Adrienn Erős

The impact of tax structure on long-term economic growth

Theory and empirical experience in view of the Hungarian data

The primary aim of economic policy is to achieve as great and as general welfare as possible. The only way to achieve the long-term growth of welfare is to ensure the intense but sustainable development of the economy. This is why it is a key issue to study economic growth. Most of the growth theory studies are prepared in this spirit, which leaves all aspects besides growth out of the scope of attention, while the aim of economic policy is to increase welfare. However, we think that this contradiction is only seeming, and it depends on the selection of the time horizon, as the level of consumption cannot be permanently detached from the level of output. It is probably starting out from this idea that the majority of researchers opt on the maximization of the growth rate of output rather than consumption (welfare).

STATE ROLE AND ECONOMIC GROWTH

Whatever tax type the income of the state is generated from, the tax impact can be broken down to income[1] and substitution[2] effects in each case. The lump sum taxes only exert income effects, so the distorting effect of any tax is directly proportionate to the extent of the substitution effect.[3] Since the lump sum taxes do not involve substitution (distorting) effects, these generate the highest amounts of

income, with equivalent loss in individual welfare.[4] The substitution impact causes a loss of efficiency, which is called deadweight loss[5]. This suggests that from an efficiency point of view, the best solution would be to collect all the revenue from lump sum taxes but this method is unacceptable from a social perspective. Accordingly, we have applied the following definitions in our study.

◘ Distortionary taxation, which influences the investment decisions (should they refer to physical or human resources) of economic actors and distort the steady state growth rate of the economy. The tax types imposed on income from capital and work are listed in this category, including personal income taxes and corporate profit taxes, social security contributions, other payment obligations related to wages, as well as the property tax.

◘ Non-distortionary taxation does not affect savings or investment decisions due to the nature of the indifference curve, thus they have no impact on the growth rate (these are the taxes imposed on consumption).

◘ Those items are listed in the category of other revenues whose impact on growth is ambiguous, the proportion of such items is usually low. This group contains the taxation of international trade, non-tax type income and other tax income.[6]

The tax system influences output through several channels. These supply side effects are insignificant in the short run but they determine the rate of economic growth over the long run.[7] Production functions, based on which output can be determined, usually contain the inputs of production and a variable referring to the state of the applied technology. Based on this, output is defined by the supply of natural resources, the quantity of labor force (and its quality, in the case of more up-to-date production functions), the volume of available capital and the standard of technology.

The supply of natural resources cannot be influenced by the state but what about the other factors? The quantity of labor force depends on such demographic factors which cannot really be controlled by the state on the one hand, but on the other hand, the quality of the work force is dependent on the education system (which belongs to the competence of the state up to a certain level of education). The willingness to take up employment can also be influenced through the tax system, although the revenue and replacement effects usually neutralize each other in the case of men (which, logically, also means that the incurred distorting effect may be significant). However, research suggests that the participation of women in the labor market is affected by the income tax system.[8] Much depends on the marginal tax rate as well, the more progressive a system is, the less it will encourage people to take on extra work.[9]

The state can influence the savings of the private sector by several measures as well. As for the households, the tax system can influence the choice between present and future consumption. However, this decision has a twofold impact. On the one hand, it slows down the accumulation of capital if it fails to encourage saving, thus the adequate amount of capital will not be available for the implementation of investments. At the same time, howe-ver, people can spend more on consumption in the present, on the demand side. The income tax benefits usually do not change the size of the savings, they just divert them from certain forms of savings to others. The system of depreciation and the tax treatment of dividends impact the savings of the business sector.[10] Savings are a necessary but insufficient condition to investments, when the investment decisions are made. Tax considerations once again play a role, as in comparing the alternatives, the after-tax income will be considered.[11] The state of the applied technology depends, among others, on the intensity of the research and development activity. This is why the tax system of most countries contains certain incentives (such as the possibility to account research expenses as costs, or that of the multiple deduction of these amounts).[12]

ANALYSING ECONOMIC GROWTH

According to the neoclassical growth theory, long-term economic growth is explicable by two exogenous variables, which are the pace of technological progress and the growth rate of the economically active population. Thus, fiscal policy may only have a temporary effect on the growth rate, although it definitively influences the level of the achieved welfare.

"Endogenous growth is long-run economic growth at a rate determined by forces that are internal to the economic system, particularly those forces governing the opportunities and incentives to create technological know-ledge."[13] This theory is of utmost importance for giving space to fiscal policy in influencing economic growth. "According to the endogenous theory of growth the rate of long run economic growth depends on such governmental activities like taxation, the protection of law and order, supplying infrastructure, defence of immaterial goods, and the regulation of inter-

national trade, capital markets and other segments of the economy. That's why governments can have a wide range of possibilities to influence long-term economic growth both in positive and negative directions."[14] However, growth depends on a number of such factors which the government is unable to influence, such as the fertility of the population (the willingness to have children) or access to the natural resources.[15] Since my study deals with the impact of tax policy on the long-term growth of the economy, we will now focus on the studies dealing with the impact of the elements of the tax system, out of the wide selection of literature.

The size of the state sector

There are two methods to measure the size of the state sector.

- On the one hand, we can examine the proportion of state expenses to the GDP (i.e. the size of redistribution),
- on the other hand, we may examine the proportion of state withdrawals to the GDP (i.e. the size of income centralization).

According to Wagner's Law, the size of the state sector is larger in countries with higher incomes. The growth rate of tax revenue was moving around 9.9 percent in the European countries between 1970 and 1998.[16] According to the theory, the high level of taxation deteriorates growth perspectives through several channels in the long run. According to the endogenous theory, the source of growth is the accumulation of factors of production, this is why the incentives that act against these will reduce the growth potentials.[17] Higher tax levels decrease the growth rate (through the reduction of the available income), as well as the investment rate (through decreasing profitability), thus the accumulation of capital will

slow down, which results in ever slower economic growth over the long run, and may also change the marginal product of the capital, thus may divert capital allocation from the optimum level.[18] Tax policy may moderate the increase in the profitability of capital as well, as long as it fails to encourage research and development activity adequately. However, higher tax rates mean a less intense incentive for taking up employment and the accumulation of human capital as well, through their unfavorable effect on real wages.

According to Wagner's Law, the size of the government sector increases parallel to the increasing income levels. The state needs more revenue to cover for its higher expenses, while the higher level of taxes moderates growth. Does this mean that the countries with higher incomes realize a lower growth rate? The idea of absolute convergence is not supported by empirical research but conditional convergence (the approximation of the income levels of countries with the same conditions) is justified by a high number of studies. This means that both too large and too small state sectors are detrimental to growth. At least in theory there exists an ideal proportion of state revenue, which ensures the most efficient financing of the required state services.

The size of the state sector does not influence the growth potentials in itself.[19] The "quality of governing" is a very important factor, which is defined by how efficiently the government uses the available resources. According to Barro's 1988 model, in an ideal case, the proportion of the productive expenses of the state and the output is equivalent to the proportion of the productivity of the public and the private sectors.[20] According to the model, this optimum condition (which only refers to the proportion of productive expenses) will not change even if the state produces such goods for consumption which are not indicated in the production function of the pri-

vate sector but appear in the utility function of the consumers.[21] In such cases, logically, more tax revenue is needed (as the Barro model calculates with a balanced budget), which will result in distortion and will slow down the process of growth.[22] The model suggests that the role of the size of the state sector in forming the growth rate is twofold. In the case of a small state, the positive effects are dominant but if the state sector becomes oversize, the negative effects will come to the foreground, as a result of the ever increasing weight of the distorting taxes.[23]

In practice, however, two problems arise in connection with the proposals made by theory. "Two observations can be made related to this aspect. First, the precise determination of this optimal level is pratically impossible to make in the real world. Second, all the industrial countries have now tax levels that, at least from the point of view of financing essential spending, are above the optimal level. Therefore, a reduction of the tax level in these countries would promote a faster rate of growth as long as this reduction were accompanied by a reduction in non productive spending" (which is indicated as an input in the production of the private sector).[24]

What can you learn from the empirical literature about the correlation between the size of the state sector and the rate of long-term economic growth? The studies do not represent a uniform standpoint in this respect. No significant correlation has been found by certain studies between the two variables, while others have demonstrated a significant negative correlation, which is suggested by the theoretical models as well. There are, however, other studies that have not found any relationship between the rate of growth and the level of taxation. None seems to have found a positive relationship.[25]

Certain studies have not shown any significant correlation between the level of taxation and the long-term rate of growth. The study prepared by *Mendoza, Milesi-Ferretti* and *Asea* in 1997 can be listed in this category, in which study it is proven that it is *Harberger's* neutrality conjecture[26] that stands the test of reality as opposed to the forecasts of the endogenous models, according to which tax policy is not an efficient long-term tool to change the rate of growth. In their study, they have shown a significant correlation between the tax burdens and the investment rates by analyzing the data of eleven OECD member states between 1965 and 1991 but they have not found the impact of the very same factors on long-term growth rate significant.[27]

Those studies whose authors have found a significant negative correlation between the level of taxation and long-term growth rate are listed in the other category. In *Romer's* 1989 empirical study, a negative correlation was found between income-proportionate state expenses and the long-term rate of growth[28] on the basis of the data of ninety-four countries collected between 1960 and 1985. *Fölster* and *Henrekson*, in their studies prepared in 1998 and 2000, examined the impact of the size of the state sector on growth, by using two indicators, namely the tax revenue and the proportion of state expenses to the GDP. In the case of both variables, a significant negative correlation was found between these and the rate of growth, with regard to the developed countries. This correlation proved to be closer in the case of the state expenses than for the taxes.[29] *Engen* and *Skinner,* in their 1992 study, also found a clear and strong negative relationship between the tax level and the long-term rate of growth, on the basis of the data of one hundred and seven countries collected between 1970 and 1985. On the basis of their regression calculations, they also assigned a negative impact to the increase in state expenses.[30]

At the same time, in their 1996 study, co-authors Engen and Skinner concluded from the

historical data of the United States of America that in the USA, there is a very slight chance for tax reduction to become self-sustaining, i.e. for such a measure to result in achieving the earlier revenue level as a result of the extra growth generated by the tax reduction itself.[31] In their study, the authors have reached the ultimate conclusion that the structure of the tax system probably has a greater impact on the long-term rate of economic growth than the level of the tax revenue itself.[32]

Thus, the evaluation of the correlation between the size of the state sector and the rate of economic growth is ambiguous in the literature. In our immediate vicinity, among the European Union member states that show faster than average growth rates, it is easy to find countries with larger than average (Finland, Denmark) and smaller than average (Ireland) state sectors.[33] This is why we agree with the above-quoted conclusion made by Engen and Skinner in their 1996 study, which was confirmed (among others) by *Sala-i–Martin* (2002) as well, saying that besides the proportion of the state sector to the GDP, most probably the structure of income and expenses also plays an important part in the aggregate impact on growth. This is why we continue to study the literature by discussing the impact of the individual elements of the taxation system on growth.

The structure of taxation

The effect of the various tax types on growth perspectives is different. According to Barro's 1988 model, income tax (even if lump sum) diverts the economy from the optimum balance situation in market economies.[34] Thus, the rate of savings and the achieved level of utility will be lower than it could be in case the savings rate were determined by the state (just like in the command economies). In order to realize the higher utility level of the command economies, Barro proposes the application of a lump-sum consumption tax instead of that of the income tax for the decentralized (market) economies, as long as the level of taxation is selected by the government in accordance with the optimum condition of efficiency[35], or lower than that. If the withdrawal level is higher than optimum, Barro suggests that income tax should be imposed.[36]

Later Barro and Sala-i-Martin jointly developed this theory further, by incorporating the various types of public goods into it. From their model, they concluded that imposing a lump-sum tax is superior to the application of the income tax if the service provided by the community is publicly provided private goods (which involves rivalry and others can be excluded from their utilization), or is publicly provided public goods (which does not involve rivalry and others cannot be excluded from their utilization). However, these conditions are not fulfilled for a certain part of the public assets, as they are subject to congestion so involve rivalry but others can only be excluded from their utilization to a certain extent (these mean fee-paying assets,[37] such are transport and courts). In these instances, the income tax functions as a kind of user fee, so it is a better solution than lump sum taxation.[38]

In their model, *Roubini* and Milesi-Ferretti examined the impact of the taxation of income from work and capital on economic growth. They have established that the ideal solution would be if taxes were imposed on neither of these factors but if this is not doable as a result of the budget constraint, the taxation of these two factors at the same rate is proposed,[39] since the taxation of work-related income has an indirect negative effect on the profitability of capital.

To what extent do the empirical studies support the conclusions that can be drawn from the theoretical models? The studies do not rep-

resent a uniform view in this respect either (similarly to the analysis of the size of the state sector).

In the 1997 study of Mendoza, Milesi-Ferretti and Asea, a significant negative correlation between the investment rate and the taxation of factor incomes was demonstrated, and the same negative but statistically not significant correlation was found with regard to growth as well. In the case of the consumption taxes, a significant positive relationship was found with the investment rate but their impact on growth was not found significant either.[40]

In their 1993 empirical study, *Easterly* and *Rebelo* found it embarrassing that, as opposed to the unambiguous forecasts made by the theoretical models, the analysis of data only shows an insignificant relationship between the income tax rates and growth. As a possible reason for this, they indicate that, according to their research, the countries with higher incomes rely on the taxation of incomes as a source of revenue to a much higher extent, and in turn, these countries usually realize a lower rate of growth.[41]

In *Tanzi* and *Schuknecht's* empirical study conducted in 2003, a strong negative correlation was found between the growth performance and the level of direct taxes (including the social security contributions) based on examining the data of twenty-four OECD countries between 1960 and 2000.[42] This negative relationship is proven by the authors by the clear correlation between the increase in direct taxes and the decrease in capital accumulation and the proportion of the employed population, which two factors are the two main elements of any growth theory equations.

The stability of the taxation system is another important element in the relationship between growth and the taxation system. Frequent changes in taxation rules and the related uncertainty may influence the econo-mic decisions on the future, or may even result in postponing these decisions.[43] Tanzi and Schuknecht have proven in their study that the revenue from direct taxes is more volatile than that coming from indirect taxes. One reason for this is definitely that incomes fluctuate more than consumption does (people adjust the level of their consumption to the level of income that they expect during their lifetime, rather than to their momentary earnings). On the other hand, "the regulation governing personal income tax and corporate profit tax benefits and allowances is changed more often than the rules of indirect taxes."[44]

Thus, to sum up, we can state that the majority of both the theoretical models and the empirical studies have discovered a negative correlation between the rate of long-term growth and the taxation of factor incomes (although the results are not significant according to each and every empirical study), while they generally attribute a neutral effect to the indirect taxes.

METHODOLOGY OF EMPIRICAL STUDIES

The time horizon of the study comprises fifteen years. The shift in the political system (i.e. the fall of the Berlin Wall in 1989) brought about such a fundamental turn in the life of the country which renders it senseless to look back at the decades preceding 1990. This fifteen-year period gives us a narrow time horizon for the examination of long-term growth but a number of empirical studies have relied on the analysis of a similar, fifteen-twenty-year period, so we regard this as acceptable.

In the empirical tests, it is important to separate the long- and short-term effects of the individual measures. The most widely applied method is to break down the time-series of data to five- or three-year periods and the correlations between the five-year average values

are analyzed. In order to make as many observations as possible, we will apply moving averages, as we have seen in other studies in the technical literature (Devarajan et al, 1996, p. 322).

We need statistical data for performing the calculations. However, when we evaluate our conclusions drawn from these, we always have to be aware that the Hungarian budgetary data are not to be regarded as absolutely reliable in the first half of the period under review. Although ad hoc manipulation ceased to be applied after the shift in the political system, certain systematic distortions still occurred until 1998.[45]

The sources of the data that we have used are as follows: we apply two variables for the measurement of the evolution of real income (OECD Factbook 2006, Economic, Environmental and Social Statistics, ISBN 92-64-03561-3, © OECD 2006). We apply the consolidated figures of public finances as budgetary variables. The income data come from the OECD database (OECD Economic Outlook 79 database, Annex Table 25, General Government total outlays).

Before conducting any further statistical analyses, we have to examine whether their results are acceptable with adequate certainty. For this, we have to test the level of integration of the time series (by applying the extended Dickey-Fuller test of the statistical software EViews). Such types of testing basically give reliable answers to the question in the case of time series of the adequate length (samples consisting of a high number of elements). In the case of the extended Dickey-Fuller-test, the critical values were defined for 20 observations, however, due to the objective reasons listed above, we only had short periods available for the study (in the case of most variables, we could only build on 8–12 observations – because of the method of using moving averages). It is exactly because of this that we had

reservations before performing the test. In spite of this, in a significant proportion we came to the conclusion that our time series calculated with the moving averaging method are stationary, based on which the further tests can be performed. Where the result was contrary to this (i.e. we accepted the Ho Hypothesis, according to which the time series are integrated), our result was not so far from acceptable (the critical value) either, it was only higher than that (it was relevant on the 15–20–25 percent significance level). On the basis of the tests, we ultimately came to the conclusion that they do not suggest that we should not conduct the planned analyses with our datasets, and should not draw conclusions from these, although it will be justified to handle the results with a certain level of reservation due to the brevity of the time series.

EMPIRICAL TESTING WITH HUNGARIAN DATASETS

The methods to be applied in this test are rather simple, however, if we use the introductory thoughts of the 2003 Tanzi and Schuknecht study, "rather than adding a new, econometric chapter (which is questionable, similarly to the earlier ones) to the technical literature of this subject, we will conduct a simpler but hopefully still informative analysis". This choice is also justified by the fact that this way our findings will be comparable with the international technical literature. However, in judging such a complex issue as the effect of fiscal policy on the rate of long-term economic growth, "a system with such a low dimension can only be regarded as the "marginalization" of a model with several variables, from which only limited conclusions can be drawn."[47]

In Hungary, we can see a strong negative correlation between the proportion of the budgetary revenue to the GDP and the rate of growth

Figure 1

CORRELATION OF THE GROWTH RATE WITH THE TOTAL STATE REVENUE IN PROPORTION TO GDP IN HUNGARY

Dependent variable: 5-year average growth rate of the real GDP

	Model summary					Parameter estimates		
Equation	r2	F	df1	df2	Signific	Constant	b1	b2
Linear	.976	450.267	1	11	.000	26.978	518	

Dependent variable: total GDP-rated revenue, 5-year moving average
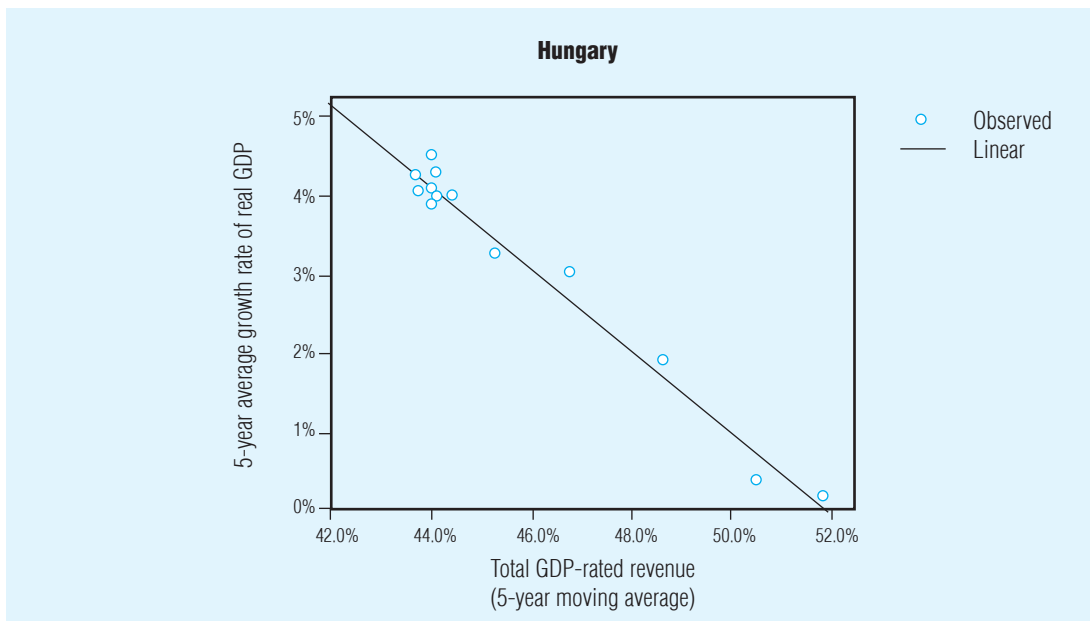
Source: own calculation

(see table 1, line 1). The strong negative correlation between the two variables is shown in *Diagram 1:* the value of the determination coefficient is rather high (*r²*=0.98), significant (0.000). This result is the same as the forecasts made by theory and the models, as well as the results of empirical tests in developed countries.

The proportion of income and profit taxes to the GDP is in a negative but insignificant relationship with the growth rate (table 1, *line 2*). However, it deserves attention that the level of these tax types as compared to the GDP decreased in the period under review (from 12.66 to 8.48 percent). However, their proportion increased (from 19.4 to 21.9 percent) with-

in the generally decreasing tax burden, however, this change still has a significant positive effect on the growth rate (table 1, *line 3*). This probably suggests a reverse causality between growth and the tax structure, i.e. it is not this change in the tax system that causes a higher growth rate but the developed countries usually rely on income and profit taxes to a higher extent, this is why the role of this tax type increases in public financing in parallel to the increase in the per capita real GDP, as concluded by Easterly and Rebelo in their 1993 study.[48]

There is a significant negative correlation between the level of social security contributions as compared to the GDP and the growth

rate (table 1, *line 4*). This correlation is supported by regression as well, the value of the determination co-efficient is high (r^2=97.8 percent). The changed proportion of the social security contributions within the total revenue also has a significant negative impact on growth (table 1, *line 5*). The revenue from social security contributions reached as much as 18.2 percent of the GDP in 1993, then, after continuous decrease, it made up 11.4 percent of the GDP in 2004. This means a decrease from 32.7 to 26.3 percent in proportion to the total revenue.

The other two tax types are distortionary, i.e. other contributions tied to wages, and the property tax do not fulfill a significant role in the budgetary sources of the state either (their proportion to the GDP fluctuates around 1.3 and 1.7 percent). These are in a significant positive relationship with the long-term growth rate in Hungary (table 1, *lines 6–7*). This correlation contradicts international experience and our expectations on the basis of theory as well, however, for the time being, these do not fulfill a significant role in the public revenues on the one hand, and the weight of the property tax still lags behind the general level typical in the developed countries, on the other hand.

The Hungarian dataset of the proportion of distorting taxes to the GDP (based on the 3- and 5-year moving averages) is not integrated. We can find a significant negative correlation in the totality of the GDP-rated distortionary taxes (in harmony with the individual impact of each element) (table 1, *line 8*).

The GDP-rated indicator of non-distorting taxes[49] suggests a significant positive correlation with the proportion of non-distortionary taxation to GDP in the case of both indicators that measure economic growth calculated for the five-year period (table 1, *line 10*). The proportion of non-distortionary taxes to the GDP rose from 12.2 to 14.6 percent in the period under review. In the meantime, the total tax burden fell significantly, by some 8.5 percent-

age points, as a result of which the proportion of non-distortionary taxes within the total revenue grew significantly, from 24.7 to 32.1 percent. This change in the tax structure is in a significant positive relationship with the rate of economic growth (table 1, *line 11*).

The category of other revenue[50] contains several elements. The proportion of each of these to the GDP is in a significant negative relationship with the growth rate, as the Hungarian data suggest (table 1, *line 12*).

SUMMARY

In the study, we discussed the fundamental and disputed issue of whether there is any correlation between tax policy and long-term economic growth, and if so, how strong this relationship is. There are frequently voiced arguments for the "omnipotence" of economic policy, and that the state can do anything that it wants. In the age of Keynes, it seemed to be logical that crises can only be overcome by state involvement, while classical economists say that in crisis-free periods, state involvement will distort market balance.[51] A number of experts emphasize that the state should interfere with the operation of the economy to the slightest possible extent, in most cases adding that the primary goal (once the situation is as it is, and in today's world, mixed economies, where the state and the market exist side by side, are natural) is to maintain the equilibrium of the budget and to reduce the volume of the state debt.

According to the neoclassical growth theory, the rate of long-term economic growth is explicable by two exogenous variables, namely technological development and the growth rate of the economically active population. Thus, budgetary policy may only have a temporary impact on the rate of growth, although it definitively influences the achieved standard of welfare. As

opposed to this, endogenous growth theory states that fiscal policy can also influence the long-term rate of economic growth. We assume that there is a correlation between the rate of long-term economic growth and the individual elements of tax policy, and in Hungary, the type of these correlations is in harmony with the generally accepted tendencies described in the theoretical models and the empirical studies referring to the developed states.

Based on the correlation and regression studies, we can conclude, by way of a summary, that the calculated results have proven our expectations developed in the course of studying the theoretical and empirical technical literature with regard to certain variables, while they have not with regard to others. The indicator of the size of the state sector (the size of income centralization) is in a negative correlation with the rate of economic growth in Hungary. This correlation is known as scale effect in the technical literature of endogenous growth theory, and we have proven its existence in Hungary as well. Our study suggests that the proportion of distorting taxes to the

GDP negatively correlates with the rate of economic growth, which tendency is also in line with our expectations developed from studying the theoretical and empirical literature. Our theoretical knowledge suggests that there should be an insignificant correlation between the GDP-rated level of non-distortionary taxes and growth. However, the Hungarian data have led to a result that contradicts this assumption, pointing to a significant positive relationship between the two variables. The probable reason for this is that the proportion of non-distortionary taxes has grown within the generally decreasing tax burden, while theory suggests that the reduction in the weight of distortionary taxes has a positive effect on the rate of long-term economic growth (although this is not supported by our own calculations, we could only find a negative correlation between the GDP-rated indicator of distortionary taxes and the rate of growth). The rise of the proportion of non-distortionary taxes within the total income has a favorable effect on the rate of growth, which is in harmony with our expectations.

Table 1

TWO-VARIABLE CORRELATIONS BETWEEN THE VARIABLES OF THE BUDGET AND THE MEASURES OF ECONOMIC GROWTH

	5-year moving average		3-year moving average	
	Average growth rate of real GDP	Economic growth (per capita PPP measured real GDP)	Average growth rate of real GDP	Economic growth (per capita PPP measured real GDP)
1 Total GDP-rated revenue (5- and 3-year moving average)				
Pearson adj.	-0.988**	-0.984**	-0.959**	-0.917**
Sig. (two-side)	0.000	0.000	0.000	0.000
N	13	11	15	13
2 GDP-rated income and profit taxes (5- and 3-year moving average)				
Pearson adj.	-0.278	-0.353	-0.495	-0.522
Sig. (two-side)	0.437	0.316	0.102	0.082
N	10	10	12	12
3 Income and profit taxes in proportion to the total revenue (5-year moving average)				
Pearson adj.	0.733*	0.681*		
Sig. (two-side)	0.016	0.030		
N	10	10		

	5-year moving average		3-year moving average	
	Average growth rate of real GDP	Economic growth (per capita PPP measured real GDP)	Average growth rate of real GDP	Economic growth (per capita PPP measured real GDP)
4 GDP-rated social security contributions (5- and 3-year moving average)				
Pearson adj.	-0.965**	-0.951**	-0.931**	-0.871**
Sig. (two-side)	0.000	0.000	0.000	0.000
N	10	10	12	12
5 Social security contributions in proportion to the total revenue (5-year moving average)				
Pearson adj.	-0.909**	-0.886**		
Sig. (two-side)	0.000	0.001		
N	10	10		
6 GDP-rated property tax (5- and 3-year moving average)				
Pearson adj.	0.883**	0.858**	0.797**	0.748**
Sig. (two-side)	0.001	0.001	0.002	0.005
N	10	10	12	12
7 Property tax in proportion to the total revenue (5-year moving average)				
Pearson adj.	0.914**	0.894**		
Sig. (two-side)	0.000	0.000		
N	10	10		
8 GDP-rated distortionary taxes (5- and 3-year moving average)				
Pearson adj.	-0.977**	-0.987**	-0.972**	-0.921**
Sig. (two-side)	0.000	0.000	0.000	0.000
N	10	10	12	12
9 Distortionary taxes in proportion to the total revenue (5-year moving average)				
Pearson adj.	0.124	0.031		
Sig. (two-side)	0.733	0.933		
N	10	10		
10 GDP-rated non-distortionary taxes (5- and 3-year moving average)				
Pearson adj	0.860**	0.850**	0.746	0.738
Sig. (two-side)	0.001	0.002	0.116	0.006
N	10	10	12	12
11 Non-distortionary taxes in proportion to the total revenue (5-year moving average)				
Pearson adj.	0.959**	0.951**		
Sig. (two-side)	0.000	0.000		
N	10	10		
12 Other GDP-rated revenue (5- and 3-year moving average)				
Pearson adj.	-0.962**	-0.946**	-0.876**	-0.853**
Sig. (two-side)	0.000	0.000	0.000	0.000
N	10	10	13	12
13 Other revenue in proportion to the total revenue (5-year moving average)				
Pearson adj.	-0.924**	-0.902**		
Sig. (two-side)	0.000	0.000		
N	10	10		

Note: * The correlation is significant on the level of 0.05 (two-side test)

** The correlation is significant on the level of 0.01 (two-side test)

NOTES

[1] Income effect: due to imposing taxes, the (disposable) income available for people is decreasing – this impact is direct in the case of income taxation, while indirect in the case of consumption taxes, as a result of the increase in the price of the product, as the purchasing power of income will thus decrease.

[2] Substitution effect: in the case of imposing certain types of taxes, the steepness of the budget constraint will change, as a result of which the point of balance shifts in such a way that we will remain on the same indifference curve. Consequently, the taxes influence economic decisions (be they decisions on work and leisure time, present or future consumption, choices between forms of investment or savings, or between products) and distorts efficient allocation. [Musgrave – Musgrave (1989), p. 279]

[3] Stiglitz (2000), p. 467

[4] Stiglitz (2000), p. 451

[5] Deadweight loss is the difference between the income that can be generated from a lump sum tax and income gained from a distorting tax which exert the same effect on the welfare of consumers. [Stiglitz (2000), p. 467]

[6] Kneller et al 1998, p. 24

[7] Musgrave – Musgrave (1989), p. 297

[8] Stiglitz (2000), p. 487

[9] Musgrave – Musgrave (1989), p. 300

[10] Musgrave – Musgrave (1989), p. 305

[11] Musgrave – Musgrave (1989), p. 307

[12] Musgrave – Musgrave (1989), p. 311

[13] Howitt (2006), p. 1

[14] Barro (2005), p. 17

[15] Barro (1993), p. 1

[16] Halmosi (2004a), p. 21

[17] King – Rebelo (1990), p. 8

[18] Engen – Skinner (1996), p. 4

[19] Sala-i-Martin (2002), p. 10

[20] Barro (1988), pp. 24–25; as well as Barro – Sala-i-Martin (1995), p. 155

[21] Barro (1988), p. 21

[22] Barro (1989), p. 11

[23] Barro – Sala-i-Martin (1995), p. 161

[24] Tanzi – Schuknecht (2003), pp. 4–5

[25] Tanzi – Schuknecht (2003), p. 13

[26] Harberger (1964) in Mendoza – Milesi-Ferretti – Asea (1997), p. 99

[27] Mendoza – Milesi-Ferretti – Asea (1997), p. 121

[28] Romer (1989), p. 37

[29] Fölster – Henrekson (2000), pp. 5–7

[30] Engen – Skinner (1992), pp. 22–23

[31] Engen – Skinner (1996), pp. 33–34

[32] Engen – Skinner (1996), p. 36

[33] OECD Economic Outlook, No. 79, Annex: tables 1 and 25

[34] Barro (1988), pp. 13–14

[35] In an optimal case, the proportion of the productive expenses of the state and the output is equivalent to the proportion of the productivity of the public and the private sectors.

[36] Barro (1988), pp. 17–18

[37] Vigvári (2005), p. 85

[38] Barro – Sala-i-Martin (1990), pp. 7–12
The reason for this is that if a certain producer increases the volume of his capital, his output will grow, for which a higher amount of state services should be provided in the case of a given production function. However, if the utilization of the state service in question is competitive, this will result in overdemand for this public service, with the given volume of the service. In the case of imposing lump

sum taxes, this external effect may be disregarded by the individual producer, thus there is too high motivation for increasing his capital or output. In order to internalize the distortion, the producer who increases his capital and output (thus exerting an external effect) will have to provide supplementary funds in order to leave the public service accessible to others as well, i.e. so that the rate of public service/output were maintained on a permanent level. The level of required compensation is equivalent to the product of the rate of public service/output and supplementary output. With this tax rate, the individual producers will generate the very amount of output which is necessary to maintain the optimum rate of public service/output. [Barro – Sala-i-Martin (1995), p. 159]

[39] Roubini – Milesi-Ferretti (1994), p. 25

[40] Mendoza – Milesi-Ferretti és Asea (1997), pp. 114–116

[41] Easterly – Rebelo (1993), p. 21

[42] Tanzi – Schuknecht (2003), pp. 27 and 29

[43] Tanzi – Schuknecht (2003), p. 6

[44] Tanzi – Schuknecht (2003), p. 29 (The study was conducted by measuring the weights of the individual tax types in comparison to the total revenue. Thus, the impacts of the cyclical fluctuations of the economy were filtered to a certain extent; since, if the real value of the income decreases in the case of a recession, total revenue, in proportion to which the weight of the individual factors is examined, will decrease as well.)

[45] Stiglitz,(2000), p. 63

[46] Tanzi – Schuknecht (2003), p. 16

[47] Mellár (2001), p. 578

[48] Easterly – Rebelo (1993), p. 19

[49] The time series of non-distortionary taxes are integrated, while the indicators of economic growth are steady, so we have to treat the correlations between the two indicators with reservations.

[50] They are not integrated in the case of the time series of other revenue.

[51] Halmosi (2004b), p. 42

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