it has currently been implemented in 26 countries[1] of the European Union. The differences between the statutory (nominal) rates in particular EU member countries are considerable and according to some studies (European Commission, 2004) contribute to harmful competition between the EU countries. Using the corporate tax as a tool of the economic policy is often a subject of controversy (ZEW, 2004). To compare the real (effective) tax burden of companies, other indicators are being searched for. The mostly used indicators include the effective average tax rate (EATR) and the effective marginal tax rate (EMTR). The values of effective rates differ from the statutory one significantly. The deviation of the nominal rate value from the effective corporate tax rate may be caused by different methods and time of depreciation, possibility of group taxation, using different methods of supply evaluation, provision of investment incentives and losses compensation, amount of property taxes and property transfer taxes, application of VAT on input, possibilities of costs deduction and other various tax exemptions and credits.

1 Estonia imposes the so-called distribution tax on distributed profits.

MATERIALS AND METHODS

The paper compares the possible dependence of effective taxes on the change of the statutory corporate tax rate and the possible influence of the policy of depreciation on changes in the effective tax rates of corporate taxes. The objective is to quantify the dependency of some factors influencing the amount of the effective rates of corporate taxes. To meet the objective, the paper uses the methods of analysis, deduction, comparison and synthesis. All data used for the depreciation policies of the EU member states are from the European Tax Handbook for the years 2004–2010, the EATR and EMTR values were mostly provided by the Institute for Fiscal Studies. Due to unavailability of some data or its possible inaccuracy, only 25 (except Bulgaria and Romania), or 24 (except Estonia) EU member states are the subject of comparison and only the effective average tax rate is being concerned.

Statutory Corporate Tax

The corporate tax is imposed as a tax rate on the tax base. As the corporate taxes have not been unified in the EU countries (the endeavour to apply CCCTB has not reached a positive response in all member states[2]), the items included or not included in the tax base differ according to the standards of particular countries. A high variance of corporate tax rates in the European Union is caused by the fact that at present each of the EU member states has its own rules and regulations for assessing the corporate tax base which means that there are 27 different ways of measuring the tax base of corporations. The statutory tax rate is not much predicative; which is illustrated by Tab. I. The measure for effective taxation of corporations is then the effective corporate tax rate. It takes into account not only the size of the statutory corporate tax rate but also other aspects of tax systems which define the overall actual tax burden of corporations. The effective tax rates therefore enable the international comparison of tax systems.

There are three fundamental methods for setting up effective tax rates, namely the methods of backward-looking macro view, backward-looking micro view and forward-looking micro view.

Effective average tax rate and effective marginal tax rate of corporations

The effective average tax rate (EATR) is used for comparing the cases in which taxes affect investments in the specified field. A simple calculation of this rate would lie in deducting the after-tax net present value from the before-tax net present value, measured relative to the before-tax net present value. However, this measure suffers from the problem that EATR would be undefined for investment projects for which the net present value equals zero.

The difference between a macro and a micro view lies mostly in the data used. The macro view calculates effective tax rates using macroeconomic data of national accounting of particular countries. The micro view calculates the effective tax rate from financial statements of individual corporations. A backward-looking view uses real data gathered from corporations and a forward-looking view uses data concerning particular future entrepreneurial decisions of corporations (Bucovetsky, P., 2009).

The methods of the backward-looking macro view use data of national accounting of particular countries which is published by particular national or international organisations such as OECD, European Commission and national statistical institutions. Such data provides time lines for monitoring the changes in the effective tax burden. The effective tax rate is set as the rate of aggregate income taxes or aggregate profit taxes paid by corporations in addition to the tax base. The tax base may be e.g. the aggregate gross profit or loss, GDP or total tax yield in a country. Further, it may be the net operating profit or loss of non-financial and financial corporations, the difference between received and paid interests, income from proprietary insurance or ground rent. This tax base is called an implicit corporate tax rate. The rate measures the real or effective average tax burden directly or indirectly imposed on various kinds of economic income which are the potential subject of taxation in particular EU member states. The advantage of the aggregate indicators lies in the possibility of mutual comparison of national accounting data according to the European System of Accounts.

The calculations using the methods of the backward-looking micro view use financial statements of individual corporations. There are three ways of setting the effective tax rates from the corporate income in which the rates are calculated as the rate of corporate income / profit taxes paid and of the tax base: 1. the total profit or loss before tax (i.e. profit on ordinary activities before tax + extraordinary income + extraordinary charges), 2. the total operating income, or 3. the gross operating profit or loss (total operating revenues – operating expenses – operating charges and taxes – personal expenses).

The methods of the forward-looking micro view use several approaches for calculating the effective tax burden. These approaches include the method of King and Fullerton (1984), the OECD method (1991) and the method of Devereux and Griffith (1998) which was used for the calculating purposes of this paper. The Devereux and Griffith[3] method is one of the most complex methods of the forward-

2 Common Consolidated Corporate Tax Base. More details in COM(2011)121 final.
3 This method was used also by the European Commission in COM (2001)582 final.

looking micro view. It determines two values specifying the tax burden of corporations, i.e. the effective marginal tax rate and the effective average tax rate. It is important to note that the method of the forward-looking micro view abstracts from inflation, risk, debt finance and personal taxes. This method is considered also by Sørensen (Sørensen, 2004), the approach of whom is based on Devereux and Griffith and in calculations of EATR and EMTR he abstracts from risk, debt finance, personal taxes and inflation.

EATR is being used in cases of investments which are more profitable than marginal investments. For the investor, the rate indicates what influence the corporate tax will have on the volume of post-tax profits in comparison with pre-tax profits. Based on that, investors can decide whether it is profitable for them to invest into the given field in the given country. EATR is calculated (see equation 1)[4] as the rate of the net present value of tax („NPVT") and of the net present value of investment („NPV").

$$EATR = \frac{net\ present\ value\ of\ tax}{net\ present\ value\ of\ investment}. \quad (1)$$

NPVT is calculated (see equation 2) as the rate where the corporate tax rate τ is multiplied by the sum of the cost of capital p (or the net rate of return) and the exponential rate of depreciation δ; and this value is divided by the sum of the cost of capital and the exponential rate of depreciation $p + \delta$. This expression is then reduced by the present value of the future reduction in tax A. The present value of the future reduction in tax A is calculated as the rate of the corporate tax multiplied by the rate of depreciation and of the sum of the firm's discount rate and the rate of depreciation $\tau \times \varphi / \rho + \varphi$. *NPV* is calculated as the rate of the cost of capital p and the firm's discount rate raised by the exponential rate of depreciation $\rho + \delta$.

$$EATR = \frac{NPVT}{NPV} = \frac{\frac{\tau \times (p+\delta)}{p+\delta} - A}{\frac{p}{\rho+\delta}}. \quad (2)$$

If the before-tax gross marginal rate of return p^o is considered, EATR will then be:

$$EATR = \frac{p^\circ}{p} \times EMTR + \left(\frac{p - p^\circ}{p}\right) \times \tau. \quad (3)$$

The effective average tax rate is calculated (see equation 3) as the rate of the gross rate of return p^o (or the cost of capital) and the net rate of return p, multiplied by EMTR to which the difference of the post-tax turnover reduced by the gross pre-tax capital turnover is added; and the expression is further reduced by the post-tax turnover $(p - p^o)/p$; and multiplied by the statutory corporate tax rate τ. With marginal investments $p^o = p$. The rate of return p^o is calculated (see equation 4):

$$EATR = \frac{(1-A) \times (\rho + \delta)}{1 - \tau} - \delta. \quad (4)$$

EMTR expresses the influence of corporate taxes on new, additional (marginal) investments. It includes investments into new, additional projects which bring such a rate of return of initially invested capital to be profitable for the investor. EMTR is defined (see equation 5) as the difference between the required before-tax gross rate of return p^o and the net real revenue from the investment p, where tax was deducted; measured relative to the before-tax gross rate of return p^o:

$$EMTR = \frac{gross\ rate\ of\ return - net\ real\ investment\ revenue}{gross\ rate\ of\ return\ before\ tax}. \quad (5)$$

The more the EMTR rate approaches one, the higher the cost of capital is, which results in the decrease of new or even existing investments. On the other hand, the more the EMTR rate approaches zero, the more profitable the investment is and this results in the increase of existing investments or new investment coming to the country, but only in a short term as these investments are of a marginal kind. In long-term perspective, this rate does not predicate the tax attractiveness of a country for an investor; therefore the paper compares the EATR rate. The values of EATR are shown in Tab. I.

RESULTS AND DISCUSSION

The interdependence of the statutory rate and EATR (Fig. 1 shows their variance in 2008) can be studied using the correlation coefficient which takes the value in the interval <–1; 1>, where the positive or negative values signal the dependence direction. The absolute value expresses the strength of a linear dependence where the more the value approaches one, the stronger the linear dependence between the x and y variables is. Any value above 0.7 is said to be of a significant dependence, any value above 0.9 is regarded as a very significant dependence.

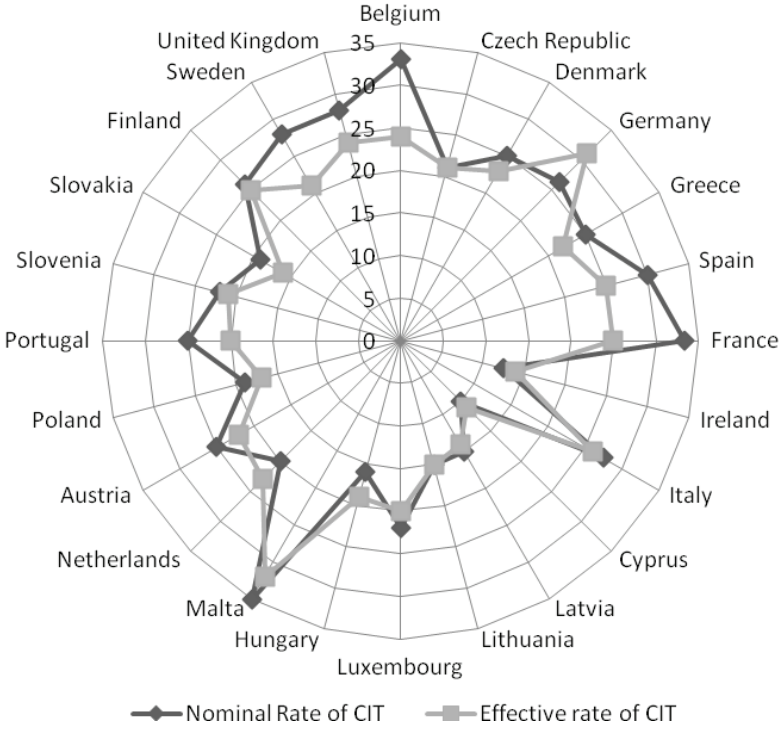
The values of the coefficient of correlation between the statutory rate and EATR are in Tab. III. The calculated values differ for particular countries. Although for some countries the value shows a very significant dependence (Greece, Austria), for others the dependence is insignificant (Luxembourg) or shows even inverse proportion (Germany, Italy). Therefore it cannot be generalized that there is any interdependence between the statutory rate and EATR.

4 Equations 1 to 5 are taken from the methodology used by Sørenson and adjusted by the authors.

I: *Development of statutory tax rate / EATR in the EU in the surveyed period*

Country	2004	2005	2006	2007	2008	2009	2010
Belgium	33/26	33/26	33/25	33/25	33/24	33/24	33/*
Czech Republic	28/25	26/23	24/21	24/21	21/21	20/*	19/*
Denmark	30/26	30/25	28/25	28/25	25/23	25/23	25/*
Germany	25/32	25/32	25/32	25/32	26,38/31	26,38/31	26,38/*
Greece	25/30	32/28	29/25	25/22	25/22	25/23	24/*
Spain	35/26	35/26	35/26	32,5/25	30/25	30/*	30/*
France	33,33/27	33,33/25	33,33/25	33,33/25	33,33/25	33,33/26	33,33/*
Ireland	12,5/14	12,5/14	12,5/14	12,5/14	12,5/14	12,5/14	12,5/*
Italy	33/26	33/26	33/26	33/26	27,5/26	27,5/27	27,5/*
Cyprus	10/15	10/11	10/11	10/11	10/11	10/*	10/*
Latvia	15/14	15/14	15/14	15/14	15/14	15/*	15/*
Lithuania	15/13	15/13	15/16	15/15	15/15	20/*	15/*
Luxembourg	22/21	22/21	22/20	22/20	22/20	21/20	21/*
Hungary	16/18	16/17	16/17	16/19	16/19	16/*	19/*
Malta	35/32	35/32	35/32	35/32	35/32	35/31	35/*
Netherlands	29/28	27/25	25,5/25	20/25	20/23	20/23	20/*
Austria	34/31	25/23	25/23	25/23	25/22	25/22	25/*
Poland	19/17	19/17	19/17	19/17	19/17	19/*	19/*
Portugal	25/20	25/20	25/20	25/20	25/20	25/*	25/*
Slovenia	25/21	25/21	25/22	23/21	22/21	21/21	20/*
Slovakia	19/16	19/16	19/16	19/16	19/16	19/*	19/*
Finland	29/27	26/25	26/25	26/25	26/25	26/25	26/*
Sweden	28/21	28/21	28/21	28/21	28/21	26,3/21	26,3/*
United Kingdom	30/24	30/24	30/24	30/24	28/24	28/23	28/*

Source: IFS, OECD.



1: *Comparison of the nominal rate of the corporate tax with EATR in 2008*
Source: Tab. I.

II: *Value of the coefficient of correlation between the statutory rate and EATR*

Country	Belgium	Czech Republic	Denmark	Germany	Greece
Correlation Coefficient	-	0,88	0,94	–1	0,99
Country	Spain	France	Ireland	Italy	Cyprus
Correlation Coefficient	0,92	0	-	–0,63	-
Country	Latvia	Lithuania	Luxembourg	Hungary	Malta
Correlation Coefficient	-	-	0,32	-	-
Country	Netherland	Austria	Poland	Portugal	Slovenia
Correlation Coefficient	0,82	0,99	-	-	0,42
Country	Slovakia	Finland	Sweden	United Kingdom	
Correlation Coefficient	-	1	-	0,63	

Source: Own calculations.

Depreciation

Since the corporate tax is a tax from the net income, it is necessary to deduct from the taxable income all expenses related to business activities, i.a. the costs of capital investments, i.e. depreciation. Depreciation decreases the amount of the current tax liability; what is therefore important is their time behaviour which is affected by the length of depreciation and the minimum value of depreciated assets as well as the depreciation speed. In the European Union, the countries set up the depreciation speed as even, degressive or accelerated (see Nerudová, 2011 for more details), which is illustrated by Tab. III.

Further we analysed the development of depreciation, or more precisely the changes in the policy of depreciation in the 24 EU member states throughout the whole 7-year period. The analysis

III: *Methods of depreciation and the depreciation rates in the EUcountries in 2010*

	Method		**Depreciation Rate in %**			
Country	**Machinery**	**Buildings**	**Machinery ED**	**Machinery DD**	**Buildings ED**	**Buildings DD**
Belgium	ED/DD	ED/DD	10; 33	2xED	3–5	10; 33
Czech Republic	ED/AD	ED/AD	2.15–22.25	**	1.02–3.4	**
Denmark	DD	ED		25	5	
Germany	ED/DD	ED	20	2xED	2	
Greece	ED	ED	20		5	
Spain	ED/DD	ED	8–30	1.5–2.5xED	1.47–3	
France	ED/DD	ED	20	1.25–2.25xED	20	
Ireland	ED	ED	12.5		4–15	
Italy	ED	ED	20–25		3–7	
Cyprus	ED	ED	10		3–4	
Latvia	DD	DD		15–70		10
Lithuania	ED/DD	ED/DD	10–25	***	5–15	***
Luxembourg	ED/DD	ED	10–25	3xED	2–5	
Hungary	ED	ED	14.5		3–15	
Malta	ED	ED	4–15		2	
Netherlands	ED/DD	ED/DD	20	20	*	*
Austria	ED	ED	10		2–4	
Poland	ED/AD	ED	4.5–20	2xED	1.5–4.5	
Portugal	ED/DD	ED	12.5–33.3	0.5–1.5xED	2–5	
Slovenia	ED	ED	20–50		3	
Slovakia	ED/AD	ED/AD	2–20	****	1.5–2.5	****
Finland	DD	DD		30		4–20
Sweden	ED/DD	ED	20	30	1.5–5	
United Kingdom	DD	ED		25	4	

Source: Nerudová (2011) + European Tax Handbook (2010). ED – even depreciation, DD – degressive depreciation, AD – accelerated depreciation.

IV: *Changes in depreciation*[6]

Country	2005/2004	2006/2005	2007/2006	2008/2007	2009/2008	2010/2009
Belgium	0	0	0	0	0	0
Czech Republic	+	0	0	-	0	0
Denmark	0	0	0	0	0	+
Germany	0	0	0	++	0	0
Greece	0	0	0	0	0	++
Spain	0	0	0	0	0	0
France	0	0	0	0	0	0
Ireland	0	0	0	0	0	+
Italy	0	0	0	0	0	0
Cyprus	0	0	0	0	0	0
Latvia	0	0	0	0	0	0
Lithuania	0	0	0	--	0	+
Luxembourg	0	0	0	0	0	0
Hungary	0	0	0	0	0	-
Malta	0	0	0	0	0	0
Netherlands	0	0	0	0	0	0
Austria	0	0	0	0	0	-
Poland	0	0	0	0	0	0
Portugal	0	0	0	0	0	0
Slovenia	0	0	-	0	0	0
Slovakia	0	0	0	0	0	0
Finland	0	0	0	0	0	++
Sweden	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	-

Source: Kovářová, A., Široký, J. (2011) and own surveys.

resulted in 168 partial results[5] which cannot be individually described in detail in this paper due to its limited scope. Tab. IV describes the changes in the depreciation policy using the scale method.

CONCLUSION

In our analyses we found out that depreciation affects the change of neither the EATR rate nor the EMTR rate. The interdependence of depreciation and the effective tax rates was not confirmed and the existence of any interdependence between the statutory rate and EATR cannot be generally assumed. The results of our analyses show that there is no relationship or trend between the change of the depreciation policy and the EATR and EMTR indicators. If there was any change in depreciation in an EU member state, this change did not affect the change of EATR and EMTR, or one or both indicators were changed but not in the same year as the change in depreciation. There also was a case when the depreciation policy remained the same but the EMTR and EATR indicators changed. The influence of the changes in depreciation was not proved in the changes of the statutory tax rates as the changes of the statutory tax rate were more frequent in the surveyed period. The difference between the statutory corporate tax rate and effective corporate tax rates are therefore caused by forces other than the change of the depreciation policy of the European Union.

SUMMARY

The effective tax burden of corporations depends on the methodology of tax calculation with regard to e.g. setting up the tax base and applying deductions and built-in methods of depreciation. The EU member states set all the above mentioned aspects of the corporate tax in a different way, they

5 The authors research signified some potential changes during 7 years in 27 analysed states. We always compared the monitored year with previous one.

6 -- ++ change of the rate over 5%, change from ED to DD and vice versa; -+ change of the rate up to 5%; 0 no change

compete with one another and therefore finding out the effective rate and its interdependence with the statutory tax rate is one of possible ways of comparing tax systems of particular countries. The most frequently used indicators of the effective rate are EATR and EMTR. To analyse the interdependence of the statutory tax rate and the effective one, the EATR indicator was selected as it represents a long-term perspective. Using the correlation analysis, no general interdependence between EATR and the statutory corporate tax rate was found. What is important for comparing tax systems from an investor's point of view is to find out which of the factors built in tax systems has a substantial effect on the change of the effective tax rate and therefore on its interdependence with the statutory rate. One of these factors is the policy of depreciation. Based on the analyses, no influence of depreciation on the change of EATR and EMTR was found; the interdependence of depreciation and the effective tax rate cannot be confirmed. Deviations of the nominal corporate tax rate from the effective one are caused by factors other than the policy of depreciation.

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