THE TAXES IMPACT ON THE ECONOMIC GROWTH: THE CASE OF EUROPEAN UNION

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Abstract: This paper is studying the impact of taxes and social contributions on the economic growth. We have development a model of economic growth under the incidence of tax revenues, using econometrical analysis (the Pool Data Model). With this mathematical relation we have quantified the connections intensity between taxes and economic growth in the case of European Union 25.

Keywords: Tax, Impact, Economic Growth, Econometrical Model

JEL codes: H2, N1, C1

1. INTRODUCTION

Starting from the distribution function of the public finances, from the fiscal policy and the tax multiplier, this paper analyses the impact of global tax burden on the GDP per capita in the European Union 25, for every member state.
The tax multiplier derives from the investments multiplier used in keynesian economics. The investments multiplier calculates the changes in national income, determined by a change in the level of investments (measuring the increase in national income induced by an increase of one unit in level of investments). The tax multiplier determines the changes in national income induced by a change of one unit in the level of taxation.
Starting from the keynesian general equilibrium equation,

$$Y = C + I + G \tag{1}$$

where, Y is the national income (GDP per capita), C private consumption , I private investments and G government expenditures. The private consumption is a function of disposable income (Y_D) and marginal propensity to consume (c):

$$C = c \times Y_D \tag{2}$$

Disposable income is the total amount of income that remains after paying all the taxes and can be written:

$$Y_D = Y - T \tag{3}$$

when using the lump sum taxation (T – lump sum tax)
or

$$Y_D = Y - t \times Y = Y \times (1-t) \tag{4}$$

when using a flat rate tax (t – flat rate tax).

In the Keynesian general equilibrium equation we can substitute the consumption determined by the disposable income and the marginal propensity to consume with (3) and (4). The result is the tax multiplier under lump sum taxation and the tax multiplier under the flat rate taxation.

A. The tax multiplier under lump sum taxation:

$$Y = c \text{ x } Y_D + I + G = c \text{ x } (Y - T) + I + G \tag{5}$$

$$Y \text{ x } (1 - c) = I + G - c \text{ x } T \tag{6}$$

$$Y = \frac{1}{1-c} \text{ x } (I+G) - \frac{c}{1-c} \text{ x } T \tag{7}$$

where, $\frac{1}{1-c}$ is the government expenditures multiplier, and $-\frac{c}{1-c}$ is the tax multiplier.

From the equation number (7) we can depict the following remarks:

- a raise in the level of government expenditures determines an increase of the national income measured by the government expenditures multiplier, while a raise in the lump sum tax causes a decrease of the national income measured by the tax multiplier;
- both multipliers depend on the marginal propensity to consume, which is determined by various factors (economical, social, cultural, political and even historical factors).
- the government expenditures multiplier is larger than the tax multiplier, and therefore, the effects induced to the national income by a change in government expenditures are greater then the ones induced by a change in the lump sum tax.

B. The tax multiplier under flat rate taxation:

$$Y = c \text{ x } Y_D + I + G = c \text{ x } (Y - t \text{ x } Y) + I + G \tag{8}$$

$$Y \text{ x } (1 - c + c \text{ x } t) = I + G \tag{9}$$

$$Y = \frac{1}{1-c+c \text{ x } t} \text{ x } (I+G) = \frac{1}{1-c \text{ x } (1-t)} \text{ x } (I+G) \tag{10}$$

In the (10) equation, $\frac{1}{1-c \text{ x } (1-t)}$ is the tax multiplier when using a flat rate taxation system.

The resulting formula has the following interpretation:

- an increase in the tax rate will cause a decrease in the level of national income, given by the level of the tax multiplier;
- the tax multiplier depends on the marginal propensity to consume and the level of the tax rate.

2. THEORETICAL FOUNDATION

Thus, the economic connection between the tax burden and the national income (GDP per capita) is opposite, so raising the tax burden will decrease the GDP per capita.

In order to analyze the connection between the tax burden (global tax burden and the tax burden of direct taxes, indirect taxes and social contributions) and the GDP per capita in the European Union, we have selected the 25 member states (until the 1st of January 2007) in the following order: 1 – Belgium, 2 - France, 3 - Germany, 4 - Italy, 5 - Luxembourg, 6 - Netherlands, 7 - Denmark, 8 - Ireland, 9 – United Kingdom, 10 - Greece, 11 - Portugal, 12 - Spain, 13 - Austria, 14 - Finland, 15 -

Sweden, 16 - Cyprus, 17 - Estonia, 18 - Latvia, 19 - Lithuania, 20 - Malta, 21 - Poland, 22 – Czech Republic, 23 - Slovakia, 24 - Slovenia and 25 - Hungary.

3. THE MODEL

The analyzed period is between 1995-2005[i], and the analysis method is econometrical modeling using the EViews 5.0[ii] software. This software allows data analysis in panel system, which implies a mixture of time and data series for different entities.

The „Pool Date" regression model has the following construction:

$$Y_{it} = \alpha + \beta_{it} x X_{it} + \varepsilon_{it} \tag{11}$$

$$i=\overline{1,25} \tag{12}$$

where,

- Y_{it} - the dependent variable (GDP per capita);
- α the coefficient of the free factor;
- β_i coefficients of independent variables;
- X_{it} the independent variables;
- ε_{it} random variable;
- *i* number of "sections" based on witch the regression is made - 25 sections (number of member states in the European Union until the 1st of January 2007);
- *t* the time period (1995-2005).

The model will quantify the correlation between GDP per capita and, on the one hand, global tax burden in every member state, and, on the other hand, tax burden of the direct taxes, indirect taxes and the social contributions. These fiscal constraints are a result of the action of the tax multiplier. "The gross domestic product, the base for measuring the results of economic activity, represents the gross added value of the final production of goods and services created during a specific period on the country's territory and is destined for consumption, investment, increase of the inventories and export".[iii]
Therefore, it is possible to construct a "Pool Date" regressive model for quantifying the impact of global tax burden (F) on GDP per capita.

In this situation the model has the following configuration:

$$GDP = \alpha + \beta x F + \varepsilon_t \tag{13}$$

In the same manner, for quantifying the impact of the burden of direct taxes (D), indirect taxes (I) and social contributions (A) on the GDP per capita, the mathematical relation will be:

$$GDP = \alpha + \beta_1 x D + \beta_2 x I + \beta_3 x A + \varepsilon_t \tag{14}$$

1. Modeling the impact of global tax burden on the GDP per capita in the European Union - EU 25. After the required calculus, the results of the statistical tests are (Table 1):

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[i] Data source: *General government expenditure and revenue: 2005 data,* Statistic in focus - Economy and finance nr.19/2006, Eurostat, 2006.
[ii] Copyright © 1994-2004 Quantitative Micro Software, LLC, All Rights Reserved.
[iii] Băbăiţă Ilie, Duţă Alexandrina, Silaşi,Grigore, Imbrescu Ion, *Macroeconomie*, Ediția a II-a, Editura Mirton, Timişoara, 2003, pag.148.

Table 1

Modeling the impact of global tax burden on the GDP per capita in the European Union - EU 25

Dependent variable: GDP Method: Pooled Least Squares Sample: 1995 -2005 Included observations: 11 Cross-sections included: 25 Total pool observations: 275				
Variable	Coefficient	Standard error	t-Statistic	Probability
1--F1	0,612659	0,014556	42,08992	0.0000
2--F2	0,579335	0,014946	38,76077	0.0000
3--F3	0,646098	0,016476	39,21485	0.0000
4--F4	0,557743	0,015772	35,36382	0.0000
5--F5	1,032385	0,016190	63,76772	0.0000
6--F6	0,605504	0,016690	36,27891	0.0000
7--F7	0,604276	0,013458	44,89947	0.0000
8--F8	0,752749	0,021207	35,49494	0.0000
9--F9	0,755075	0,018393	41,05224	0.0000
10--F10	0,300072	0,018664	16,07784	0.0000
11--F11	0,279380	0,018902	14,78038	0.0000
12--F12	0,406779	0,019117	21,27872	0.0000
13--F13	0,586640	0,014531	40,37061	0.0000
14--F14	0,514554	0,015292	33,64963	0.0000
15--F15	0,520654	0,012908	40,33573	0.0000
16--F16	0,377933	0,021471	17,60211	0.0000
17--F17	0,124130	0,019688	6,304762	0.0000
18--F18	0,098097	0,019873	4,936133	0.0000
19--F19	0,109027	0,022313	4,886220	0.0000
20--F20	0,265697	0,021881	12,14295	0.0000
21--F21	0,112576	0,017890	6,292721	0.0000
22--F22	0,148715	0,018038	8,244322	0.0000
23--F23	0,106878	0,019024	5,618144	0.0000
24--F24	0,234974	0,016699	14,07114	0.0000
25--F25	0,117143	0,017016	6,884330	0.0000
R-squared	0,964112	Akaike info criterion		4,520371
Adjusted R-squared	0,960667	Schwarz criterion		4,849168
Standard Error of regression	2,221078	F-statistic		279,8394
Durbin-Watson	2,135050	Probability (F-statistic)		0,000000

From Table 1 we can depict the following conclusion:

- The values of the standard errors and the coefficients are inferior, in modulo, to the coefficient values, which imply that they are correctly estimated, conclusion empowered by the minimum levels of the probability;
- The R-squared, taking a value of 96,4%, demonstrate that the statistical connection between the dependent variable GDP and the independent F is very strong, any change in the tax burden resulting in a change of the GDP in a similar ratio;

- the Durbin-Watson test, with a value slightly above the critical level 2, indicates that residual values are not interrelated.

Consequently, considering especially the result of the Durbin-Watson test, we can appreciate that the model is suitable for describing, in the case of the European Union, the connection between the global tax burden and the GDP per capita for every member state.

As a result, the model can be written as:

$$
\begin{aligned}
GDP1 &= 0,6126594272*F1\\
GDP2 &= 0,579334739*F2\\
GDP3 &= 0,6460982952*F3\\
GDP4 &= 0,557742759*F4\\
GDP5 &= 1,032384844*F5\\
GDP6 &= 0,6055044525*F6\\
GDP7 &= 0,6042759975*F7\\
GDP8 &= 0,7527491562*F8\\
GDP9 &= 0,7550753937*F9\\
GDP10 &= 0,3000720932*F10\\
GDP11 &= 0,2793799507*F11\\
GDP12 &= 0,4067790207*F12\\
GDP13 &= 0,586639586*F13\\
GDP14 &= 0,5145535073*F14\\
GDP15 &= 0,5206540532*F15\\
GDP16 &= 0,3779328815*F16\\
GDP17 &= 0,1241299705*F17\\
GDP18 &= 0,09809692086*F18\\
GDP19 &= 0,1090268134*F19\\
GDP20 &= 0,2656974544*F20\\
GDP21 &= 0,1125757997*F21\\
GDP22 &= 0,1487149282*F22\\
GDP23 &= 0,1068783379*F23\\
GDP24 &= 0,2349740769*F24\\
GDP25 &= 0,1171430634*F25
\end{aligned}
\tag{15}
$$

2. Modeling the impact of tax burden generated by direct taxes, indirect taxes and social contributions on the GDP per capita in the European Union - E.U. 25. After the required calculus, the results of the statistical tests are (Table 2):

Table 2

Modeling the impact of tax burden generated by direct taxes, indirect taxes and social contributions on the GDP per capita in the European Union - E.U.25.

Dependent variable: GDP				
Method: Pooled Least Squares				
Sample: 1995 -2005				
Included observations: 11				
Cross-sections included: 25				
Total pool observations: 275				
Dependent variable: GDP				
Variable	Coefficient	Standard error	t-Statistic	Probability
D?	1.616228	0.093802	17.23019	0.0000
I?	-0.832092	0.124468	-6.685173	0.0000
A?	0.695854	0.101890	6.829464	0.0000
R squared	0.545954	Akaike info criterion		6.898169
Adjusted R squared	0.542616	Schwarz criterion		6.937625
Standard Error of regression	7.574001	F-statistic		163.5294
Durbin-Watson	2.101448	Probability (F-statistic)		0.000000

From Table 1 we can depict the following conclusion:
- The values of the standard errors and the coefficients are inferior, in modulo, to the coefficient values, which imply that they are correctly estimated, conclusion empowered by the minimum levels of the probability;
- The R-squared, taking a value of 54,5%, demonstrate that the statistical connection between the dependent variable GDP and independent variables D, I and A is significant, any change in the tax burden resulting in a change in GDP per capita;
- the Durbin-Watson test, having a value slightly above the critical level 2, indicates that residual values are not interrelated.

As a result of the statistical tests, the model is suitable for describing, in the case of European Union, the connection intensity between the tax burden of the direct taxes, indirect taxes and social contributions and the GDP per capita.
Consequently, using the resulting coefficients, the model can be written:

$$GDP = 1{,}616228194 \cdot D - 0{,}8320918247 \cdot I + 0{,}6958540987 \cdot A \tag{16}$$

4. DISCUSSIONS

The first model illustrates the fact that, surprisingly, for the member states of the European Union, global tax burden has a stimulation effect on the economic growth, rather than a prohibitive one, as a result of the “income effect”. Accordingly, we can observe:
- this effect is higher in Luxemburg, where an increase of 1% in the tax burden level generates an increase of GDP per capita of 1,03%;
- the income effect has a slightly lower intensity in Ireland and United Kingdom, where a rise in the global tax burden of 1% produces an increase in GDP per capita around 0,7%;
- in countries such as: Belgium, France, Germany, Italy, Netherlands, Denmark, Austria, Finland and Sweden, an increase in the tax burden of 1% generates an increase in GDP per capita of 0,5-0,6%;
- in the other states income effect is much weaker, the smallest level being recorded in Latvia, where a rise in taxation of 1% generates only a insignificant rise of 0,09% in GDP per capita.

After studying the results of the *second econometrical model,* we can observe that, for the entire European Union, the income effect is present only in the case of direct taxes and social contributions. For the indirect taxes the effect is opposite. Thus, a rise of 1% in the burden of direct taxes and social contributions generates an increase of 1,61% of the GDP per capita, and 0,69% in the case of social contributions. Increasing the indirect tax's burden with 1% produces a decrease of 0,83% in GDP per capita.

5. CONCLUSION

The results of the econometrical models allow us to conclude that, in the case of European Union (EU 25), the tax policy encourages economic growth when using direct taxes and contributions, with different intensity among the member states, as a result of the authorities political choices. Moreover, the result of the paper empowers the idea of the tax harmonization, in contrast with the "tax competition".

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