

AN EMPIRICAL EVIDENCE FOR THE IMPACT OF TAXATION ON ECONOMY GROWTH IN THE EUROPEAN UNION

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ABSTRACT

The paper is intended to study the basic trends in the distribution of the total tax burden in the EU (27) member states during the period 1995-2010. The comparative analysis is focused on the cross-country differences in terms of total tax burden, measured by the tax-to-GDP ratio and design of tax structure, presented by the breakdown of the total tax revenues into standard components such as direct taxes, indirect taxes and social contributions. Special emphasis is placed upon the impact of taxation on the economic growth. The relationship is investigated by the means of the regression analysis. The conclusion is that tax structure based on direct taxes is more efficient in terms of supporting the economic growth in the EU countries.

KEYWORDS

Taxation, Economy growth, European Union

1. INTRODUCTION

Contemporary tax policies pursue many policy objectives. Taxation is intended to raise the necessary funds for public expenditure, to redistribute income, to stabilize the economy, to overcome externalities, to influence the allocation of resources, while at the same time should be supportive to the economic growth. The purpose of the efficiently designed taxation is to achieve desired fiscal policy objectives (allocation, redistribution, and stabilization) in the most efficient way, namely by limiting undesired distortions, minimizing the cost of tax collection and promoting economic growth. The efficiency of taxation and particularly the tax structure plays important role in achieving economic growth and fiscal consolidation.

According to the economic theory taxation (except for the lump sum taxes) creates distortions and in turn impact negatively on economic growth. Considering a simple production function it is obvious that taxation can affect growth through its impact on (1) physical capital, (2) human capital and (3) through its effect on the total factor productivity. According to some researches corporate and personal income taxes are the most detrimental to growth, while consumption, environment and property taxes are less harmful (OECD, 2008).

Having in mind these observations this paper is intended to study the basic trends in the distribution of the total tax burden in the EU (27) member states during the period 1995-2010 and its impact on the economy growth. The paper is structured in five sections. Section two presents the literature review. Section three provides a comparative analysis, focused on the cross-country differences in terms of total tax burden, measured by the tax-to-GDP ratio and design of tax

structure, presented by the breakdown of the total tax revenues into standard components such as direct taxes, indirect taxes and social contributions. Section four investigates the impact of taxation on the economy growth. The adopted methodology is regression analysis. Section five concludes.

2. LITERATURE REVIEW

A good approach for literature analysis of the empirical studies on the relationship between taxation and economy growth is applied by Jens Arnold (2008). He uses the review done by Myles (2006), but focuses on the most important analyses. The literature sources are differentiated in evidence on the tax level and growth and evidence on tax structure and growth. Arnold notes that the findings of the studies, analyzing the link between growth and tax structures provide somewhat more conclusive answers than the studies focused on the level of taxation. The results from the empirical analyses of Kneller *et al.* (1999), Gemell *et al.* (2006), Widmalm (2001), Schwellnus and Arnold (2008), Vartia (2008), Lee and Gordon (2005) are considered as sufficiently reliable evidence for the nature of the studied relationship. The collective of Kneller *et al.* (1999) contribute to empirical analysis on this topic by identifying a depressing effect of 'distortionary taxes', which include taxes on income and property. They also find that productive government expenditure stimulate economy growth. In the comments of Arnold (2008) is emphasized that the results from the analysis of Gemell *et al.* (2006) confirm the findings of Kneller *et al.* (1999).

Experience of the OECD countries is analyzed by Widmalm (2001), Schwellnus and Arnold (2008) and Vartia (2008). Widmalm (2001) estimates a negative relationship between budget revenue accumulated by income taxes and economic activity growth. According to her conclusions, the predictions of conventional wisdom for negative effect of indirect taxes on economy are not confirmed. The empirical results from analyses of Schwellnus and Arnold (2008) and Vartia (2008) indicate a negative effect of corporate taxes on the productivity of firms and industries, based on large data sets of firms and industries across OECD countries. The significant negative correlation between statutory corporate tax rates and growth for 70 countries during 1970-1997, found by Lee and Gordon (2005), is noted as a similar result.

Romer Ch. D and D. H. Romer (2007) review other papers presenting evidence for various aspects of the relationship between taxation and economy growth. There are different kinds of econometric approaches applied. Some of studies link the GDP growth rate and public spending and receipts (Andersen and Jordan, 1968). The studies of Blanchard and Perotti (2002) and Perotti (1999) are considered as more sophisticated, because these researches assume that once one corrects for the impact of economic activity on revenues and controls for the behavior of government spending, changes in revenues are uncorrelated with other determinants of output growth. A different approach is applied in studies, which are reviewed by Gale and Orszag (2004) and investigate the impact of tax changes on consumption. Such types of studies are made by Roger Kormendi (1983) and Emanuela Cardia (1997). The estimated impact of tax increases on consumption in these studies ranges from roughly no effect to a substantial negative effect.

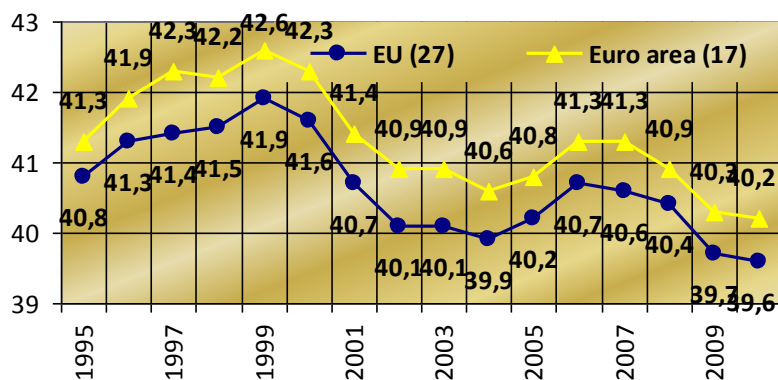
3. TAXATION TRENDS IN THE EU MEMBER STATES (1995 - 2010)

The revenues from taxes and social security contributions account for over 91% of total general government revenue in the European Union. During the last three years total tax burden in the EU has declined, due to the worldwide economic and financial crisis. The drop was most marked between 2008 and 2009. In 2010 total tax revenues in terms of GDP reached its lowest point in the

period from 1995 onwards. According to the Eurostat database in 2010 tax revenue stayed at 39.6 % of GDP in the European Union (27) and 40.2 % of GDP in the euro area (17).

There are many reasons for the significant variations in the total revenue from taxes and social contributions during the analyzed period. Moreover, the causes of these fluctuations in each particular country are different. In general, amongst the basic preconditions are changes in the economic activity, affecting the employment levels and sales of goods and services, changes in the tax legislation, affecting the tax anatomy, as well as changes in the level of GDP.

Graphic 1: Trends in the overall tax-to-GDP ratio in EU (27) and euro area (17)¹, 1995-2010



Source: Eurostat

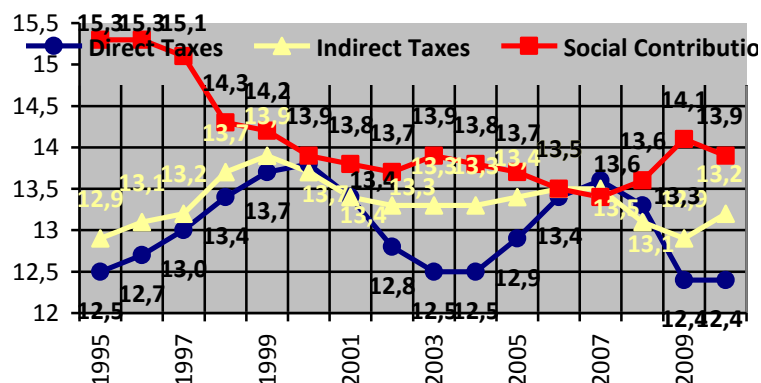
Note: Social security contributions are included

The worldwide economic and financial crisis parallel to the fiscal policy measures, adopted in the EU member states had a strong impact on the level and composition of the total revenues from taxes and social contributions during the last three years of the analyzed period. In comparative terms, the total tax burden, measured as percentage of GDP, was highest in Denmark (48.5%), Belgium (46.4%) and Sweden (46.3%), whereas it tended to be lower than the EU average in the new member states. The lowest shares were reported by Latvia (27.5%), Lithuania and Bulgaria (both 27.4%). Among the new member states Slovenia reported the highest total tax revenue-to-GDP ratio (38.2%). Among the old member states Ireland (29.8%), Spain (32.9%) and Greece (33.2%) recorded the lowest rates of the total tax burden.

In 2010 the total tax burden in the EU (27) was relatively equally distributed between the direct taxes (31.2%), indirect taxes (33.3%) and social security contributions (35.1%). The revenue from direct taxes has noticeably decreased during the period 2007-2009, outpacing the reduction of the GDP. This is due to the economic crisis, which has negatively affected the corporate profits and personal incomes. As a whole, the indirect taxes have formed a comparatively constant share of the total tax revenue during the analyzed period.

¹ The Euro area consists of 11 countries in 2000, 12 - in 2006, 13 - in 2007, 15 - in 2008, 16 - in 2010 and 17 - in 2011

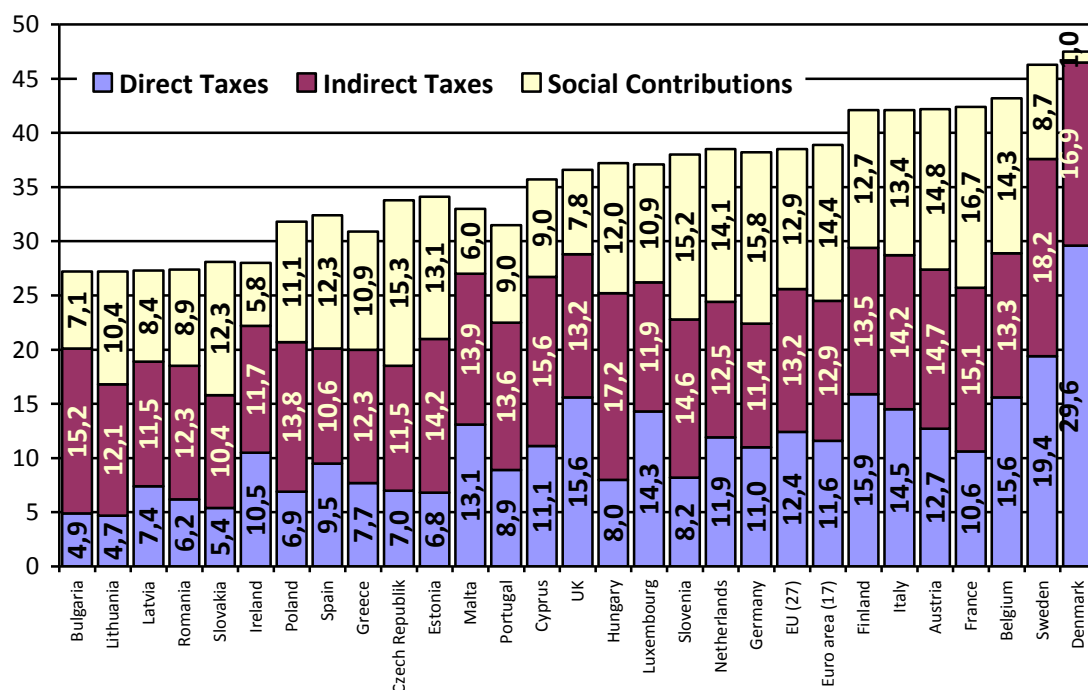
Graphic 2: Trends in the distribution of total tax burden in the EU (27), 1995-2010, (% of GDP)



Source: Eurostat

In 2010 revenues from indirect taxes amounted to 13.2% of GDP, 12.4% of GDP were accounted for by direct taxes, while social contributions represented 13.9% of GDP. Because of the different national tax systems, the importance of indirect taxes, direct taxes and social contributions vary considerably from country to country in terms of the generated tax revenues.

Graphic 3: Distribution of the total tax burden in the EU member states (% of GDP), 2010



Source: Eurostat

The biggest ratios of indirect tax revenue-to-GDP were reported by Sweden (18.2%) and Denmark (16.9%), parallel to the high overall level of taxation, typical for these countries. Comparatively high share of indirect tax revenue was recorded in Hungary (17.2%), regardless of decreasing total tax burden. The lowest ratio of the indirect taxes among the EU (27) member states was detected in Spain (10.6%).

The highest ratio of direct tax revenue-to-GDP was recorded in Denmark (29.6%), where most of the welfare spending is financed via taxes on income and consequently, the figures for social contribution are very low by comparison with the other countries. Among the countries, which reported high relative figures are Sweden and Finland, which raised 19.4% and 15.9% of GDP respectively through the direct taxes. The next are Belgium and the UK, both recorded direct tax revenues equal to 15.6% of GDP. At the other end of the scale Lithuania (4.7%) and Bulgaria (4.9%) accumulated exceptionally small revenues from direct taxes.

4. EMPIRICAL ANALYSIS ON THE IMPACT OF TAXATION ON ECONOMY GROWTH IN THE EU

4.1. CONCEPTUAL FRAMEWORK AND EMPIRICAL METHODOLOGY

We could adopt the Barro's endogenous model as an appropriate analytical framework for investigation the impact of taxation and public expenditure on economy growth in the EU countries. The further development of this model shows that 'the long-run growth rate of per capita output is a function of the tax rate and the shares of spending by different levels of government' (Davoodi H., *et al.*, 1998, p. 247).

We use the regression analysis method in order to test validity of the predictions, made by Davoody and Zou, in terms of the European Union. Thus we estimate the relationship between the long-run growth rate and different components of the tax burden and the public spending in the EU-27. The regression model is built on the base of the described conceptual framework. Its specification includes the annual growth rate of GDP per capita as dependant variable and different types of tax revenue and public expenditure as independent variables. The independent variables are presented as a ratio to GDP. The equation (1) expressing this relationship is following:

$$(1) y_{it} = b_1 + b_2 T_{it} + b_3 X_{it} + \varepsilon_{it},$$

where y_{it} is the annual growth rate of GDP per capita for each country and year, T_{it} is tax revenue for each country and year – taxes on production and imports, value added type taxes (VAT), taxes on land, buildings and other structures, taxes on income, actual social contributions as well as total receipts from taxes and social contributions (including imputed social contributions) after deduction of amounts assessed but unlikely to be collected. The goal is to be compared the efficiency of different revenues accumulated by direct and indirect taxes. The total budget spending for each country and year is marked with X_{it} . The error term is ε_{it} . The regression parameters are b_1 , b_2 , b_3 . The estimation procedure for the regression model parameters is the ordinary least squares (OLS) method. It is applied to a year data panel for the European Union. The period of analysis is 1996-2010. The countries Malta and Finland have been excluded from the panel. Source of data is Eurostat.

4.2. REGRESSION RESULTS

The regression results are presented in the Table 1. The Table includes results from the estimating procedure applied to a year data panel for the European Union (27). The separate variants of the model specification are constructed by different combinations of explanatory variables from equation 1. Thus, we get specifications of the Models from 1 to 4.

Model 1 analyzes the influence of public expenditure on GDP growth. The model's adequacy has been confirmed by the tests. According to Durbin-Watson statistics, there is a weak positive

autocorrelation. Regression coefficient expresses the impact of public expenditure on GDP growth. It has a negative sign and statistical significance at 1% level. Consequently, this result is a reliable empirical evidence for the negative influence of budgetary spending on economy growth. This fact shows that the efficiency of public expenditure in the EU (27) is not very high. A non-linear relation hypothesis is tested and it is empirically confirmed. The form of relationship is quadratic. The negative sign means the parabola is concave down and has a maximum turning point. This means that an increase in the size of budgetary spending would decrease the negative effect to a point. After this point, each new increase in the spending size would lead to an increase in the negative effect on economy growth. Other analyzers have found similar to present empirical results. The regressions of L. Andersen and J. Jordan indicate that an increase in government expenditures is mildly stimulative in the quarters in which spending is increased, but in the other quarters this increase in expenditures causes offsetting negative influences. They explain that the results are consistent with modern quantity theories which hold that government spending, taxing, and borrowing policies would have, through interest rate and wealth effects, different impacts on economic activity under varying circumstances. (Andersen, L. and J. Jordan, 1968, p. 37)

Model 2 analyzes the influence of main direct taxes and social contributions on the GDP growth rate in the EU (27) countries. The presence of a weak positive serial correlation is confirmed. Hypothesis of non-linear relationship for each variable has been tested but it is not empirically confirmed. Tax revenue derived by taxes on land, buildings and other structures has a positive impact on economy growth due to the increase in efficiency of total taxation. The regression coefficient is not statistically significant. This result could not be accepted as a reliable empirical evidence for the kind of influence. The regression coefficients for revenue of income taxes and social contributions have positive signs. That means a significant positive effect of the revenue from taxes and social contribution on the long-term economic growth. Their statistical significance respectively is at 1% and 5% level, respectively. These results support the admission for effective income taxation in the EU (27) countries, but they are not consistent with the results of most of the empirical studies.

The authors' collective of Kneller, Bleaney and Gemmell examine the experience of OECD countries and find the impact of tax structure on economy growth (Kneller *et al.*, 1999). They use the terms 'distortionary taxes' and 'non-distortionary taxes'. The first type of taxes includes these ones on income and property. The consumption taxes are defined as non-distortionary. They found a depressing effect of direct taxes on the growth of economy. Such type of effect is not registered for consumption taxes. Similar results are found by Widmalm (2001). According to her study the revenues from income taxes negatively affect the economic growth in the developed OECD countries. More complex results about the impact of taxation on growth have been found by Jens Arnold (2008). The results of his analysis suggest 'that income taxes are generally associated with lower economic growth than taxes on consumption and property. Property taxes, and particularly recurrent taxes on immovable property, seem to be the most growthfriendly, followed immediately by consumption taxes. Personal income taxes seem to be significantly inferior, and corporate income taxes have the most negative effects on GDP per capita.' (Arnold, 2008, p.18)

Table 1. Regression results for the EU (27) for the period 1996 – 2010

Variable	Model 1	Model 2	Model 3	Model 4
(Constant)	7.935*** (12.438)	6.422*** (7.495)	6.002*** (8.097)	7.741*** (12.592)
Total budget spending (% of GDP) ^2	-0.002*** (-8.198)	-0.004*** (-8.243)	-0.003*** (-9.846)	-0.005*** (-9.469)
Taxes on land, buildings and other structures (% of GDP)		0.414 (1.173)		
Taxes on income (% of GDP)		0.193*** (3.430)		
Actual social contributions (% of GDP)		0.157** (2.433)		
Taxes on production and imports (% of GDP)^2			0.023*** (4.675)	
Value added type taxes (% of GDP)			-5.86E-05 (-1.486)	
Total receipts from taxes and social contributions (% of GDP)^2				0.003*** (5.575)
R-squared	0.152671	0.184379	0.209995	0.218013
Adjusted R-squared	0.150399	0.175561	0.203607	0.213809
Durbin-Watson stat	1.266440	1.280357	1.324934	1.310475
F-statistic	67.20675	20.91051	32.87245	51.85571
Prob(F-statistic)	0.000000	0.000000	0.000000	0.000000
Observations	375	375	375	375

Source: Eurostat, Author's calculations

Note: t-test in parenthesis

Malta and Finland have been excluded from the population

*** significant at 1%; ** significant at 5%; * significant at 10%

Table 2. Residuals tests for the EU (27) for the period 1996 – 2010

Variable	Model 1	Model 2	Model 3	Model 4
Mean	3.85e-16	-3.72e-16	-3.61e-16	-1.72e-15
Median	0.472441	0.540266	0.497167	0.462025
Maximum	9.286494	9.124067	9.037013	9.960150
Minimum	-20.80560	-19.69878	-19.66257	-18.61729
Std. Dev.	3.466682	3.401200	3.355896	3.330333
Skewness	-1.873303	-1.658427	-1.890413	-1.483546
Kurtosis	10.22482	9.297301	10.40244	9.008333
Jarque-Bera	1034.923	791.5236	1079.543	701.6204
Probability	0.000000	0.000000	0.000000	0.000000
Observations	375	375	375	375

Source: Eurostat, Author's calculations

Model 3 aims to analyze the influence of the revenue accumulated by indirect taxes on economy growth. For this purpose, the receipts from taxes on production and imports as well as value added type taxes (VAT) have been taken as independent variables. Durbin Watson statistics show a weak positive serial correlation. The relationship between the revenues from taxes on production and imports and GDP growth rate is quadratic. This is not strong impact because the nonlinearity diminishes strength of the relationship. This result shows that these taxes are not very effective instrument for political influence on the economy development. Value of the regression coefficient

is very low, which is due to the low share of these taxes as a source of revenue for budget. The positive sign means a catalyzing effect of taxes on production and imports on the national economy growth. This type of relationship is due to the intensifying of national production of goods as the imports are restrained because of taxes. The regression coefficient expressing the impact of tax revenue accumulated by value added type taxes (VAT) on economy growth is "consistent with light of the conventional wisdom" (Samimi A., *et al.*, 2010, p. 5492). Negative sign of the coefficient means a negative relationship. It is not statistically significant and could not be accept as reliable empirical evidence. The results from empirical analyses on the relationship between indirect taxes and economy growth are not necessarily characterized by negative signs. Such type of example is shown by analysis of the authors' collective of Kneller, Bleaney and Gemmell (Kneller *et al.*, 1999). According to analysis of Widmalm (2001), the revenue from consumption taxes has a weak positive effect on economy growth in developed countries.

Total receipts from taxes and social contributions (including imputed social contributions) after deduction of amounts assessed but unlikely to be collected have been put into Model 4. The model has a weak positive serial correlation. The small amount of the coefficient confirms assumptions of the catalyzing effect on economic growth of the increase in total receipts from taxes and social contributions in terms of fixed budgetary spending size. The empirical result for the EU countries could be explained by the financial strengthening of public authority. A hypothesis for nonlinearity has been tested. The form of relationship is quadratic. This kind of link suggests a weak influence of total tax burden on economy growth. The level of statistical significance of the regression coefficient is 1%, which makes this result reliable empirical evidence. The sign of the regression coefficient is not consistent with estimated results in other studies. Ch. Romer and D. Romer have found that tax changes have very large effects on output and an exogenous tax increase of one percent of GDP lowers real GDP by roughly three percent (Romer Ch. D. and D. H. Romer, 2007, p.42). Their research is based on the US experience since World War II. L. Andersen and J. Jordan do not find a support of the theory predictions for an ambiguous negative effect of the receipts on economy growth. They estimate both positive and negative coefficients for the receipts (Andersen, Leonall C., and Jerry L. Jordan. 1968, p. 37).

5. CONCLUSIONS

The empirical results showed a clear and strongly expressed impact of the direct taxes on economy growth. This is due to efficiency gains of revenue accumulation through taxation of wealth. The comparison between the impacts of tax revenue accumulated by the two types of taxation confirms the assumptions for a lower efficiency of the indirect taxes as a method of budgetary revenue accumulation. This fact is due to the considerable extent of inequity of the indirect taxes and shrinking effects on production and sales. Consequently, the tax structure based on direct taxes is more efficient in terms of supporting the economy growth in the EU countries. However, analysis on the tax system is always a topical problem and it is difficult to draw definitive conclusions from these empirical results.

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