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**Taxation and economic sustainability**

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## **Abstract**

Macroeconomic theory says that taxes play a repressing role in the economy. Introduction of new forms of taxation, the increase of tax rates and augmentation of tax income of the Government puts a downturn risk on consumption and therefore on economic growth. Knowing that, Governments start to compete with other countries by lowering corporate tax rates and trying to boost economic growth by using foreign investments. On the other hand Governments are pushed to lower personal tax rates in order to satisfy their electorate. It was highly believed that countries with lower tax rates have better prospects for future growth. However, small tax income boundaries government spending and might cause serious imbalances in economy. As the Irish example shows smaller taxes cannot guarantee sustainable growth of the economy. So the taxation and economic development relationship needs rethinking.

This paper aims to test the efficiency of taxation in sustainable economic development terms and to discuss the factors that are the most important. The comparative analysis of EU countries is used for the research.

## **Introduction**

Macroeconomic theory says that taxes play a repressing role in the economy. Introduction of new forms of taxation, the increase of tax rates and augmentation of tax income of the Government puts a downturn risk on consumption and therefore on economic growth. Knowing that, Governments start to compete with other countries by lowering corporate tax rates and trying to boost economic growth by using foreign investments. On the other hand Governments are pushed to lower personal tax rates in order to satisfy their electorate. It was highly believed that countries with lower tax rates have better prospects for future growth. However, small tax income boundaries government spending and might cause serious imbalances in economy. As the Irish example shows smaller taxes cannot guarantee sustainable growth of the economy. So the relationship between taxation and economic development needs rethinking.

Government budget and government debt crises recently questioned the sustainability of government finances and entire economy in many European countries. Social welfare that European governments are aiming for puts a downturn risks on the budget, government debt as well as on economic sustainability. Economic growth that lasted over a decade boosted tax income. This made governments illusory think about loosening of the budget. It led to a massive expansion of public sector in most of the economies. But the economic downturn which was expected to happen changed the situation to the worsen way. Countries that seemed to be the most competitive in the aspect of taxation appeared in the unfavorable situation where the government commitments to electorate and public could not be relieved so easily. This situation in global economy examined budgets and sustainability of government finance as well as the short-sightedness of government in most of the countries. At the moment one of hottest topics among economists as well as politicians is the prospects of public finance and taxation first of all.

This paper aims to contribute to the discussions by testing the efficiency of taxation in various countries in terms of sustainability of economy. The economic sustainability here is understood as sustainable public finance when there is no down side risk on public budget. So we analyze taxation income in EU countries and apply HP filter to extract its trend and cyclical behavior.

Optimal taxation level and tax structure was an issue for discussions and empirical research for a long time. There is a big range of theoretical models and empirical research on the impact of taxation on economic growth. Most of these researches apply long-term economic growth models such as Solow or AK endogenous growth models. Y. Lee and R. Gordon (2004) summarize theoretical ways in which the taxation can affect long-term economic growth. Economic growth is depended on accumulation of human and physical capital. So taxes can affect the accumulation of these production factors. Y. Lee and R. Gordon (2004) note that lower corporate tax rates

(especially on investment) suggest boom in short-term growth because of increasing corporate investments. This can be considered as one of the risks on sustainability of economic growth because of distortions and excessive investment that might cause oversupply in economy in medium-term.

The other way in which taxes make an influence on economic growth rates is the initiatives to do business and to invest. When following Schumpeterian and endogenous growth logics the bigger emphasis is on the structure of taxes than on the size of tax rates. In this case comparison between personal and corporate tax rates, schedules of personal income taxes and similar questions matters. The results of previous research (Cullen, Gordon, 2002) show that corporate tax rates should be lower when compared to the personal tax in order to encourage creation of private business and foster growth of the economy.

### **Comparative analysis of taxes in EU**

Our study begins with comparative analysis of tax rates and tax income in the selected EU countries. Its results should show the dynamics of tax rates and tendencies in tax income. On the other hand the comparison of the indicators of different countries could describe the relative situation in a specific country. Corporate income tax rate was chosen for the analysis as it is one of the main indicators that EU countries are competing on. Table 1 presents corporate income tax rates in the selected EU countries and their evolution since 1990.

As we can see in table 1 since 1990 the corporate tax rate was reduced in all major EU countries. This finding suggests that EU countries are competing on corporate tax rates in order to attract more foreign investment and spur the growth of their economies. The biggest decrease during 20 years was observed in Ireland where corporate income tax rate was diminished from 43% in 1990 to 12.5% since 2003. Other leading country in this case is Germany where the tax rate was diminished by 29.6 p.p. It is caused not only by government policies but also because of integration of former GDR in 1991. However if we look at the second half of the period analyzed, in Germany the decrease of corporate tax rate since 2000 was the sharpest. We can also see that the countries which met the most serious public finance problems in 2010 (Greece, Portugal, Ireland) had lowered the corporate income tax the most.

In overall, the analysis results imply that competition on tax rates even increased since 2000 because the reduction of tax rates is even bigger. This period was also followed by constant and increasing economic growth which was favorable for governments to have increasing tax income even though the tax rate was lower. This situation might have fooled the governments about having positive tax returns based on Laffer curve and helped them to increase budget spending without having a negative impact on the balance and debt.

**Table 1****Corporate income tax rates in EU countries available, %**

	2010	2008	2006	2004	2002	2000	1998	1996	1994	1992	1990
Austria	25	25	25	34	34	34	34	34	34	30	30
Belgium	33.99	33.99	33.99	33.99	40.17	40.2	40.17	40.17	40.17	39	41
Czech Republic	19	21	24	28	31	31	35	39	42	-	-
Denmark	25	25	28	30	30	32	34	34	34	34	40
Finland	26	26	26	29	29	29	28	28	25	n.a.	n.a.
France	34.43	34.43	34.43	35.43	35.43	37.76	41.66	36.66	33.33	34	42
Germany	15.83	15.83	21.89	21.89	21.89	35.02	39.73	41.35	39.13	45.11	45.45
Greece	24	25	29	35	35	40	40	35	35	46	46
Hungary	19	20	17.33	16	18	18	18	18	36	40	40
Ireland	12.5	12.5	12.5	12.5	16	24	32	36	40	40	43
Italy	27.5	27.5	33	33	36	37	37	53.2	53.2	52.2	46.4
Netherlands	25.5	25.5	29.6	34.5	34.5	35	35	35	35	35	35
Poland	19	19	19	19	28	30	36	40	40	40	n.a.
Portugal	25	25	25	25	30	32	34	36	36	36	36.5
Slovak Republic	19	19	19	19	25	29	40	40	40	-	-
Spain	30	30	35	35	35	35	35	35	35	35	35
Sweden	26.3	28	28	28	28	28	28	28	28	30	40
United Kingdom	28	28	30	30	30	30	31	33	33	33	34

Source: OECD Tax Database

The effect of tax lowering policy in EU countries can be suggested by analyzing budget income. First of all we should notice that tax income is of a very big importance for government budgets in all EU countries. The biggest share of tax income is in Belgium, Italy and UK. On average tax income in these countries makes more than 90% of total budget inflow. The smallest share is in Bulgaria, Greece, Latvia, Malta, Poland and Finland where tax income on average makes less than 85% of total budget inflow. These findings support the fact that public finance and economic sustainability is very much depended on taxation and tax income of the government.

Second issue is about tax rates of other major taxes: personal income tax and value added tax. A brief analysis of their tax rates indicated that value added tax rate was increasing only in new EU member states because of Union regulations. In other countries it remained much more stable as well as personal income tax rates. Average of standard deviation of corporate income tax during 1990 – 2010 is 5.8 and the average of the same ratio of personal income tax is 1.2. It suggests that despite a big importance of these two taxes in tax income of the countries, governments do not compete on them. So the possibility of these two taxes to become risky low is much smaller. These findings support our preliminary choice to study corporate income tax in this paper.

Table 2 presents the shares of income of taxes on the income or profits of corporations in total taxation income in EU countries available. We can see that on average corporate taxes contributes only about 8% to total taxation income to the budget. Though, the average correlation

ratio between corporate tax income and total taxation income in economies is 0.87 and ranges from 0.55 in Italy to 0.99 in Romania. This suggests that despite a small share the corporate tax income are important for total taxation income fluctuations. In smaller countries, such as Luxembourg, Malt, Cyprus and Czech Republic corporate taxes are more important. Corporate income tax share is the smallest in Germany – the biggest economy in EU. As it was noted earlier Ireland was the country where corporate income tax rate was diminished the most and we can see in table 2 that the share of corporate taxes was decreasing since 2003 when the new tax rate was introduced. In absolute terms corporate tax income started to fall in 2007 in Ireland.

**Table 2**

**Share of income of corporate income tax in the total taxation income, %**

	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Belgium	5.62	7.39	7.73	7.78	7.00	6.67	6.21	6.50	6.71	6.92
Bulgaria	8.15	9.19	12.42	5.95	5.22	7.41	8.09	10.00	11.86	8.25
Czech Republic	10.62	11.80	13.52	13.19	12.15	12.56	12.77	12.31	12.03	10.27
Denmark	5.03	6.76	7.66	8.66	7.64	6.37	5.97	5.93	5.68	6.53
Germany	1.67	2.72	3.38	3.39	2.75					
Ireland	8.30	9.07	10.33	11.30	10.63	11.39	12.28	12.50	11.61	11.49
Greece	7.42	7.35	7.41	8.12	9.72	9.04	8.61	9.58	9.72	11.51
France	2.91	6.21	6.48	6.38	5.12	5.24	4.81	5.73	6.79	6.16
Italy	5.62	7.11	7.56	7.00	5.78	5.35	5.25	6.11	7.03	5.59
Cyprus	18.52	18.11	16.65	15.10	13.15	11.14	13.05	19.23	20.08	20.57
Latvia	5.86	10.81	8.93	7.54	6.93	6.14	5.29	7.03	6.57	5.22
Lithuania	6.28	9.14	8.68	9.42	7.36	6.57	4.90	2.08	1.86	2.26
Luxembourg	14.41	14.04	14.53	13.58	15.13	15.05	18.90	20.14	18.19	17.67
Malta	17.10	15.91	14.37	11.49	10.23	9.50	12.26	9.82	9.21	8.72
Netherlands	5.55	8.72	9.05	9.33	9.58	8.70	8.03	9.31	10.85	10.81
Austria	4.22	6.01	6.01	5.39	5.36	5.39	5.16	5.30	6.99	4.88
Poland	7.26	7.96	7.97							
Portugal	8.55	10.32	10.08	8.29	7.73	8.55	8.10	9.76	9.90	11.26
Romania	9.43	10.49	10.35	9.75	9.52	11.42	9.98	9.21	8.73	9.68
Slovenia	4.90	6.74	8.59	7.74	7.16	5.03	4.54	4.11	3.33	3.10
Slovakia	8.73	10.73	10.27	9.98	8.74	8.23	8.33	7.60	7.82	7.64
Sweden	6.37	6.28	8.00	7.49	7.31	6.02	4.57	4.29	5.29	7.28
United Kingdom	7.44	8.84	8.47	9.90	8.59	7.57	7.37	7.57	9.09	8.79

*Source: calculations based on Eurostat data*

In general since 2004 – 2005 the share of income of corporate taxation in total taxation income was increasing in most of the EU countries. But most likely that it is related to economic growth and favorable economic situation for companies to make big profits than to lower tax rates. In 2008 – 2009 income of corporate taxation decreased in both absolute and relative terms in all EU countries except Luxembourg and Malta. This suggests that cyclical fluctuations of economies

might have misled the governments when making decisions on taxation. Despite the knowledge that lower taxes lead to faster economic growth there is a big risk on economic sustainability.

### **Research structure and methods**

In this paper it is suggested to analyze the sustainability of economic development by looking at public budget deficit/surplus. As recent developments in European economies shows the most challenging problems that governments face are related to steeply increasing budget deficits and debts. This hurts economic development the most. This paper looks at budget income – taxation that sometimes governments compete on by lowering tax rate in order to promote growth of economy.

The results of comparative analysis on taxation in EU countries suggest that because of favorable business cycle situation in economy their governments are misled when making decisions on taxation. The biggest risk in terms of decreasing corporate income tax rates and taxation income was observed in Ireland, Portugal, and Greece. These are the countries that faced the severe public finance problems during recent economic downturn. We suggest analyzing cyclical fluctuations of government taxation income in order to understand when diminishing tax rates became harmful for economic sustainability.

We apply Hodrick – Prescott filter (HP filter) for the detailed research. HP filter helps to separate cyclical behavior from the log run path of economic series. It decomposes the economic series of interest into slow changing trend and transitory deviation that is called “cycle”:

$$s_t = r_t + c_t$$

Where  $s$  – economic series observed;  $r$  – trend component;  $c$  – cyclical component. Usually HP filter extracts the trend from a time series by solving the next problem:

$$\min_{\{r_t\}} \sum_{t=1}^T (s_t - r_t)^2 + \lambda \sum_{t=2}^{T-1} [(r_{t+1} - r_t) - (r_t - r_{t-1})]^2$$

Where the smoothing parameter  $\lambda$  controls the smoothness of the adjusted trend series. The larger its value the smoother is  $s$ . When  $\lambda \rightarrow 0$  the trend is close to actual series and when  $\lambda \rightarrow \infty$  the trend becomes linear. HP filter has some shortcomings and drawbacks, but as H. Ahumada and M. Garegnani (1999) notes they do not appear to have great effects on its wide use on empirical research.

We apply HP filter on corporate taxation income in EU countries with data available in Eurostat during 1995 – 2010. Corporate taxation income was chosen because of higher deviations observed previously and suggested finding that governments compete on corporate income tax rate the most in order to attract more foreign investment and foster economic growth. After the cyclical

component of corporate taxation income is extracted we estimate its variance and assess the risk which can be addressed to unsustainable taxation income.

### Research results

With the help of HP filter we decomposed the corporate taxation income in available EU countries during 1995 – 2001 into trend and cycle data. The derived trend line shows the implicit behavior of the corporate taxation income in the countries. Our results suggest about basic behavior of taxation income and they are summarized in the Table 3.

**Table 3**

**Shapes of trend curves of corporate taxation income in EU countries**

Trend curve				
Linear	Parabola			
Increasing	Upward		Downward	
		Break point		Break point
Austria	Italy	2001	Ireland	2004
Belgium	Slovakia	2001	France	2006
Bulgaria			Greece	2004
Czech Republic			Luxembourg	2002
Denmark			Netherlands	2001
Cyprus				
Latvia				
Lithuania				
Malta				
Portugal				
Romania				
Slovenia				
Sweden				
United Kingdom				

As it is presented in table 3 in most of EU countries there is an increasing tendency of corporate taxation income. The slope of trend curves differs indicating about faster or slower growth of budget income from corporate taxation but they are not the object of this paper. Two countries – Italy and Slovakia – have an estimated upward parabola trend curve which means that till 2001 the corporate taxation income were decreasing and afterwards they started to increase. In Italian case it might be partly related with a solid reduction of corporate income tax rate in 1998 which might have helped to motivate corporate activity. In Slovakia as well as in many other former Soviet countries taxation income growth might be caused by economy development, foreign investment growth, and increasing confidence of the country.

The estimated corporate taxation income trend lines suggest that in Ireland, France, Greece, Luxembourg and the Netherlands income has a downward trend. Two countries from the list are those which recently met fiscal difficulties. For both of them the preliminary break point could have



been in 2004. As it was noted previously and presented in table 1, Ireland and Greece made serious reductions of corporate income tax rates. In Ireland the tax rate was reduced to 12.5% in 2003 and in Greece the reduction started in 2004 from 35 % and stopped in 2010 at 24% tax rate. These results suggest that in Greece and Ireland the reduction of tax rates was too big and harmful for the budget and economic sustainability.

**Table 4**

**Descriptive statistics of cyclical fluctuations of corporate taxation income**

No.	Country	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Obs.
1	Malta	-2.52E-12	7.789912	24.34387	-30.9368	20.60712	-0.57593	1.78926	10
2	Latvia	-4.26E-12	-6.26673	100.0362	-63.8456	38.06619	0.977248	4.529738	15
3	Slovenia	-5.48E-12	-16.4453	185.7643	-211.681	95.51617	0.014233	3.452984	15
4	Cyprus	-1.04E-11	-1.24709	126.8631	-203.493	96.04829	-0.55428	2.457553	15
5	Luxembourg	-3.34E-11	-27.5928	249.3524	-179.7	118.9503	0.545779	2.735886	15
6	Slovakia	-1.77E-11	-16.7609	314.9455	-140.629	124.304	1.120166	3.714627	15
7	Lithuania	-1.34E-11	49.07337	367.4569	-391.429	254.2167	-0.20884	1.776564	15
8	Bulgaria	-9.21E-12	-42.7128	572.3312	-411.589	308.1328	0.378304	2.07895	15
9	Ireland	-7.29E-11	41.08132	711.9086	-929.753	384.4896	-0.60806	3.727514	15
10	Romania	-6.84E-11	-30.6158	895.2681	-749.05	487.4661	0.256474	2.081641	14
11	Portugal	-1.14E-10	10.69455	755.71	-684.026	501.7726	0.251679	1.703174	15
12	Greece	-1.02E-10	-197.996	1447.154	-721.644	533.3476	1.287998	4.657081	15
13	Austria	-9.40E-11	-85.6613	1806.92	-1106.45	691.912	0.96451	4.341494	15
14	Belgium	-1.26E-10	-75.4632	1074.436	-1861.71	798.366	-0.55189	3.117056	15
15	Netherlands	-3.28E-10	1121.182	1878.179	-4249.32	1983.119	-0.98285	2.57904	15
16	UK	-5.74E-10	578.6042	7046.344	-5389.45	4094.428	0.107397	1.793997	15
17	Italy	-6.09E-10	-1790.23	10844.97	-6117.78	5545.978	0.577093	2.014391	15
18	France	-8.05E-10	-291.24	8481.147	-16945.2	6677.428	-0.837	3.822132	15
19	Denmark	-1.03E-09	-396.99	14214	-14352.3	6718.723	0.072801	3.457222	15
20	Czech Rep.	-1.94E-09	881.6359	14839.62	-19541.1	9361.315	-0.39988	2.483785	15
21	Sweden	-1.34E-09	-2209.94	20603.81	-20049.3	11342.78	0.013276	2.462332	15

The cyclical component of corporate taxation income in EU countries available was extracted by subtracting estimated trend from real corporate tax income series. Afterwards the descriptive statistics of the cyclical component time series was calculated and analyzed. Table 4 presents the results. The countries in table 2 are listed in regards of standard deviation of cyclical component. First of all we note that the mean value of the cyclical component of corporate taxation income is much lower than the median in all EU countries. This finding suggests that corporate taxation income was above its trend more often and such situation creates assumptions for inappropriate government decisions.

The values of standard deviation coefficient indicate the variability of the cyclical component and it is used to assess the risk. The results show that Ireland, Portugal and Greece lists

in the middle among other EU countries indicating that risk of unexpected downturn of corporate taxation income which is harmful for the budget is on the upper side. The results suggest that France situation is the most risky. As it was noted earlier in this paper the corporate taxation income in France has a downward trend and the variance of the cycle is one of the biggest. This indicates a high risk of unexpected sharp decrease of corporate taxation and total budget income that might deteriorate economic sustainability.

## **Conclusions**

Some of EU countries compete by lowering corporate income tax rates and trying to be more attractive for investors. The leading country in this case is Ireland where the reduction of corporate income tax rate was the largest. Despite that the share of corporate taxes in total taxation and budget income is not big, its high variation which is strongly correlated to budget income suggests about its importance for public finance sustainability.

The research results show that Ireland, France, Greece, Luxembourg, and the Netherlands have a downward corporate taxation income trend. The break points of the trend lines are very close to the dates of tax rate reduction. These findings suggest about the harmfully small tax rates that could hit the sustainability of public finance and economy. Ireland and Greece has already met some public finance problems. And the situation of France can be considered to be the most risky because of high variation of its corporate taxation income cycle.

## **References**

1. Ahumada, H., Garegnani, M. (1999). Hodrick–Prescott filter in practice. CiteSeerX Scientific Literature Digital Library.
2. Cullen, Julie Berry, Roger H. Gordon. Taxes and Entrepreneurial Activity: Theory and Evidence for the U.S., NBER Working Paper No. 9015, 2002.
3. Lee, Y, Gordon, R. H. (2005). Tax structure and economic growth. *Journal of Public Economics*, No 89, Elsevier.

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