

TAXATION AND ECONOMIC GROWTH: THE TRENDS IN THE EU COUNTRIES

*Tiia Püss
Mare Viies
Reet Maldre**

Abstract

Taxes are an important fiscal policy instrument and the main source of revenue for any country, which are used to regulate and influence economic and social development in the country. The tax harmonization process in the European Union (EU) is designed to meet the objectives to improve the economic environment and facilitate development. Also the effects of taxation on economic growth have been studied quite widely, often with contradictory theoretical and empirical results. In this paper we discuss the main trends in tax burden, structure of the tax revenue and GDP per capita at PPS in three groups of EU countries (EU-25, EU-15 and EU-10). We concentrate on convergence analysis of the total tax burden; the taxes on labor, consumption and capital, and GDP per capita levels on the basis of most recent data available. We use harmonized data on the taxes and GDP per capita in the EU countries collected by Eurostat. As the Eurostat had information on tax revenues in EU-10 countries available for the years 1995-2006, we have discussed just these years.

Introduction

The relationship between fiscal policies and economic growth is constantly in the focus of several theoretical and empirical studies. How taxes and public expenditures affect economic growth? What type of taxes and expenditures are more likely to enhance or reduce the growth rate? Are such impacts transitional or persistent? Theoretical studies have described various channels through which fiscal policies might affect economic growth. In the context of endogenous growth theory, governments can contribute to both temporal and permanent economic growth through fiscal policy promoting accumulation of such factors as knowledge, research and development, human capital, productive public investment (Easterly 1993; Folster and Hendrekson

* Tallinn University of Technology, Tallinn, Estonia; Tiia.Pyss@tv.ttu.ee;
Mare.Viies@tv.ttu.ee; Reet.Maldre@tv.ttu.ee

1999). Empirical results vary from study to study and depend on several research parameters, such as theoretical approach, model specification, econometric techniques, countries and time periods under study.

However, there are some common viewpoints emerged from both theoretical and empirical literature, such as growth reducing effect of distortionary taxes, especially capital taxes. The impact of labor and consumption taxes is not so clear.

Taxes are an important fiscal policy instrument and the main source of revenue for any country, which are used to regulate and influence economic and social development in the country. In an open economy, linked by trade and capital flow, tax policy of one country may affect economic activity and public revenue in other countries. This observation has led to calls for international tax coordination in the wake of deepening economic integration. Although lower taxes can yield significant efficiency gains there is a risk that the financing of public goods and social protection will be shifted to the least mobile tax base – labor, or that the production of public goods and the welfare systems will be endangered, especially in these countries where income redistribution, social protection and public goods provision are given a high weight in social preferences. The European Union (EU) has harmonized standards and regulations in numerous areas. However, there has been a lower degree of harmonization in taxation. The tax harmonization process in the past decade was designed to meet objectives to improve the economic environment and facilitate development, which are still relevant. Significant measures towards the harmonization have been raised strategically in the EU agenda.

Many theoretical concepts and various econometric models have been proposed and different determinants of economic growth have been analyzed. Also the effects of taxation on economic growth have been studied quite widely, often with contradictory theoretical and empirical results. Our previous analysis indicated that the level of taxes increased in most of the EU countries over the last decades (Püss and Viies 2007). In this paper we concentrate on analyzing the trends of taxation and economic growth in the EU countries. In the empirical part of this paper we provide an analysis of the main trends of the structures of tax revenue and tax burdens in the EU countries on the basis of most recent data available. We use harmonized data on the taxes and GDP per capita in the EU countries collected by Eurostat. As the Eurostat had information on tax revenues in EU-10 countries available for the years 1995-2006, we have discussed just these years.

1. The overview of methodology

The explanation of how fiscal policies influence economic growth is different in traditional neoclassical and endogenous economic growth models. In traditional neoclassical growth models, the long run growth in output is exogenously given and depends on the exogenous rate of technological progress. Fiscal policies could only affect the steady state level of output, but not have any impact on the long run economic growth rate. Endogenous growth models introduced by Romer (1986), Lucas (1988) and Barro (1990) among others predict that fiscal variables can permanently change not only the output level but also growth rates.

According to the economic theory of convergence, economic development level of less developed countries should approach the level of more advanced countries which have the same economic resources or fundamentals. Socio-economic convergence is mainly discussed in the context and on the basis of two main economic growth theories: neo-classical and endogenous. Two main concepts of convergence are used in the classical literature of growth theory: σ -convergence and β -convergence (Quah 1996; Sala-i-Martin 1996).

One of the simplest methods for estimating socio-economic convergence is calculation of σ -convergence, which is based on standard deviation. With this method it is possible to examine how the dispersion between national income levels (or other indicators) has changed, or how the differences of indicators inside groups of countries are changing compared to the average (Baumol 1986; Dorwick and Nguyen 1989; Barro and Sala-i-Martin 1991, 1992a, 1992b). A reduction coefficient of variance (standard deviation/arithmetic average) of indicators indicates a reduction of the difference, or the presence of σ -convergence.

The test for the presence of β -convergence (Baumol 1986; DeLong 1988; Barro and Sala-i-Martin 1991, 1992a, 1992b; Sala-i-Martin 1994; Boyle and McCarthy 1997) posits that β -convergence exists if a poor economy tends to grow at a faster rate than a rich one so that the poor country tends to catch up in terms of per capita income or product.

The literature makes distinction between absolute (unconditional) and conditional β -convergence. Absolute β -convergence pertains to the coefficient β of the bivariate equation. This is based on the assumption that all countries in the sample converge to the same steady state. Conditional β -convergence pertains to the coefficient β of the socio-economic level variable in an equation that includes additional explanatory variables reflecting differences across countries, which direct each economy to converge to its own steady state. In both cases, the convergence hypothesis is that the growth rate of a socio-economic indicator will be negatively related to the level of this indicator.

Technically, β -convergence exists if the rate of output growth is negatively correlated with the level of per capita income in a regression model. Although it is generally assumed that a precondition for σ -convergence to work is the presence of β -convergence, several authors (for example, Sala-i-Martin 1996) state that β -convergence is a necessary but not sufficient condition for σ -convergence.

We used the following equation to estimate absolute β -convergence:

$$(1/T)\ln(Y_{iT}/Y_{i0}) = \beta_0 + \beta_1 \ln(Y_{i0}), \quad (1)$$

where the left-hand side is the average annual growth rate of indicators in country i from year 0 to year T . The condition for β -convergence is the test that $\beta_1 < 0$.

For estimating the rate (speed) of convergence we used the following equation:

$$(1/T)\ln(Y_{iT}/Y_{i0}) = \beta_0 - [(1 - e^{(-\beta T)})/T] \ln Y_{i0}, \quad (2)$$

where β is the rate (speed) of convergence and the rate of convergence grows with parameter β .

Conditional β -convergence recognizes that different countries may have different steady states so that at any given level of capital per worker, the marginal product will differ between countries. Arena et al. (2000) has emphasized that evidence of conditional β -convergence of real regional GDP per capita does not imply that real regional income will converge on the same value, but, rather that there will be convergence to different steady state levels of real income.

Conditional β -convergence is equivalent to sustained differences in the levels of regional real income per capita. The very rapid rates of income convergence that were found arise, at least in part, from the regions having fairly similar levels of income per capita. According to Barro and Sala-i-Martin (1991), the more diverse initial levels of regional incomes and the longer sample period are the reasons for the slower estimated income convergence. Cho (1994, 1996) and Easterly (2001) argue that the control variables used to hold the steady state level of income constant are endogenous to the level of income. Cho argues that once the simultaneity bias is eliminated, conditional convergence does not hold.

2. Empirical analysis

2.1. Trends in total tax burden

Taxation can influence economic growth, prosperity and social security through three channels:

- tax system must provide sufficient revenue for financing good-quality public services and social transfers;
- through influence on economic decisions taxation must create stimuli to increase employment and effective and sustainable use of natural resources;
- taxation inevitably redistributes incomes and must do it so as to reinforce effective demand and social balance, reducing large gaps in income distribution.

In most general terms, a national tax policy is characterized by the tax burden indicator, i.e. ratio of resources collected by the state in the form of taxes to GDP. Our analysis indicated an increase in tax burdens in most of the EU Member States over 1970-2006. At the same time, it was identified that the tax burden experienced a particularly fast growth in the 1970s, slowed down in the 1990s and in 2000 started to fall again. The average tax burden in EU-25 in 2006 was 40.3% of GDP. The width of this band reflects the significant differences in the role played by the State within the Member States. General tax burden ratios tend to be significantly higher in the “old” EU-15 than in the “new” EU-10 Member States (40.3% and 33.7% in 2006, respectively).

The 2004 accession of EU-10 Member States resulted in an increase in the diversity of tax burden trends. EU-10 have in common a significantly lower tax burden than EU-15 and they even display different trends over time: in the EU-15 the tax burdens generally increased until the turn of the century and declined afterwards, in EU-10 the decline was concentrated in 1995-2001. In this context it is also worth noting that economic growth has been substantially different in EU-15 and in EU-10: in the period 1995-2006, the latter groups' GDP, although starting from a low level, increased about twice as much as its EU-15 equivalent. It should be noted, however, that EU-10 are far from constituting a homogeneous group, as Slovenia and Hungary display tax ratios that are not very distant from EU-15 levels, while the tax ratios in Lithuania and Latvia are considerably lower from the EU-10 average. Tax burden in Estonia was 31.0% in 2006, hence also lower than the EU-10 average. A comparison with the European countries pointed out that the tax burden in the USA in 2004 was only 25.5% of GDP, hence approximately 15 percentage points lower than in EU-15 and 8 percentage points lower than in EU-10.

On the basis of the tax burden in 2006 we can divide EU countries into 5 groups:

- seven countries had a higher than EU-15 average tax burden. These are Belgium, Italy, Denmark, France, Austria, Finland and Sweden. From among them the tax burden in Sweden and Denmark constituted nearly 50% of GDP;
- on a more-or-less the same level with EU-15 average are Germany, Luxembourg, UK and Netherlands, which may be placed into the second group;
- the third group includes countries where the tax burden remains much lower than EU-15 average. These are Greece, Spain, Portugal and Ireland;
- EU-10 Member States (with the exception of Slovenia and Hungary where the indicator is on the EU-15 average level) are characterized by much lower tax burdens than EU-15 and also EU-25 average. These are Czech Republic, Poland, Malta and Cyprus;
- the lowest is the tax burden in Estonia, Slovakia, Lithuania and Latvia.

In the period 1970–2006, the tax burden in EU-15 increased by an average of 10 percentage points, including most in Spain, Portugal and Italy (more than 15 percentage points) and in the period 1980–2006 approximately by 5 percentage points. For comparison, the tax burden in the USA has stayed for a long period on the same level or has even fallen (from 27.0% in 1970 to 26.4% in 1980 and to 25.5% in 2004). Grouping the EU-15 countries on the basis of tax burden changes over 1995–2006, we can distinguish 3 groups of countries:

- the first group comprises countries where the tax burden growth was the biggest. These are Italy, Greece, Spain, Portugal and the UK;
- the second group comprises the countries where the tax burden increased up to 1 percentage points. This group includes Denmark, France, Sweden, Austria and Belgium;
- the third group consists of countries where the tax burden remained the same or decreased. These are Germany, Finland, Ireland, Luxembourg and the Netherlands.

The reasons for such tax burden developments vary across countries. For example, in Greece and Portugal these are connected with the convergence process with EU so as to adjust the national infrastructure and social protection system to EU requirements. Tax burden growths in Spain and Italy are associated with the rapidly aging population and the related fast growth of social protection expenditure.

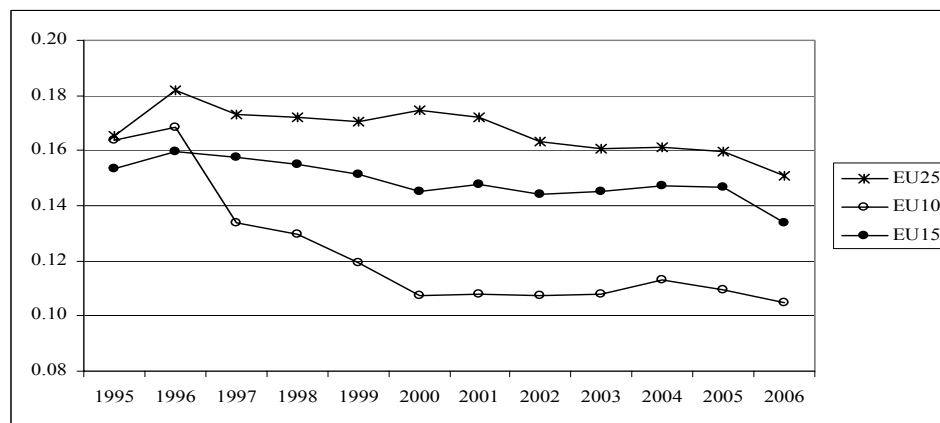
Analyses of the changes in tax burdens in EU-10 suggest that in 1995–2006 the tax burden decreased from year-to-year in Estonia, Latvia, Hungary, Poland, Slovenia and Slovakia. It has been relatively stable in Czech Republic and Lithuania and has risen heavily in Cyprus and Malta.

2.1.1. Convergence analysis in tax burden

Over the period 1995-2006, the tested variation coefficient fell in all EU countries from 0.165 in 1995 to 0.151 in 2006 and in old EU Member States from 0.153 to 0.134, confirming that the tax burdens converged in this period (Figure 1).

This is also evidenced by the risen ratio of the minimal to maximal tax burden from 55% to 60% in the EU-25 and from 60% to 65% in the EU-15. In EU-15 the highest tax burdens have been throughout the period in Sweden and Denmark, but the countries with the lowest tax burden have changed. However, generally these have been Greece, and since 1998 Ireland where the tax burden has been falling constantly in this period.

Figure 1. Variation coefficients of tax burdens in the EU, 1995-2006



The tax burdens have converged between EU-10 countries over the period 1995–2006 as confirmed by the decline in the variation coefficient from 0.164 to 0.105. And the ratio of minimal to maximal tax burden has also increased, which at the beginning of the period, in 1995, was 64% and at the end of the period, in 2006, 75%. Also, the country with the minimal tax burden has changed: at the beginning it was Malta, at the end of the period the country with the lowest tax burden was Lithuania. At the same time, analysis of all EU-25 countries in this period indicated that there has been no convergence in tax burden between EU-15 and EU-10 Member States and the level of the latter amounted to 83.6% of the EU-15 average level at the end of the period (in 1995 88.3%).

For the period 1995-2006, the test for β -convergence indicates the presence of β -convergence in tax burden in all three groups of EU countries under observation (EU-25, EU-15 and EU-10) with different level of

convergence, as well as different statistical significance (Table 1). The coefficient is negative and statistically most significant for EU-25 and EU-10 countries. The presence of β -convergence reflects dependence of the growth on the initial level of the indicator for all three groups of EU countries. Our estimation gave statistically significant coefficients and strong conditions for β -convergence in tax burden across the EU countries. For the EU-10 countries the value of the coefficient was -0.084 with 95% confidence interval from -0.129 to -0.039 and $\text{AdjR}^2 = 0.70$. The speed of convergence is rather slow, especially in EU-15 countries (1.5% annually) but the fastest in EU-10 countries (5.9% annually).

Table 1. β -convergence in tax burden in the EU, in 1995-2006

		Coef.	Std.Err	t	P> t	[95%CI]	
EU-25	Beeta	-0.035	0.012	-2.98	0.007	-0.059	-0.011
	Intercept	0.127	0.042	2.98	0.007	0.039	0.215
	AdjR^2	0.30					
EU-15	Beeta	-0.017	0.007	-2.42	0.031	-0.032	-0.002
	Intercept	0.064	0.026	2.51	0.026	0.009	0.119
	AdjR^2	0.31					
EU-10	Beeta	-0.084	0.020	-4.29	0.003	-0.129	-0.039
	Intercept	0.294	0.069	4.25	0.003	0.134	0.453
	AdjR^2	0.70					

Source: authors' calculations based on the EUROSTAT data.

2.2. Trends in the structure of tax revenue

Our evaluation (classification) of the structural changes in taxes is based on their economic function: taxes on labor, goods and services, and on capital.

Labor is one of the major objects of taxation, whereas labor mobility is smaller than mobility of capital, hence the labor tax base is more stable. The least mobile is the consumption tax base. The composition of tax policy and tax system in different countries has a significant effect on the structure of tax revenue. As a rule, less developed countries try to increase the share of taxes with a more stable tax base and reduce the role of highly mobile factors by raising or lowering the tax rates for the achievement of this purpose. As a result, they try to shift taxation from business income to personal income, from capital income to labor income, from direct income and taxation of welfare to taxation of consumption.

Analysis of taxation according to economic function indicates that both in EU-15 and EU-10, taxation of labor in 2006 contributed approximately half of the overall tax revenue (48.8% and 46.5%, respectively) and accounted respectively for 20.1% and 15.9% of GDP. The analysis also indicates that the share of taxes on labor in total tax revenue in both EU-15 and EU-10 has been relatively stable over the period 1995-2006.

Tax revenue on consumption in 2006 contributed in EU-15 an average of 11.8% and in EU-10 12.7% of GDP, accounting for 29.5% and 37.3% of overall tax revenue, respectively. At the same time we can perceive a decline in their share in EU-15 countries (compared to 1995 by 0.7 percentage points) and an increase in EU-10 countries (0.8 percentage points). Analyzing changes in the average tax rates on consumption we can see an uptrend since 1995 for the EU-15 and EU-10. The 2006 increase was quite broad (14 out of 25 countries recorded an increase).

Of critical importance in the taxation of capital is the composition of corporate income tax systems. In this respect the European Commission more than in other spheres has attempted to harmonize taxation of enterprises across the EU Member States. Globalization of capital markets has changed capital more sensitive to taxation, and therefore, in order to maintain tax revenue, the states have had to lower the tax burden. In the EU, taxes on capital usually account for less than one fifth of total tax revenue, while consumption taxes account for around one third. There are some differences in the structure between EU-15 and EU-10 Member States. In EU-10, consumption taxes usually account for a somewhat higher share of total tax revenue, while taxes on capital play, on average, a smaller role. Tax revenue on capital in 2006 accounted for 21.9% in EU-15 and 16.6% in EU-10 of total tax revenue. The share of revenue yielded by capital taxes is large in the UK, Luxembourg and Ireland in EU-15, and in Malta in EU-10. In Denmark and Sweden the relatively low shares are rather due to high taxation of other factors than to low taxation of capital, while for the EU-10 low taxation of capital is undeniable, although the existing data limitations might result in a downward bias.

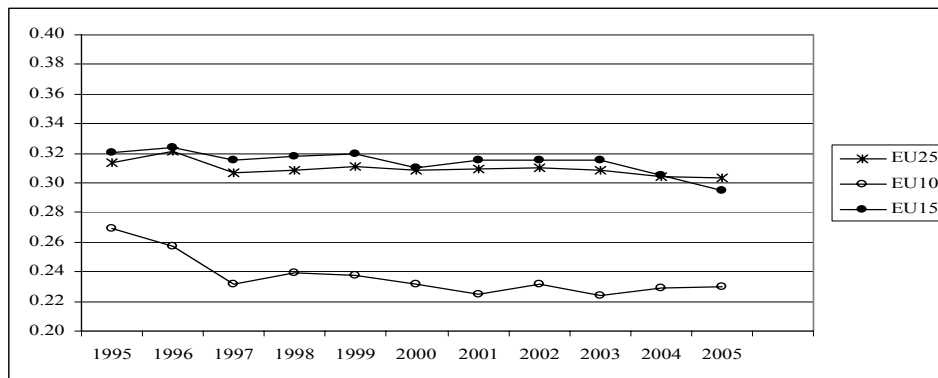
2.2.1. Convergence analysis of the taxes on labor, consumption and capital

We analyzed whether in addition to overall convergence in tax burden between EU countries there has occurred also convergence in the structure of tax revenue. The analysis indicated that the variation coefficient of labor taxes as percent of GDP decreased in EU-25 from 0.314 to 0.303 in the period 1995-2006. Cyclical changes were discovered in EU-10, and shorter and longer periods of divergence occurred. At the end of the period of analysis, i.e. in

1995-2005, the share of taxation on labor in GDP in EU-15 and in EU-25 converged (Figure 2).

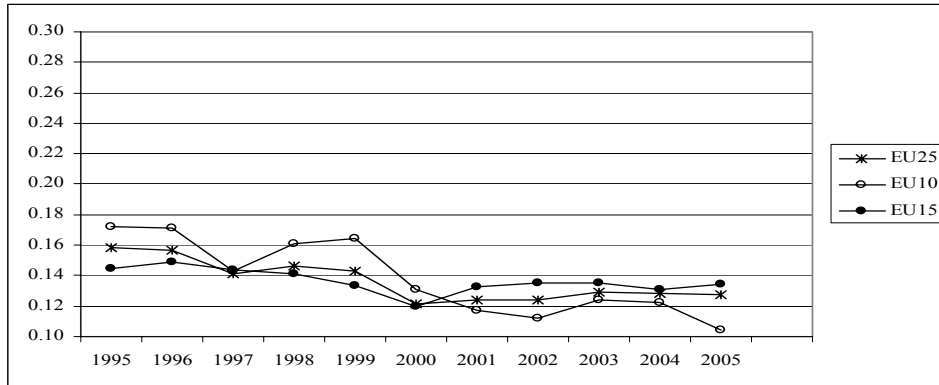
Since the mid-1990s, several EU-15 countries have implemented reforms to their tax systems. The reforms vary in coverage, but are often aimed at reducing the tax burden on labor. Reforms of personal income tax have lowered the statutory rates (for example, in Spain, Ireland), reduced the number of tax brackets (e.g. Austria, Finland) and increased the minimum level of tax-exempt income (e.g. Germany, Luxembourg).

Figure 2. Variation coefficients of the taxes on labor as % of GDP in the EU, 1995-2005



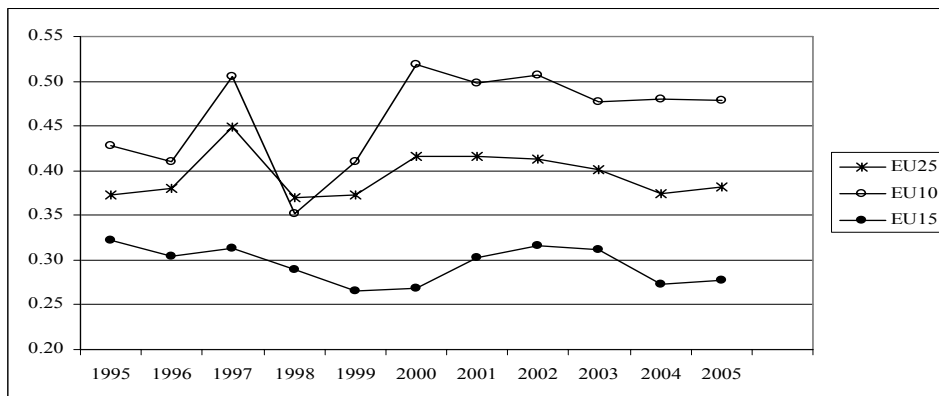
The presence of convergence was detected also in tax revenues on consumption as a share of GDP. In the period 1995-2005, the variation coefficient in EU-25 decreased from 0.159 to 0.128, in EU-15 from 0.144 to 0.134 and in EU-10 from 0.172 to 0.104 (see Figure 3). In the second half of the 1990s, some countries implemented comprehensive “green” tax reforms. Indirect taxes were increased and new environment related taxes were introduced (e.g. in Denmark, Finland, Germany). Several countries raised the VAT rate, either the general VAT rate or for some products (e.g. Netherlands, Sweden), while others have implemented either general VAT reductions or targeted reductions for certain products/services (e.g. Ireland, Greece). These steps were often taken to compensate for the decrease in the revenue from taxation of labor.

Figure 3. Variation coefficients of the taxes on consumption as % of GDP in the EU, 1995-2005



Unlike the taxation of labor and consumption, no convergence is clearly detected in taxation of capital (Figure 4). In the period 1995-2005, the variation coefficient in EU-15 decreased from 0.323 to 0.278. Despite the emphasis on the need to coordinate tax reforms in EU countries, the reforms still do not show essential co-operation in transforming tax systems. The main reason for the competition caused by the diversity of national tax systems is the international mobile capital. To attract investments and maintain the existing ones the states have had to lower tax rates (e.g. Ireland, Denmark). Reduction in the tax revenue, however, is often compensated by increase in the tax base.

Figure 4. Variation coefficients of the taxes on capital as % of GDP in the EU, 1995-2005



The new EU countries have lowered the even so low corporate income tax rates, whereas no harmonization has been detected in taxation of capital.

The variation coefficient in EU-10 increased from 0.428 in 1995 to 0.479 in 2005. At the same time, the ratio of the minimal to maximum level countries has diminished from 22% to 25%.

According to the β -convergence test, there appears to have been convergence of taxes by economic function in these three groups of EU countries during the period 1995-2006, but the estimated coefficients of explanatory variables are characterized by different statistical significance. Stronger β -convergence over the period under observation is detected in taxes on consumption and labor as a share of GDP in the EU-10 countries. The speed of convergence indicates that consumption taxes were converging faster than labor taxes in the EU-10 (2.8% and 1.4% annually, respectively). In the EU-25 and EU-15 countries, the test for β -convergence in the taxes on labor, consumption and capital as a share of GDP did not satisfy the strong conditions for β -convergence and did not give statistically significant coefficients either.

2.3. Trends in GDP *per capita*

The higher economic growth the EU has enjoyed during the last two years has to a great extent been achieved thanks to reforms in areas such as labor market, business regulation and social welfare. On the basis of GDP per capita in 2006 we can divide EU countries into 5 groups:

- four countries had a higher than EU-15 average GDP per capita. These are Austria, Ireland, Luxembourg and Netherlands. From among them the GDP per capita in Luxembourg was more than twice as high as EU-15 average;
- on a more-or-less the same level with EU-15 average are Belgium, Denmark, Sweden, Finland, Germany and UK, which may be placed into the second group;
- the third group includes countries where the tax burden remains much lower than EU-15 average. These are Greece, Spain, France, Italy and Portugal;
- EU-10 Member States are characterized by much lower GDP per capita than EU-15.
- the lowest is the GDP per capita in Poland, Lithuania and Latvia, where it is less than 50% of the EU-15 average level.

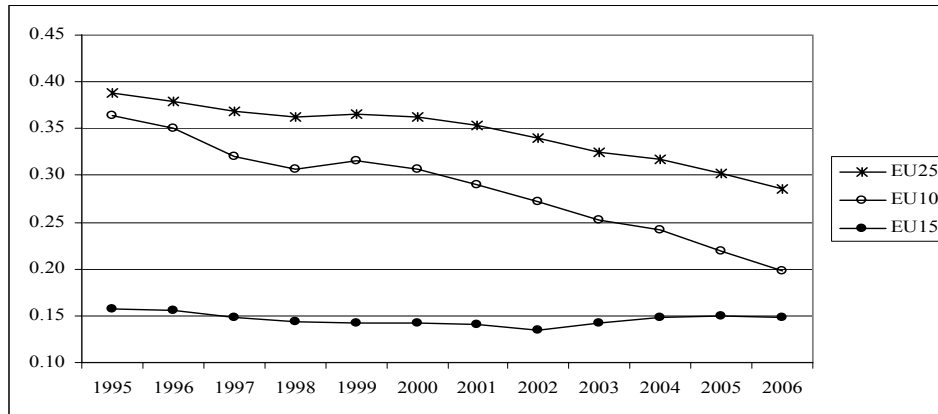
EU is one of the few regions where income convergence has occurred in the long term and where income differences between countries have diminished. This shows faster economic growth in countries with a low development level and slower growth in more advanced countries. At the same time, earlier studies demonstrate that income convergence in EU-15 countries occurred mainly in 1973-1998, and in the subsequent years the convergence

slowed down (Barro 1990; Barro and Sala-i-Martin 1991). In 1995-2006, the slowest annual average economic growth rate in EU-15 was in Italy and Germany – 1.3 and 1.4%, respectively, and the fastest in Ireland – 7.4%. At the same time, also in the highest income country Luxembourg economic growth has been remarkably fast – on average 5.9% a year. In 2006, the GDP per capita in Luxembourg was 269% of the average EU-25 level and 221% of the EU-15 level. Overall economic growth has been faster than in the developed world just in new EU-10 countries. From among them, the fastest annual average growth rate in the period of analysis has been in Estonia – 7.3%, Latvia – 7.0% and Lithuania – 6.5%. These countries' GDP *per capita* in 2006 was 65.5%, 53.8% and 55.7%, respectively, of the EU-25 level and 53.8%, 44.3% and 45.8%, respectively, of the EU-15 level. The lowest compared with the average is the level of incomes in Poland where it is only 51% of the EU-25 and 42% of the EU-15 level.

2.3.1. Convergence analysis in GDP *per capita*

In order to eliminate the impact of Luxembourg on the assessment of convergence we have analyzed the economic growth trend without Luxembourg. In the period 1995-2006, the tested variation coefficient in EU-25 countries fell from 0.388 in 1995 to 0.286 in 2006, in EU-15 from 0.158 to 0.148 and in EU-10 countries from 0.365 to 0.198, confirming that the income levels (measured as GDP *per capita* at PPS) have converged in this period (Figure 6). The smallest has been the convergence in EU-15 countries, where also the ratio of the minimal to maximal level has fallen from 60% to 52%. The highest income country since 2000 has been Ireland, which retained that position till the end of the period of analysis. The lowest income country among EU-15 countries throughout the period has been Portugal, which has not enhanced its relative income level significantly.

Figure 6. Variation coefficients of the GDP per capita in the EU, 1995-2006



The biggest convergence has occurred among EU-10 countries where the min/max ratio has increased. Incomes of the country with the lowest level at the beginning of the period constituted 36%, at the end of the period 57% of the per capita income of the highest level country. These countries in general are characterized by a very fast economic growth in this period, as a result of what convergence in income level to EU-10 and EU-25 countries can be detected. However, the average income per capita in EU-10 countries reached only 55.4% of the respective EU-15 level at the end of the period (in 1995 46.1%).

The β -convergence test for the GDP per capita in these three groups of EU countries in 1995-2006 satisfies the strong conditions for β -convergence and demonstrates quite a similar level of convergence. But the statistical significance of the estimated coefficients of explanatory variables was stronger for EU-25 ($\text{AdjR}^2 = 0.70$) and EU-10 ($\text{AdjR}^2 = 0.80$) countries (Table 2). The coefficients' values were: -0.035 with 95% confidence interval from -0.045 to -0.026, and -0.049 with 95% confidence interval from -0.069 to -0.030, respectively. The annually speed of convergence varies from 3.9% in EU-10 to 2.5% in EU-15.

Table 2. β -convergence in GDP per capita in the EU, in 1995-2006

		Coef.	Std.Err	t	P> t	[95%CI]	
EU-25	Beta	-0.035	0.005	-7.690	0.000	-0.045	-0.026
	Intercept	0.387	0.043	8.950	0.000	0.297	0.476
	AdjR ²	0.70					
EU-15	Beta	-0.029	0.011	-1.72	0.112	-0.066	0.008
	Intercept	0.329	0.165	1.99	0.070	-0.031	0.689
	AdjR ²	0.20					

Taxation and economic growth: the trends in the EU countries

EU-10	Beta	-0.049	0.008	-5.93	0.000	-0.069	-0.030
	Intercept	0.510	0.075	6.85	0.000	0.339	0.682
	AdjR ²	0.80					

Source: authors' calculations based on the EUROSTAT data.

Conclusions

The most significant trend in tax burden development in the three groups of EU countries (EU-25, EU-15 and EU-10) in the period 1995–2006 has been the convergence of tax burdens. This is confirmed by the convergence analysis, both σ -convergence and β -convergence tests of tax burdens indicate convergence although at different levels of convergence, as well as different statistical significance. There has been convergence also in GDP *per capita* at PPS between countries in this period, especially between EU-25 countries and EU-10 countries, as a result of a very fast economic growth in the latter.

References

- Arena, P., K. Button, and S. Lall (2000), "Do Regional Economic Converge?", *International Advances in Economic Research*, Vol. 6(1), pp. 1-15.
- Barro, R. J. (1990), "Government Spending in a Simple Model of Endogenous Growth", *Journal of Political Economy*, Vol. 98(5), pp. S103-125.
- Barro, R. and X. Sala-i-Martin (1991), "Convergence across States and Regions", *Brookings Papers on Economic Activity*, No. 1, pp. 107-182.
- Barro, R. and X. Sala-i-Martin (1992a), "Convergence", *Journal of Political Economy*, Vol. 100(2), pp. 223–249.
- Barro, R. and X. Sala-i-Martin (1992b), "Regional Growth and Migration: a Japan-United States Comparison", *Journal of the Japanese and International Economies*, No. 6, pp. 312–346.
- Baumol, W. (1986), "Productivity Growth, Convergence and Welfare: What the Long-run Data Show", *American Economic Review*, No. 76, pp. 1072-1085.
- Boyle, G. and T. McCarthy (1997), "A Simple Measure of β -Convergence", *Oxford Bulletin of Economics and Statistics*, No. 59, pp. 257-264.
- Cho, D. (1994), "Industrialization, Convergence, and Patterns of Growth", *Southern Economic Journal*, No. 61, pp. 398-414.
- Cho, D. (1996), "An Alternative Interpretation of Convergence Results", *Journal of Money, Credit, and Banking*, No. 28, pp. 669-681.

- DeLong, J. (1988), "Productivity Growth, Convergence and Welfare: Comment", *American Economic Review*, Vol. 78(5), pp. 1138-1154.
- Dorwick, S. and D. Nguyen (1989), "OECD Comparative Economic Growth 1950–85: Catch-Up and Convergence", *American Economic Review*, Vol. 79(5), pp. 1010–1030.
- Easterly, W. (1993), "How Much Do Distortions Affect Growth?", *Journal of Monetary Economics*, Vol. 32, pp.187-212.
- Easterly, W. (2001), *The Elusive Quest for Growth*. Cambridge, MA: MIT Press.
- Folster, S. and M. Henrekson (1999), "Growth and the Public Sector: a Critique of the Critics", *European Journal of Political Economy*, Vol. 15, pp. 337-358.
- Lucas, R. E. (1988), "On the Mechanics of Economic Development", *Journal of Monetary Economics*, Vol. 22, pp. 3-42.
- Püss, T., and M. Viies (2007), "Tax Burden Convergence in EU Countries: a Time Series Analysis", *The Journal of American Academy of Business, Cambridge*, Vol. 12 (1), pp. 193-198
- Quah, D. T. (1996), "Twin Peaks: Growth and Convergence in Models of Distribution Dynamics", *The Economic Journal*, Vol. 106, pp. 1045-1055.
- Romer, P. M. (1986), "Increasing Returns and Long-run Growth", *Journal of Political Economy*, Vol. 94, pp.1002-1037.
- Sala-i-Martin, X. (1994), "Regional Cohesion: Evidence and Theories of Regional Growth and Convergence", Discussion Paper No. 1075, Centre for Economic Policy Research.
- Sala-i-Martin, X. (1996), "The Classical Approach to Convergence Analysis", *Economic Journal*, Vol. 106, pp. 1019-1036.