

Taxation of Corporations and Their Impact on Economic Growth: The Case of EU Countries

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Abstract

One of the most debated questions in economy is the relationship between tax rates and economic growth. Especially taxation of corporations has great importance because a corporate tax base is quite a mobile factor of production and simultaneously the tax competition is currently still tougher due to required economic development particularly in the context of the economic crisis. Based on the available literature, we can deductively derive and suppose an inverse relationship between tax burden and economic growth; on the other side, the degree of correlation is not so obvious.

The aim of this article is to verify the expected negative relationship between corporate taxation and long-term economic growth in the sample countries. This analysis is based on the neoclassical growth model extended with human capital. Furthermore, the model associated with the variable reflecting the different possibilities to measure the tax burden on corporations, especially tax quota separated on income taxation of corporations, the implicit tax rate on capital and effective tax rates secured by micro-forward looking methods. The default is a panel regression methodology and related methods of data analysis. The sample consists of EU member states. The reference periods are the annual frequencies in the time frame 1998 - 2010.

Key words: Economic Growth, Investment, Implicit Tax Rates, Effective Marginal Tax Rate, Average Effective Tax Rate, Partial Tax Quota.

1. INTRODUCTION

In the present time nearly all countries try to cope with the consequences of global economic crisis. Governments try to optimize their tools aimed at efficient resources allocation and to eliminate the consequences of the crisis. The European Union (EU) is also facing to the other problem – budget crisis which has its origin in the budgetary discipline mostly of the southern countries – but its impact is area-wided and is alarming especially for the member countries of the monetary union. This situation has raised several questions which need to be dealt as quickly as possible. A fundamental issue is how to set up the system for the best support of economic growth and simultaneously to keep budgetary discipline and lower budget deficits. In this area is the most often mentioned the idea of the introduction of common EU fiscal rules and fiscal responsibility. Some countries however remain sceptical to this step (e.g. Czech Republic). At this time the fiscal policy instruments remain in the hands of individual countries.

The empirical literature (see Chapter 2) suggests that there exists inverse relationship between economic growth and tax burden. Johansson et al. (2008) in their work conclude that the most damaging is for the economic growth the corporate tax followed by income tax and consumption tax. Clearer is the existence of the relationship between tax burden of income tax and

economic growth. Ambiguity remains in the case of the consumption taxes (e.g. Kotlán et al., 2011). It can be derived that the corporate tax policy can affect consumption, investment activity and employment to some extent. An appropriate tax system can lead to the optimal resources allocation and to the increase of economic growth. Most studies which are interested in this area however employ only statutory tax rates which have only limited informative value about actual tax burden.

The aim of this paper is to verify the expected negative relationship between corporate taxation and long-term economic growth. The analysis will be based on the neoclassical growth model with human capital. Furthermore, the model is widened by variables reflecting the different possibilities of corporate tax burden measurement, especially tax quota, implicit tax rate on capital and effective tax rates. Therefore, this work uses mainly effective tax rates, which are considered to be crucial aspect for the allocation of investment. In the model will be used regression analysis of the panel data. The sample consists of EU member states. To ensure homogeneity of the sample are created two sub-groups which consist of EU12 and EU15 countries, this division used eg. Onaran, Boesch and Leibrecht (2011). The reference period is the annual rate over the period from 1998 – 2010.

2. CURRENT STATE OF CONSEQUENCES OF THE ECONOMIC GROWTH THEORY AND TAXATION

The fundamental view on the growth theory was brought by Sollow (1956) and Swan (1956) which has become the basis for its next modifications. The long-run growth is in the neoclassical growth model determined by exogenous technological progress and population growth and it does not enable to monitor impact of the taxation on the individual variables. The idea about steady state and exogenous technological growth was till the time of Sollow and Swan overcome. In this respect the most important approaches were by Lucas (1988) and Romer (1986). The widening of the growth models of human capital and endogenous technological progress enables to assess deeper and more extensive analysis.

Between one of the first authors who have pointed on the possibility of the relationship between taxation and long-term economic growth belongs Judd (1985), Chamley (1986), Barro (1999) or King and Rebelo (1990) who used the neoclassical growth model with physical capital, or two-sector growth model with human and physical capital. A typical conclusion of these studies is that the three most used taxes (consumer tax, corporate tax and labor tax) generally have a negative impact on long-term growth. Johansson et al. (2008) deal with the impact of different types of taxes on economic growth in OECD member countries. They conclude that economic growth is the most jeopardized by corporate tax, income tax, and consumption taxes. Similar conclusions for corporate taxation provide Lee and Gordon (2005). On the other hand, there are also studies that do not demonstrate this relationship, but those are the exception than the rule. As example can be used work by Forbin (2011). He analysis Swedish economy in years 1951 – 2010 and shows no significant effect between corporate taxation and long-term economic growth. He also admits that if he would use marginal effective tax rates the results could be different.

Engen and Skinner (1996) define five basic channels how taxes can affect economic growth. The first one is investment discouraging, second one is by labor supply affecting, third one is

reduction of growth productivity, fourth one is through reducing of marginal productivity of capital and fifth one by reduction of the effective utilization of human capital. All these channels are primarily connected with corporate and labor taxes. This fact is confirmed by the generally known fact about distorting effects of taxes, which affect the behaviour of economic agents not only through the above-mentioned levels.

Probably the most discussed question within the empirical studies is the link between economic growth, corporate tax, and investment- and capital-activity. Tax policy mainly determines the method of corporations financing. The funds for further investments can be gained either through new equity, retained earnings or debt. High tax rates reduce corporate profits and thus the possibility of a subsequent reinvestment. International movement of capital enables simple selection of investments allocation. For small open economies which are mostly investment recipient the high taxation can be a competitive problem. Becker, Fuest and Riedel (2012) measured the relative importance of quality and quantity effects of corporate taxation on foreign direct investment. They conclude that both effects of corporate tax have a negative impact on foreign direct investment. Effects of changes of tax rates on intensive investments were engaged by e.g. Devereux (2007) and De Mooij and Ederveen (2003). In their work they conclude that this type of investment is more sensitive to the changes in laws with focus on taxes and the average tax rate, and is more flexible than standard investments.

Analyses by Buettner and Ruf (2007) or Buettner and Wamser (2006) show that corporate taxes affect both the extent and location of international investment. Keuschnigg (2008) creates a model of monopolistic competitive industry with extensive and intensive investments and show how marginal changes of these investments reacts to changes on average and marginal corporate tax rates. Lanaspa, Pueyo and Sanz (2008) point to the possibility that governments can influence FDI location decisions of firms through capital tax rates. They confirm the general conclusion that countries with lower tax burdens are FDI net recipients. Mutti and Grubert (2004) deal with the impact of taxes on the horizontally integrated international organizations which are considering foreign investment. They conclude that foreign investment is sensitive to the host country tax rates and this sensitivity is greater in developing than in developed countries and increases over time.

For the extended neoclassical growth model it is also necessary to mention approaches concerning the analysis of the impact of corporate taxation on technological progress and investment to the human capital. The theoretical and empirical literature dealing with this issue is not so extensive. Opinions on these issues are different. A clear influence of corporate taxes has not been fully empirically validated, e.g. Tremblay (2010) points to the absence of a neutral relationship between corporate taxes and investment to the human capital. In his study he comments negative relationship after adhering employee and company investing to the human capital and positive relationship after adhering only company investment to the human capital. According Lin (2001) if we look at this issue from the perspective of public finance or tax revenues respectively, there is a positive correlation between economic growth and taxation. Zeng and Zhang (2001) discuss the growth effects of taxes by using of the growth model according Howitt (1999), where are innovation the main sources of growth. The authors confirmed their findings that taxes on capital income are harmful for growth because they discourage formation of savings and capital investment. The results suggest that the technologically advanced countries, where innovation

is important for long-term growth, rather than relying on excise tax or on labor tax they should use the investment taxation.

Kotlán et al. (2011) state that taxes can be to the growth theories integrated during rate of savings, investments and capital accumulation. The pro-growth effect is evident especially in countries that still have not reached the steady state. For this work they will be considered the new EU member countries (EU12, members since 2004). The second line of the paper will analyse the impact on countries that have reached steady state, namely the old EU 15 member states.

3. TAX BURDEN EVALUATION

The empirical evidence implies that the size of the corporate tax burden is certainly one of the decisive factors influencing the management of the company in the investment allocation decisions. With the international trade and increasing globalization are more mobile factors of production and different levels of taxation one of the key factors when deciding about location of investment. The EU countries apply the different tax systems and different corporate taxation systems, which provides unequal conditions within company policy. However the question arises how to optimally assess and evaluate the diversity of these factors.

The most commonly used, but also probably the least suitable instrument for the assessment and comparison of tax burden is statutory tax rate. The more suitable possibility is the tax quota. This indicator of tax burden represents the share of total public revenue gained from taxes relatively to the gross domestic product. Using the partial tax quotas can be assessed what proportion of income is distributed through the individual taxes. But even in this case are not taken into account all relevant factors.

Another suitable measurement of the tax burden on corporations is undoubtedly effective corporate tax rates. They are mainly used because of better explanatory ability the real tax burden imposed on corporate profits. They take into account the tax base and ways of integration of corporate and personal income taxes. Therefore effective tax rates provide information about different tax treatment of companies in individual countries. They can serve as an appropriate indicator for investment decisions. The influence of corporate taxation to the net returns of investment depends on many factors such as profitability of the investment, the legal status of the investing companies, funding sources, etc. However during the calculation of tax burden is undergone number of simplifying steps. For determining these tax rates are used three main methods – backward looking macro view, backward looking micro view and forward looking. In this issue is involved e.g. Devereux and Griffith (2003), Sørensen (2004) or Nicodème (2001). For the purpose of the paper we will use the most recent measurements and methodology according Devereux et al. (2011), which is based on the methodology set out in the work of Devereux and Griffith (1998).

Backward looking micro view uses ex-post calculation and uses information obtained from specific statements of companies. The effective corporate tax rate is then determined as a proportion of tax on corporate profits on the tax base. As a tax base can serve total profit before tax, net operating income or gross operating profit. Since this rate is based purely on private corporate level it is not used in this work and will not be further characterized.

The core methodology for investment activity evaluation is forward looking micro view. This indicator is used for analyzing tax impact on corporate investment decisions. Its constructions allow international comparison of the tax burden on investment. The methodology is based on assumption of competitive markets and standard properties of production function. Devereux and Griffith (1998) distinguish two different ways how to measure tax burden imposed on corporations - effective marginal tax rate (EMTR) and average effective tax rate (EATR). EMTR represents marginal investment realized in a given country, both by resident and non-residents. Devereux and Griffith (1998) specify marginal investment as those whose expected rate of return before tax is adequate for the investor in comparison to the minimal expected rate of return after tax. The minimal rate of return is determined by the actual interest rate which can be received by alternative investment and economic rent before and after tax is equal to zero. The more is tax regime stricter the higher is EMTR and investments are less attractive. EATR provides the average level of effective taxation of investment at different levels of profitability (higher than EMTR). This indicator uses positive economic rent which is provided by given investment. EMTR and EATR are calculated for a hypothetical investment; their calculation is based on current tax law and does not reflect only the statutory tax rate.

Backward looking macro view uses ex-post data which reflect real features in the economy. These values are aggregated by macroeconomic data obtained by the system of national accounts. They measure total corporate tax revenues to the tax base (e.g. aggregated gross operating profit of corporations, aggregated total profit). A special case is the implicit corporate tax rate (ITRK). In this case the tax base includes e.g. net operating profit of non-financial and financial corporations, or the difference between received interest and paid interest. ITRK evaluates tax burden relatively to the economic activity.

From above mentioned can be assumed that higher rates of each indicator will lead to a smaller economic activity, or it will have a negative impact on economic growth respectively.

4. METHODOLOGY, DATA AND ESTIMATED MODELS

In accordance to mentioned studies are created regression models evaluating the relationship between economic growth and tax burden on corporations. These models have been assembled in accordance with a study of Makiw, Romer and Weil (1992), which belongs to the most often used. In addition to the classic variables (e.g. workforce, technological progress and capital accumulation) another variables are considered to have influence on growth. Between them belongs human capital or the tax burden.

All used data are secondary and quantitative. They represent annual time series. The used data are mainly given from statistical database of Eurostat, Penn World Table provides time series representing share of investment, Devereux et al. (2011) provides effective tax rates. Empirical verification of the relation between corporation tax burden and economic growth is performed on the panel data. This is constructed for 27 EU member countries for the period 1998 – 2010. The sample is divided into two sub-categories which represent old EU member states (EU15 - Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom) and new EU member states (EU12 - Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland,

Romania, Slovakia and Slovenia) which are examined separately. These sub-groups should ensure greater homogeneity of the chosen countries. For the evaluation of the above mentioned relationship is mainly used econometric program E-views, version (7), additional calculations are performed in MS Excel and SPSS (18).

Dependent variable is represented by the growth of gross real domestic product per capita (GDP / pc) expressed in purchasing power parity. The explanatory variables are capital accumulation (CAP), approximated by the share of investments creation to GDP expressed in purchasing power parity per capita, population (POP) which represents the rate of population growth in the given country and also human capital (HUM), this variable is represented by a share at least secondary educated population in the labor force. Corporation tax burden is approximated by tax quota separated for corporate income tax (TQC), the implicit tax rate on capital (ITRC) compiled according to ESA 1995, and the effective tax rate (EATR) and (EMTR) received by forward looking micro view.

The analysis is conducted by a regression analysis of panel data. This method allows two-dimensional view on data (Baltagi, 2010). For evaluating will be used least squares method which as states Wooldridge (2002) provides estimates of parameters after fulfilling all the assumptions about the data and the regression model.

In the case of proposed formulation the mathematical notation of chosen model is given by equation (1), for the sub-categories the model will be adjusted accordingly.

$$\text{GDP/pc}_{it} = \hat{\beta}_0 + \hat{\beta}_1 \text{CAP}_{it} - \hat{\beta}_2 \text{POP}_{it} + \hat{\beta}_3 \text{HUM}_{it} - \hat{\beta}_4 \text{TAX}_{it} + \hat{u}_{it} \quad (1)$$

$i = 1 \dots 15(12); t = 1998 \dots 2009$

This relationship can be defined by function $\text{GDP} = f(\text{CAP}, \text{POP}, \text{HUM}, \text{TAX})$. The general notation TAX represents any of the tax burden measurement (TQC, ITRC, EATR, and EMTR). The basic model always contains four explanatory variables, so within this model can be estimated five partial regression coefficients ($\hat{\beta}_1$ till $\hat{\beta}_4$), these parameters show the change in average change of GDP / pc, in the case of unit increase of one of the explanatory variables. The coefficient $\hat{\beta}_0$ represents estimated constant level. Panel data models use composed error \hat{u}_{it} , where

$$\hat{u}_{it} = \hat{\eta}_i + \hat{v}_{it} \quad (2)$$

$\hat{\eta}_i$ denotes the unobservable individual effect and \hat{v}_{it} the remained disturbance. It is assumed that the variable $\hat{\mu}_i$ is constant over time.

5. ECONOMETRIC ANALYSIS OF THE MODEL

To evaluate the impact of corporate tax burden on economic growth is used neoclassical growth model with human capital. The both sub-groups of countries (EU15 and EU12) are estimated by ordinary least square method, all necessary tests are applied at the 5% significance level. At first all time series were tested whether they are stationary. Stationary means stochastically consistent behaviour of time series. One possible way how evaluate stationary is to explore the charts of time series and subjectively evaluate and decide whether the time series is stationary or whether it is necessary the time series modify. These subjective estimates should not be entirely satisfying. Another possibility is to use mathematical test, between the suitable possibilities belongs test according to Levin, Lin and Chu.

In the case of the sub-group EU15 the used tests recognized unit roots in the cases of tax quota of capital and marginal effective tax rates, those time series were differentiated to remove unit roots. Another time series were stationary. In the case of growth variables was confirmed fact that the real output per capita, the share of investment to GDP and human capital was confirmed their growth tendency and thus non-stationary. The time series representing population did not confirmed this tendency. Also in the sub-group EU12 the growth variables have trend component so it is necessary to modify them by differentiating or logarithming those series. The variables expressing the tax burden do not show trends.

After correction of model are both models tested with fixed- and random effects. Fixed effects represent stability of certain variables in the time and space. The model with random effects assumes that the individual effect is a random variable, uncorrelated with the explanatory variables and with mean and variance does not depend on the explanatory variables. The results have shown that the usage of random effects is in both cases inappropriate.

Verification which was carried out by Hausman test do show that individual effects are correlated with explanatory variables. The both sub-groups were next estimated with fixed effects, this fact was confirmed by the fixed effects test. In this case, the results do not show systematic error. In the next step the model is then estimated by White Cross-Section Method which corrects the results in the case of presence of heteroscedasticity. Detection of autocorrelation is in the case of regression of panel data usual because of estimation methods which are used.

The following Tab. 1 and Tab. 2 show results of econometric tests and their comparison with economic theory and empirical (T / E). Since this work is fundamentally focused on the impact of corporate tax burden on economic growth and long-term causality of variables (CAP, POP, HUM) on growth has been empirically demonstrated in almost all studies that deal with this issue, the results presented here are focused only on the variables with a tax nature. This does not mean that variables CAP, HUM and POP respectively have no weight. The results of estimation in both models confirm the statistical significance of these variables and economic verification also confirmed empirical theory. The following analysis studies the relationship between economic growth and various indicators of corporation's tax burden in the case of EU15 and EU12 countries respectively. All tests were performed at 5% level of significance.

Tab. 1 - The impact of the corporate tax burden on the economic growth, EU15. Source: own

Estimation of EATR		
	Statistic verification of the coefficients	Economic verification (T/E)
C ₀	21838,34	X
EATR	-301,33	- / -
Adjusted R ²	0,95	X
F-statistic	210,46	X

Estimation of EMTR		
	Statistic verification of the coefficients	Economic verification (T/E)
C ₀	10049,58	X
EMTR	-107,74	- / -
Adjusted R ²	0,96	X
F-statistic	242,07	X
Estimation of ITRC		
	Statistic verification of the coefficients	Economic verification (T/E)
C ₀	4068,63	X
ITRC	-55,81	- / -
Adjusted R ²	0,98	X
F-statistic	502,21	X
Estimation of TQC		
	Statistic verification of the coefficients	Economic verification (T/E)
C ₀	4108,75	X
TQC	-285,90*	- / -
Adjusted R ²	0,96	X
F-statistic	305,06	X

* Statistically insignificant variable.

In the case of EU15 estimated models show, after necessary adjustment of variables due to F-test, their statistical significance at the 5% significance level (see Tab. 1). The overall significance of regression is quite high. This phenomenon shows that the variables in the model are chosen properly. Through t-test is carried out verification of statistical significance of individual variables. The only variable – TQC – is statistically insignificant. Other variables are verified at 5% significance level as significant. The sign of values confirm the negative impact of tax variables TQC, ITRC, EMTR and EATR. The coefficients have the expected direction of influence TQC (-), ITRC (-) EMTR (-) and EATR (-). The chosen variables are verified as significant except TQC, so the results are in accordance with economic theory. The individual coefficients of determination show that these independent variables explain the dependent variable quite well, so it again confirms the hypothesis, and economic theory.

Tab. 2 - The impact of corporate taxes on the economic growth, EU12. Source: own calculation

Estimation of EATR		
	Statistic verification of the coefficients	Economic verification (T/E)
C ₀	3551,33	X
EATR	-22,31	- / -
Adjusted R ²	0,63	X
F-statistic	14,91	X
Estimation of EMTR		
	Statistic verification of the coefficients	Economic verification (T/E)
C ₀	2385,37	X
EMTR	-13,36*	- / -
Adjusted R ²	0,62	X
F-statistic	14,16	X
Estimation of ITRC		
	Statistic verification of the coefficients	Economic verification (T/E)
C ₀	2791,13	X
ITRC	22,53*	- / +
Adjusted R ²	0,70	X
F- statistic	18,45	X
Estimation of TQC		
	Statistic verification of the coefficients	Economic verification (T/E)
C ₀	2391,8	X
TQC	151,37	- / +
Adjusted R ²	0,66	X
F-statistic	16,65	X

* Statistically insignificant variable.

Quite different results are found in the analysis of data of the EU12 (see Tab. 2). The results here are not so clear. EATR and EMTR confirm the negative influence of tax factors on economic growth. Statistical verification of the significance of individual variables was confirmed at the 5% significance level in case of the EATR. Variable EMTR was verified at 20% level of significance. ITRC variable at 10% significance level, and variable TQC at 5% level of significance but two last mentioned with a positive effect of corporate taxation on long-term economic growth. As the Kotlán et. al (2011) states this can be explained by the Laffer curve, where the tax burden can lead to a de facto increase of tax revenues or tax quota respectively and thus increase economic growth. All tested models demonstrated by F-test their statistical significance at 1% level of significance as a whole. This phenomenon shows that the variables in the model are properly

chosen and that the growth variables CAP, POP, and HUM are used properly. In the case of new member countries, the conclusion is that tax burden reduction will not have so significant impact on long-term economic growth.

6. CONCLUSION

The aim of this paper was to verify the existence of negative impact of corporate taxation at long-term economic growth, especially for the different types of measurement of effective tax burden (EATR, EMTR, ITRC, TQC), which are not so often used in the empirical works.

In the case of old EU member states was in all cases confirmed negative relationship between corporate tax burden and long-term economic growth. Performed regressions show negative effect of variables EATR, EMTR and ITRC on the long-term growth on 5% level of significance. It can be therefore concluded that rising of the corporate tax burden will lead to reduction of long-term economic growth in these countries. For variables TQC the statistical significance was demonstrable at a higher level of significance. In the case of the EU15 was thus confirmed the theoretical assumptions about the negative impact of corporate tax burden to the long-term economic growth in line which is in accordance with previous empirical literature.

The results of the new EU member countries have not provide so clear results. Estimation in nearly all cases did not show statistically significant influence of individual tax burden indicators at the 5% significance level and with the correct influence. Only EATR has confirmed the expected negative relationship between corporate tax burdens and long-term economic growth at the 5% level of significance. In the case of variable ITRC it was at 10% significance level and variable TQC has been verified at 5% level of significance, but these results were inconsistent with theoretical assumptions. This can be attributed to the nature of Laffer curve structure for the tax quota.

It can be summarized that reduction of the tax burden will have a greater effect in EU15 countries rather than in the EU new member countries. This does not mean that the EU12 countries should ignore the effectiveness of the tax burden. These conclusions can be fairly debatable, since the indicators used in this paper do not take into account such factors as administrative efficiency of tax collection and the overall fiscal balance and moderation, which is currently the major problem across the whole European Union.

European Commission currently considers introduction of a uniform tax rules across the EU. In the area of corporate taxation has long been preparing and implementing the Common Consolidated Corporate Tax Base and uniform tax rules for determining taxation of corporations respectively. From the above mentioned results, the changes in the taxation of corporations may, especially in the new Member States, significantly affect the economic growth of the country. Increase the tax burden on corporations could even lead to the deepening of the economic gap between the EU12 and EU15 countries.

Received results can be modified by the current macroeconomic situation because lot of EU member countries have introduced non-standard fiscal measures both on the revenue and expenditure sides as a reaction on the economic crisis. Those countries simultaneously try to solve problem of slow or also negative economic growth and budget deficits.

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