Fiscal policy and growth in new member states of the EU: a panel data analysis

MARTINA DALIĆ, PhD*

Article**
JEL: E62, H50
doi: 10.3326/fintp.37.4.1

* The author would like to thank two anonymous referees for their useful comments and suggestions.
** Received: February 13, 2013
Accepted: August 19, 2013

Martina DALIĆ
Zagreb School of Economics and Management, Jordanovac 110, 10000 Zagreb, Croatia
e-mail: mdalic@zsem.hr

FINANCIAL THEORY AND PRACTICE
37 (4) 335-360 (2013)

Abstract

Fiscal policy can have positive effects on economic growth through changes in the structure of total expenditure, i.e. reductions in unproductive or current expenditure, lower taxes, and higher government investment – provided that it is offset by a decrease in unproductive expenditure. Such changes reduce the size of government, which positively affects output growth. Lower volatility of government investment expenditure is also growth-enhancing. However, the strongest growth effects are found for improvements in the fiscal balance, in particular if achieved by a reduction in the size of government expenditure. This suggests that a cautious fiscal policy stance may be the best way to improve growth.

Keywords: growth, productive expenditure, distortionary taxation, volatility, fiscal balance

1 INTRODUCTION

The purpose of this paper is to shed some light on the growth effects of fiscal policy in new member states (NMS) of the EU. These countries have been only occasionally included in the previous research due to the lack or low quality of data. However, over time more data have become available. As these countries have functioned within the same institutional and legal framework as advanced EU economies for several years now, there is a need to understand the effects of fiscal policy on their growth path. This paper endeavours to fill this gap by analysing the relationship between fiscal policy and growth on a balanced panel of NMS and Croatia over the period 1999-2010.

Our empirical approach is based on a consistent treatment of the government budget constraint in the context of static and dynamic panel data analyses. A comprehensive analysis of the growth effects of fiscal policy requires that both sides of the budget be considered. However, to prevent perfect co-linearity among fiscal variables, growth-neutral fiscal variables have to be omitted (Kneller et al., 1999). This strategy allows us to investigate how a particular change in fiscal policy affects growth, and thus to suggest specific changes in fiscal instruments that could enhance growth.

The paper also studies the growth effects of volatility in government investment. Dalić (2013) showed that government expenditure in NMS is generally pro-cyclical, with a particularly strong pro-cyclical behaviour found for capital expenditure. This raises the question whether the high volatility of government investment could produce its own growth effects over and above those resulting from a given level of investment expenditure. An empirical investigation of the growth effects of volatility in government investment is particularly interesting for NMS, where the average level of such investment is relatively high.

FINANCIAL THEORY AND PRACTICE
37(4) 335-360 (2013)

The rest of the paper is organised as follows. Section two outlines key contributions to the literature on fiscal policy and growth. Section three discusses the data and estimation strategy. Section four presents baseline results of econometric analysis. Robustness analysis is presented in section five. Section six concludes.

2 LITERATURE REVIEW

In the recent literature, the relationship between fiscal policy and growth has been articulated, among other contributions, in endogenous growth models of Lucas (1988), Romer (1990) and Aghion and Howitt (1992). The implications of endogenous growth models for fiscal policy were also examined by Barro (1990), who discussed how fiscal policy could affect both the level of output and its steady state growth rate.

In particular, Barro (1990) postulated that the impact of fiscal policy on growth is derived from the flow of government services, and introduced a distinction between distortionary and non-distortionary taxation and productive and unproductive expenditure. He categorised as distortionary those taxes that affect the investment/saving decisions of private agents with respect to accumulation of physical and human capital. Non-distortionary taxes in his classification were those that do not affect these decisions.

Government expenditure is differentiated according to its contribution to private production and productivity of total private capital (Zagler and Dürnecker, 2003). Expenditure categories that affect the productivity of private capital and/or the stock of total capital, such as expenditure on education (Lucas, 1988), health (Bloom, Canning and Sevilla, 2001), public infrastructure (Barro, 1990; Aschauer, 1988), research and development (Romer, 1990) and enforcement of property rights (La Porta et al., 1996) are considered productive. Expenditure categories that do not affect the productivity of private capital or add to/subtract from the stock of total capital are considered unproductive. The classification of certain expenditure components as unproductive does not mean that they are unnecessary or wasteful, but rather that their potential welfare effects are too difficult to assess to be a focus of the growth analysis. At the same time, they need to be considered because the taxation required to finance them has growth implications.

More generally, public expenditure, whether productive or unproductive, uses resources and diverts them from potentially more efficient private uses. Productivity of public expenditure therefore also depends on the degree of its substitutability/complementarity with private expenditure (Irmen and Kuehnel, 2009). The overall impact of fiscal policy on growth is thus the net result of various positive and negative effects of fiscal policy instruments on productivity of overall capital and returns to human and physical capital (Zagler and Dürnecker, 2003).

The effect of individual public expenditure categories on growth cannot be assessed without consideration of the overall macroeconomic effects of fiscal policy and its implications for the sustainability of public finance. In the presence of Ricardian equivalence, fiscal expansion could leave overall output unchanged (Barro, 1979). At high levels of government debt, a permanent increase in government expenditure could even produce negative growth effects (Blanchard, 1990; Alesina et al., 2002; Alesina and Ardagna, 2009). Even in the absence of Ricardian equivalence, persistent fiscal deficits and high public debt could harm growth because deficits require the government to absorb additional resources from the private sector, which could have been used for the accumulation of private capital (Zagler and Dürnecker, 2003). Harmful effects of fiscal deficits and debt on growth could be further reinforced if government borrowing is used in order to finance less productive types of expenditure.

These hypotheses have been empirically tested and extended in several directions, using for instance different classifications of government revenue and expenditure, and different treatments of government budget constraints, i.e. different ways of accounting for the linear dependency among revenue, expenditure and the fiscal balance. Devarajan, Swaroop and Zou (1996) concluded that the productivity of different expenditure components may depend on their share in total expenditure, i.e. the productivity of the same expenditure component may differ depending on its relative size. Public investment is generally recognised as a productive determinant of growth (Aschauer, 1986; Easterly and Rebelo, 1993; Canning and Pedroni, 2004). However, there is also evidence of insignificant growth effects of public investment (Afonso and Furceri, 2008).

Kneller, Bleaney and Gemmell (1999) emphasized the need to include all fiscal policy variables in the analysis of growth effects of fiscal policy, so as to avoid the omitted variables bias. However, in order to avoid perfect co-linearity in such a case, variables with negligible growth effect should be excluded from regressions and treated as an implicit source of financing. Using this approach, Kneller, Bleaney and Gemmell (1999) showed that increases in productive expenditure have a positive effect on growth if achieved by non-distortionary taxes and cuts in unproductive expenditure. However, higher public investment has a negative effect on growth if the increase is financed with distortionary taxes. Bleaney, Gemmell and Kneller (2001) confirmed these results, and also found that government surpluses achieved through an increase in non-distortionary taxes and a reduction in unproductive expenditure have a positive impact on growth. Gemmell, Kneller and Sanz (2011) examined the robustness of previous results on the growth effects of fiscal policy on a sample of OECD countries, and again confirmed the negative growth effects of distortionary taxation and positive growth effects of productive expenditure.

FINANCIAL THEORY AND PRACTICE
37 (4) 335-360 (2013)

Some newer research highlighted the relationship between macroeconomic volatility as an important additional channel of fiscal policy influence on growth. Fatas and Mihov (2003) argued that the volatility of government expenditure was the main determinant of business cycle volatility, which in turn negatively affects growth (see Hnatovska and Loayza, 2004 and Aghion and Banerjee, 2005). Fatas and Mihov (2009) also provided evidence that the volatility of public expenditure had its own direct effects on growth, which are independent of the effects of output volatility on growth. Afonso and Furceri (2008) confirmed the harmful growth effects of volatility of total expenditure and investment expenditure for EU-15 countries.

In sum, the literature underlying the analysis carried out in this paper focuses on the effects of fiscal policy on private sector behaviour and the formation of human and physical capital. Fiscal policy affects economic growth through both the level and volatility of taxes and government expenditure. Moreover, the impact of fiscal policy on growth will depend on which taxes and expenditures are adjusted.

3 METHODOLOGY AND DATA

The relationship between fiscal policy instruments and growth is estimated by regressing the annual rate of real GDP growth on a set of conditioning non-fiscal variables and a set of fiscal explanatory variables. Therefore, the following growth equation is estimated (subscripts denote country *i* and year *t*).

$$g_{i,t} = \propto + \sum_{k=1}^{k} \beta_k Y_{ik,t} \sum_{j=1}^{m} \gamma_j X_{ij,t} + u_{i,t} \qquad (1)$$

Where:

- $g_{i,t}$ denotes the growth rate of real GDP for country *i* (i = 1..13) in year *t* (t = 1..12)
- $Y_{ik,t}$ is a matrix of *k* non-fiscal variables (k = 1..5) expressed in logarithms
- $X_{ij,t}$ is a matrix of *m* (m = 1..13) fiscal variables expressed in logarithms that also includes a variable measuring the volatility of government investment expenditure.

The choice of non-fiscal explanatory variables follows the standard approach in the literature: as proposed by Levine and Renelt (1992), we include initial GDP per capita (i.e. lagged GDP per capita), inflation, average growth rate of labour force, the share of investment in GDP, and openness (for definitions of variables see the appendix).

The expected sign of the coefficient on GDP per capita is negative: poorer economies normally grow faster than richer ones. Lagged inflation is also expected to have a negative coefficient: high inflation is bad for growth because it discourages investment in long-term projects (Barro, 2003). The growth rate of labour force and the share of investment in GDP directly affect the production function through

FINANCIAL THEORY AND PRACTICE
37 (4) 335-360 (2013)

supply of labour and physical capital; their coefficients should therefore be positive. Openness has an ambiguous effect on growth: a more open economy could grow faster than a less open economy if there is sufficient external demand. However, a more open economy is also more exposed to external shocks. The sign of the coefficient on openness therefore has to be determined empirically for the sample at hand.

The set of fiscal variables includes:

– a measure of volatility of government investment expenditure, defined by equation (2) and included with a lag of one year;
– variables describing the overall government activity, i.e. total revenue, total expenditure and fiscal balance;
– disaggregated components of revenue and expenditure.

All fiscal variables are measured as a share of GDP and expressed in logarithms; their scope is related to general government. For details, see the appendix.

Volatility of government investment expenditure is measured by squared deviations of the annual level of country's investment from the sample average:

$$VOL\_INV_{i,t} = (GOV\_INV_{i,t} - (\frac{1}{T} \sum_{t=1}^{T} GOV\_INV_{i,t}))^2 \qquad (2)$$

where $GOV\_INV_{i,t}$ represents the share of government investment expenditure in GDP in country i in year t. This measure of volatility does not discriminate between increases and decreases in the level of government investment; i.e. it only signals the intensity of a change regardless of its direction. We expect the coefficient on this variable to have a negative sign because changes in the level of government investment may increase uncertainty about the inputs the government provides for private production. Volatile public capital formation may also lead to wrong strategic positioning of private production and to suboptimal private production capacity that cannot be easily altered. Therefore we include this variable with a one-year lag.

As discussed above, to study the impact of fiscal policy on growth we need to distinguish between distortionary and non-distortionary taxes, and productive and unproductive expenditure. Table 1 provides the classification used in this paper. While all major taxes are distortionary in some respect, the distortions that are relevant for growth are taken to be those related to decisions on saving and investment. Therefore, taxes on income, profit and social contributions are classified as distortionary – they introduce tax wedge that can change the incentives to accumulate physical and human capital, which can in turn harm economic growth (Zagler and Dürnecker, 2003). Taxes on goods and services are considered non-distortionary – or rather, less distortionary for growth – because they do not

distort consumption-saving decisions at different dates (Bleaney, Gemmell and Kneller, 2001).

Table 1
Fiscal variables

	Fiscal variable included in regression equation	Revenue/expenditure category included in fiscal variable
Revenues	Distortionary taxes	Taxes on income, profit and property
		Social contributions
	Non-distortionary taxes	Taxes on domestic goods and services
		Taxes on international trade
	Other taxes	Non tax revenue and other taxes
Functional classification	Productive expenditure_health	Health expenditure
	Productive expenditure_education	Education expenditure
	Other productive expenditure	Expenditure on public order and safety
		Defence expenditure
		Expenditure on economic affairs
		Expenditure on environment protection
	Unproductive expenditure	Social security and welfare expenditure
		Expenditure on recreation
		Expenditure on housing
		Expenditure on general public services
Economic classification	Current expenditure	Compensation of employees
		Social benefits
		Subsidies
		Interest payments
		Other current and capital transfers
	Investment expenditure	Gross fixed capital formation

Distinguishing between productive and unproductive expenditure in the available statistics is more problematic than distinguishing between distortionary and non-distortionary taxes. The reason is that the underlying statistical principles of economic and functional classifications of expenditure are not guided by growth considerations. For instance, few would disagree that health and education expenditures are productive, i.e. have positive growth effects. But expenditure on economic affairs is composed of both productive expenditure items, e.g. spending on public transport and communication, and unproductive spending such as subsidies to loss-making public enterprises. These issues are recognised in the literature using the functional classification (see Kneller, Bleaney and Gemmell, 1999; Gemmell, Kneller and Sanz, 2011; Adam and Bevan, 2005), and have led some

FINANCIAL THEORY AND PRACTICE
37 (4) 335-360 (2013)

authors to use the economic classification of expenditure instead (Gupta et al., 2002; de Avila and Strauch, 2003; Afonso and Furceri, 2008).

The approach taken in this paper tries to circumvent, to the extent possible, some of these issues by using both classifications. Therefore, the regression equation (1) is first estimated for disaggregated expenditure variables based on the functional classification, and then for expenditure variables based on the economic classification. The results of these two approaches are complementary rather than mutually exclusive. For example, positive growth effects of government investment (derived from the economic classification) are not in contradiction with positive growth effects of spending on education (derived from the functional classification).

Expenditure on economic services is on balance considered productive because one of its largest components is expenditure on transport and communication, which normally has positive effect on growth (Easterly and Rebelo, 1993). Expenditure on defence and public order and safety is considered productive because it serves to maintain the rule of law and thus contributes to investor security and the stability of property rights, which are growth-enhancing (Barro, 1990).

Expenditure classified as unproductive includes social security and welfare, housing, recreation and public administration. Spending on these items does not directly affect private production and capital formation. One should note, however, that the quality and efficiency of public administration are reflected in the quality of institutions that are recognised as important determinants of growth in institutional economics (Acemoglu, 2012). Therefore, it is also possible to argue that expenditure on general public services should be considered productive. In order to address this issue, in the robustness analysis in section five we use an alternative classification that includes expenditure on general public services as productive.

When economic classification is used, total expenditure is grouped into current and investment expenditure. Investment expenditure is considered productive and current expenditure on balance unproductive because of the large weight of social security benefits, subsidies and interest payments. Regarding compensation of employees, the same caveat holds as with functional expenditure on general public services; however, we did not test for this case separately in the robustness analysis.

The estimation strategy follows Kneller, Bleaney and Gemmell (1999) and Bleaney, Gemmell and Kneller (2001). They pointed out that the results of regressions examining the relationship between fiscal policy and growth depend on how one treats the budget constraint. If the set of fiscal variables includes all the elements of the budget, i.e. government revenue, expenditure and the fiscal balance, then

they sum up to zero and perfect co-linearity is present. To avoid the problem of perfect co-linearity, at least one fiscal variable entering the budget constraint should be omitted. This variable then represents the implicit source of financing of a unit change in the relevant fiscal variables that are included in the regression. Kneller, Bleaney and Gemmell (1999) showed that the size of coefficients on fiscal variables included in the regression changes depending on the omitted fiscal variable. In other words, the effect of a particular fiscal policy instrument on growth may change depending on the way it is financed.

Kneller, Bleaney and Gemmell (1999) suggested that the omitted variables should be those that theory suggests do not affect the production function. Good candidates for omitted variables are thus unproductive expenditure, non-distortionary taxes, and the two taken together. Furthermore, if these variables are really growth-neutral, their coefficients should be insignificant when included in regressions. Adam and Bevan (2005) cautioned that country heterogeneity made it difficult to identify any revenue or expenditure category as growth-neutral across all countries. Therefore, coefficient estimates in this type of regression should be interpreted as measuring the effect of a particular fiscal variable net of the effect of omitted fiscal variables. Gemmell (2001) further noted that even where all government expenditure was productive, any increase in taxes from an already high ratio of taxes or expenditure to GDP could generate negative growth effects.

In this paper, we compiled data for a balanced panel of ten new EU member states and Croatia over the period 1999-2010. These countries were only occasionally considered in previous research due to either the non-existence or the low quality of data, especially in view of the structural breaks and rapid changes these countries went through in the 1990s. We chose 1999 as the initial year in the sample because most countries began their EU accession talks at the time, which gradually led to an improvement in the quality of data. Croatia is included in the sample because it completed the alignment with EU standards through 2010. The sources of data are the Eurostat data base, the WDI data base (for some control variables) and national sources for Croatia.

4 EMPIRICAL RESULTS

4.1 DESCRIPTIVE STATISTICS AND BIVARIATE ANALYSIS

The descriptive statistics for regression variables are presented in table 2. They confirm the large variability of data across the sample. The sample average growth rate amounted to 3.4%, and the average share of total expenditure in GDP to 41.6%. The sample average government balance was a deficit of 3.4% of GDP. All countries in the sample had on average higher unproductive than productive expenditure, and higher distortionary than non-distortionary taxes.

TABLE 2
Descriptive statistics

	Average	Standard deviation	Maximum/ country		Minimum/ country	
Growth rate of output	3.4	4.5	11.5	Latvia (2006)	-17.7	Latvia (2009)
GDP per capita, cons. EUR	6,812.2	3,866.1	16,740.8	Cyprus (2008)	1,612.9	Bulgaria (1999)
Investment ratio, % of GDP	23.5	4.3	34.9	Estonia (2006)	14.2	Malta (2000)
Openness, % of GDP	117.2	32.0	194.8	Malta (2000)	53.2	Romania (2010)
Inflation, ch	5.1	6.2	45.8	Romania (1999)	-1.1	Lithuania (2003)
Labour force growth, in %	-0.06	1.48	4.3	Slovenia (2004)	-8.8	Romania (2002)
Total revenue, % of GDP	38.2	3.7	46.9	Hungary (2010)	31.7	Lithuania (2004)
Total expenditure, % of GDP	41.6	4.8	52.2	Hungary (2006)	33.0	Lithuania (2003)
Fiscal balance, % of GDP	-3.4	2.8	3.4	Cyprus (2007)	-12.3	Slovakia (2000)
Distortionary taxes, % of GDP	20.3	2.7	25.8	Cyprus (2007)	13.2	Bulgaria (2010)
Non-distortionary taxes, % of GDP	13.6	2.2	18.6	Croatia (2000)	10.1	Slovakia (2010)
Other revenue, % of GDP	5.1	1.2	10.4	Bulgaria (1999)	3.2	Romania (2000)
Productive exp._ education, % of GDP	5.2	1.1	7.5	Cyprus (2010)	3.3	Croatia (2006)
Productive expenditure_ health, % of GDP	5.0	1.3	7.8	Czech R. (2010)	2.5	Bulgaria (2001)
Other productive expenditure, % of GDP	9.7	1.8	17.4	Slovakia (2000)	6.4	Poland (2000)
Unproductive expenditure, % of GDP	21.6	3.9	31.6	Hungary (2009)	14.6	Estonia (2006)
Government investment, % of GDP	3.6	1.1	6.8	Czech R. (2003)	1.1	Latvia (2001)
Current expenditure, % of GDP	36.5	4.4	47.0	Hungary (2009)	27.8	Estonia (2007)
Variability of government investment	0.87	1.30	0.0	Hungary (2004)	7.1	Romania (1999)

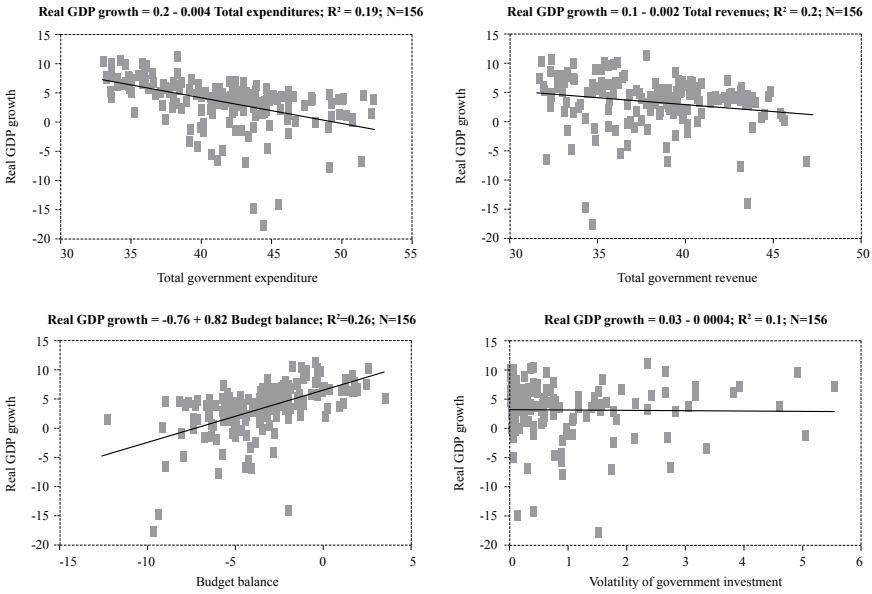
Table 3 presents bivariate correlations between regression variables. Improvements in fiscal balance (i.e. higher surpluses or lower deficits) are strongly and positively correlated with real GDP growth, while total government revenue and expenditure, as well as some of their disaggregated components, are negatively correlated with growth. As expected, different revenue and expenditure components are highly correlated with each other, highlighting the importance of the estimation strategy that avoids perfect multi co-linearity among fiscal variables.

The preliminary findings from bivariate simple regressions are reported in graph 1. The top left-hand panel shows a negative relationship between government size and growth. The bottom left-hand panel shows a positive relationship between improvements in fiscal balance and growth. The right-hand panels indicate nega-

tive correlation between the level of total revenue and growth (top) and the volatility of government investment and growth (bottom).

GRAPH 1

Overall government activity and growth



Source: Author's calculation.

4.2 BASELINE REGRESSIONS

Equation (1) was estimated using two-way fixed effects OLS estimator with the correction for first-order serial correlation in the error term. The Hausman test of significance of fixed versus random effects confirmed that it was appropriate to use the fixed effects estimator. The likelihood ratio test for the significance of fixed effects indicated the importance of both cross-section and time effects, which led us to use the two-way fixed effects estimator.

Column (2) in table 4 reports the baseline results for non-fiscal variables and the volatility of government investment. Columns (3) to (5) show the estimates with different aggregate fiscal variables.

TABLE 3

Bivariate correlations

Variables expressed as percent of GDP, unless stated otherwise

	Real GDP growth	GDP per capita, EUR	Invest-ments	Open-ness	Inflation rate	Labor force growth	Fiscal balance	Total expendi-tures	Total revenues	Expendi-ture on educa-tion	Expendi-ture on health	Other prod. expendi-ture	Unpro-ductive expendi-ture	Distor-tionary taxes	Non-distortio-nary taxes	Govern-ment invest-ment	Cur-rent expen-diture	Variabi-lity of gov. invest-ment
Real GDP growth, in %	1.00																	
GDP per capita, EUR	-0.08	1.00																
Investments	0.29***	-0.17**	1.00															
Openness	0.10	0.23***	0.15*	1.00														
Inflation rate	0.07	-0.05	-0.02	-0.35***	1.00													
Labour force growth, in %	0.06	0.19**	0.21***	0.18**	0.03	1.00												
Fiscal balance	0.52***	-0.05	0.34***	0.05	0.09	0.05	1.00											
Total expenditures	-0.44***	0.31***	-0.26***	0.08	-0.06	0.07	-0.63***	1.00										
Total revenues	-0.17**	0.36***	-0.08	0.14	-0.01	0.13	-0.05	0.80***	1.00									
Exp. on education	-0.13	0.51***	-0.10	0.14	0.10	0.11	0.02	0.14*	0.20**	1.00								
Exp. on health	-0.19**	0.14*	0.11	0.36***	-0.23***	0.01	-0.28***	0.46***	0.38***	-0.10	1.00							
Other prod. expend.	-0.20**	-0.19**	0.21***	0.08	-0.34***	0.05	-0.37***	0.33***	0.14*	-0.46***	0.27**	1.00						
Unproductive exp.	-0.34***	0.28***	-0.44***	-0.09	0.14*	0.03	-0.52***	0.88***	0.74***	0.14*	0.15*	0.00	1.00					
Distortionary taxes	-0.13	0.34***	0.03	0.34***	-0.02	0.02	-0.24*	0.64***	0.65***	0.23***	0.55***	0.16**	0.48***	1.00				
Non-distort. taxes	-0.03	0.24***	-0.13*	-0.09	-0.03	0.15	0.13	0.43***	0.66***	-0.01	0.00	-0.04	0.54***	-0.05	1.00			
Government invest.	-0.09	0.00	0.34***	0.00	-0.03	0.17*	-0.05	0.09	0.08	0.10	0.03	0.34***	-0.09	0.00	-0.02	1.00		
Current expenditure	-0.42***	0.31***	-0.34***	0.08	-0.05	0.03	-0.62***	0.98***	0.78***	0.12	0.46***	0.26***	0.90***	0.64***	0.44***	-0.13	1.00	
Variability of gov. inv.	-0.02	-0.23***	0.18**	-0.29***	0.05	0.11	-0.11	-0.10	-0.22**	-0.13	-0.12	0.21***	-0.15*	-0.16**	-0.19**	0.18	-0.14	1.00

** significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.*

Source: Author's calculation.

TABLE 4

Growth effects of overall government activity
Estimation method: OLS two-way fixed effects
Dependent variable: real output growth rate

		Omitted fiscal variable		
	Baseline	**Fiscal balance**	**Total revenue**	**Total expenditure**
1	**2**	**3**	**4**	**5**
GDP per capita, lagged	-0.166***	-0.149***	-0.154***	-0.155***
	(0.039)	(0.037)	(0.036)	(0.037)
Investments	0.105***	0.082***	0.082***	0.085***
	(0.035)	(0.024)	(0.024)	(0.024)
Labour force growth	0.149	0.190**	0.193**	0.197**
	(0.167)	(0.090)	(0.092)	(0.092)
Openness	0.118***	0.063**	0.063	0.064**
	(0.033)	(0.029)	(0.029)	(0.028)
Inflation, lagged	-0.073***	-0.123***	-0.121***	-0.121***
	(0.053)	(0.037)	(0.037)	(0.037)
Total expenditure		-0.217***	-0.210***	
		(0.073)	(0.059)	
Total revenue		-0.011		-0.189***
		(0.101)		(0.054)
Fiscal balance[1]			-0.003	0.465***
			(0.241)	(0.164)
Volatility of investment expenditure, lagged	-0.0029***	-0.0027***	-0.0027**	-0.0027***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)
$R^{2\sim}$	0.745	0.825	0.825	0.822
Number of observations	156	156	156	156

*Note: ***, ** and * indicate that the variable is significant at 1%, 5% and 10% respectively. Robust standard errors in parentheses.*
[1]Fiscal balance is defined as (1 + fiscal balance/100); an increase denotes an improvements in fiscal balance, i.e. a reduction of the deficit or an increase of the surplus.
Likelihood ratio test for joint significance of cross section and period fixed effect: p-value $\chi^2(229.7;23) = 0.000$.
Hausman test for the significance of random vs. fixed effect: p-value χ^2 (193.5;8)= 0.000.

All of the non-fiscal variables have the expected sign and most are highly significant. Inflation and labour force growth gain in statistical significance with the inclusion of fiscal variables. The coefficient on lagged volatility of government investment expenditure, although small in size, is negative and statistically significant in all regressions presented. A 1% increase in the volatility of government investment expenditure reduces the GDP growth rate in the sample on average by 0.003 percentage points. This result is in line with Afonso and Furceri (2008), who found negative growth effects of government investment volatility in advanced EU economies.

If fiscal balance is omitted and assumed to adjust freely to changes in government revenue and expenditure (column 3) the coefficient on total expenditure is negative and significant, while the coefficient on overall taxes is statistically insignifi-

cant. Negative growth effects of government spending are further confirmed if revenue is omitted from the regression (column 4): a 1% increase in total expenditure reduces the growth rate of real GDP by 0.21 percentage points. Column (5) shows that a 1% increase in total revenue reduces the real growth rate by a similar amount (0.19 percentage points). The coefficient on fiscal balance became positive and significant in this regression, indicating that an improvement in fiscal balance might be growth-enhancing if achieved through a reduction in government expenditure.

The negative relationship between growth and total expenditure (which measures the size of the government) indicates that any positive contribution of productive spending may be on balance offset by the negative contribution of the overall government size.

Table 5 presents the results for disaggregated revenue and expenditure components. Coefficients for non-fiscal variables are not reported because they maintain their sign and significance. Regression results for fiscal variables based on functional classification are reported in columns (2) to (4), while columns (5) to (7) report the results for economic classification of expenditure. When functional classification is used, the estimation strategy requires us to omit expenditure items suggested by theory to have negligible growth effects. Therefore non-distortionary taxes, unproductive expenditure, and both of these items combined are omitted and assumed to be the variables that adjust in response to changes in fiscal variables included in regressions. When economic classification is used, non-distortionary taxes, current expenditures, and the two combined are omitted.

The coefficient on volatility of government investment maintains its size and significance in regressions in table 5. The disaggregated approach confirms that the volatility of investment expenditure has its own negative growth effects, over and above those implied by the level and structure of spending.

We find no evidence of growth-enhancing effects of productive expenditure (columns 2 to 4). This result contradicts theoretical predictions, in particular with respect to education and health spending. However, this does not mean that these expenditure components are irrelevant for growth in these countries: the sample is composed of upper middle-income economies, for which the structure and efficiency rather than the level of such spending might be important for growth. Aghion and Durlauf (2009), for example, pointed out the importance of higher education for counties approaching the technology frontier. In order words, the growth-enhancing effects could be hidden in the composition of these expenditure components or in their efficiency. Uncovering these effects would require further investigation, which is for the time being constrained by data availability.

TABLE 5

Growth effects of expenditure and taxation components
Estimation method: OLS two-way fixed effects
Dependent variable: real output growth rate

Omitted fiscal variable	Functional classification of expenditure			Economic classification of expenditure		
	Non-distortionary taxes	Unproductive expenditure	Non-dist. tax. and unprod. exp.	Non-distortionary taxes	Current expenditure	Non-dist. tax. and current exp.
1	2	3	4	5	6	7
Distortionary taxes	0.052	-0.089**	-0.071	-0.042	-0.115***	-0.109**
	(0.053)	(0.038)	(0.052)	(0.057)	(0.040)	(0.049)
Non-distortionary taxes	–	-0.100**	–	–	-0.104***	–
		(0.044)			(0.034)	
Other revenue	0.024	-0.006	0.006	0.016	0.017	0.019
	(0.012)	(0.011)	(0.013)	(0.011)	(0.012)	(0.015)
Productive expenditure_health	-0.021	0.009	-0.008			
	(0.018)	(0.019)	(0.019)			
Productive expenditure_ education	0.002	0.032	0.013			
	(0.037)	(0.045)	(0.051)			
Other productive expenditure	-0.086***	-0.012	-0.036**			
	(0.019)	(0.018)	(0.015)			
Unproductive expenditure	-0.170***	–	–			
	(0.052)					
Fiscal balance[1]	-0.193	0.519***	0.360**	-0.168	0.601***	0.522***
	(0.262)	(0.167)	(0.171)	(0.270)	(0.159)	(0.177)
Current expenditure				-0.322***	–	–
				(0.075)		
Investment expenditure				-0.002	0.019**	0.013
				(0.011)	(0.009)	(0.008)
Volatility of investment exp., lagged	-0.0027*	-0.0026***	-0.0029***	-0.0022***	-0.0022***	-0.0026***
	(0.0006)	(0.0007)	(0.0006)	(0.0008)	(0.0007)	(0.0005)
$R^{2\sim}$	0.832	0.818	0.798	0.840	0.823	0.800
Number of observations	156	156	156	156	156	156

*Note: ***, ** and * indicate that the variable is significant at 1%, 5% and 10% respectively. Robust standard errors in parentheses.*
[1] Fiscal balance is defined as: (1+fiscal deficit (surplus)/100) because of which increase in fiscal balance means improvements in fiscal balance, i.e. reduction in deficit.
Likelihood ratio test for joint significance of cross section and period fixed effect: p-value $\chi^2(229.7;23) = 0.000$.
Hausman test for the significance of fixed effect: p-value $\chi^2(167.6;12) = 0.000$.

Moreover, the coefficient for other productive expenditures is negative if non-distortionary taxation is used as a source of financing (columns 2 and 4). This suggests that higher taxes are bad for growth even if they are used to finance productive expenditure. One should note, however, that "other productive" expenditure includes unproductive items such as subsidies together with productive spen-

ding on communication and transportation infrastructure. These statistical weaknesses of functional classification can affect the results; therefore, we also need to consider the economic classification of expenditure.

The coefficient on fiscal balance is highly significant and positive if implicit financing is not exclusively based on taxation (columns 3 and 4). When the balance improves by 1 percentage point as a result of lower unproductive expenditure, real GDP growth improves by as much as 0.52% percentage points. When the fiscal balance improves as a result of changes in both non-distortionary taxes and unproductive expenditure; the growth rate increases by 0.36 percentage points. However, if only non-distortionary taxes are used to reduce the deficit, the coefficient on fiscal balance is insignificant. These results suggest that to reduce fiscal deficits is the most effective way to boost economic growth. Positive growth effects of improvements in the fiscal balance are also found by Kneller, Bleaney and Gemmell (1999), Gupta et al. (2002), and Gemmell, Kneller and Sanz (2011).

Columns (5) to (7) present the results for expenditure variables based on the economic classification. The coefficient on government investment is positive and statistically significant if current expenditure is omitted from the regression. This suggests that an increase in government investment offset by a decrease in unproductive expenditure, which is the largest component of current expenditure, raises the growth rate of output. On the other hand, if the increase in investment is financed with non-distortionary taxes, then higher government investment has a negligible impact on growth. Even when positive, the coefficient on investment expenditure is small and often lower than that on fiscal balance. In other words, improvement of the fiscal balance is much more beneficial for growth than an increase in government investment.

Finally, an increase in current expenditure has negative growth effects, complementing to some extent the results presented in column (2). A 1% increase in current expenditure financed by higher non-distortionary taxes reduces the growth rate of real GDP by 0.32 percentage points (column 5).

These results point to a more general conclusion that fiscal policy can have positive effects on economic growth through changes in the structure of total expenditure, i.e. reductions in unproductive or current expenditure can trigger positive growth effects of higher government investment of lower taxes. Such changes reduce the size of government, which positively affects output growth. Lower volatility of government investment expenditure is also growth-enhancing. However, the strongest growth effects are found for improvements in the fiscal balance, in particular if achieved by a reduction of the size of government expenditure. This suggests that a cautious fiscal policy stance may be the best way to improve growth.

FINANCIAL THEORY AND PRACTICE
37 (4) 335-360 (2013)

5 ROBUSTNESS ANALYSIS

5.1 ENDOGENEITY OF FISCAL VARIABLES

A common theme in the literature on fiscal policy and growth is reverse causality between fiscal variables and economic growth. A certain degree of reverse causality can also exist between growth and investment. If economic growth affects the right-hand side variables in a regression, then parameter estimates are biased and inconsistent. Although endogeneity of fiscal variables may be a smaller problem in regressions using disaggregated fiscal variables, it is nevertheless an issue that needs to be investigated. To address this issue, we used the dynamic specification and estimator proposed by Arellano and Bond (1991), i.e. the first-differenced GMM estimator.

In particular, we re-estimated the models discussed above as dynamic models using the Arellano-Bond estimator that relies on first-differencing in order to eliminate country unobserved effects, and on lagged levels of endogenous variables as instruments. The estimates also included time dummies. The validity of instruments was checked with the Sargan test of overidentifying restrictions.[1]

The GMM estimates of the dynamic model with aggregate fiscal variables are presented in table 6.

The results confirm the findings of the fixed effects models presented in table 4. The control variables remain significant, although the lagged growth rate is not significant.

The significance of coefficients on fiscal variables remains unchanged, confirming the negative growth effect of government size, and the positive growth effects of stronger fiscal balance. The negative growth effect of the volatility of government investment is also confirmed.

Table 7 presents the results of dynamic models for disaggregated fiscal variables. The results broadly confirm the findings of fixed effects models for expenditure variables and fiscal balance. Stronger fiscal balances achieved through expenditure cuts are again found to have a positive and significant impact on growth. As with the fixed effect models in table 5, we do not find positive growth effects of increases in productive expenditure. The growth effects of higher productive expenditure are again negative if the increase is associated with higher taxes, and insignificant if the increase is associated with lower unproductive spending.

[1] We also ran several panel unit root tests. The Levin, Lee and Chun test and the Hadri test, which assume a common unit root process across the all cross-section units, reject the presence of unit root for all of the tested series with the level of significance of at least 5%. The Im, Persan and Shin test and the Fisher tests, which assume individual unit root processes across the cross-section units, indicate the potential presence of unit roots in data for unproductive expenditure and expenditure on health and government investment. However, these tests are less reliable because of the short time dimension of the panel.

FINANCIAL THEORY AND PRACTICE
37 (4) 335-360 (2013)

TABLE 6

Growth effects of overall fiscal activity, controlling for reverse causality

Estimation method: first-differenced GMM

Dependent variable: real output growth rate

		Omitted fiscal variable		
	Baseline	**Fiscal balance**	**Total revenue**	**Total expenditure**
1	**2**	**3**	**4**	**5**
Growth rate, lagged	0.254	-0.226	-0.257	-0.196
	(0.189)	(0.162)	(0.164)	(0.164)
Investments	0.094**	0.117***	0.124***	0.122***
	(0.037)	(0.041)	(0.041)	(0.041)
Labour force growth	0.213	0.287**	0.284**	0.294**
	(0.140)	(0.131)	(0.125)	(0.090)
Openness	0.212**	0.148***	0.148***	0.152***
	(0.075)	(0.025)	(0.025)	(0.025)
Inflation, lagged	-0.375	-0.433*	-0.429*	-0.445*
	(0.269)	(0.225)	(0.219)	(0.231)
Total expenditure		-0.33***	-0.401***	
		(0.106)	(0.116)	
Total revenue		-0.037		-0.348***
		(0.140)		(0.106)
Fiscal balance[1]			-0.155	0.719***
			(0.348)	(0.244)
Volatility of capital exp, lagged	-0.0088***	-0.0033**	-0.0032**	-0.0034**
	(0.0021)	(0.0015)	(0.0015)	(0.0014)
Number of observations	143	129	129	129
Sargan test, χ^2 p-value	0.33	0.21	0.31	0.22
Instrument set	Investment, lag 2-3	Investment, fiscal variables lag 2-4	Investment, fiscal variables lag 2-4	Investment, fiscal variables lag 2-4

*Note: ***, ** and * indicate that the variable is significant at 1%, 5% and 10% respectively. Robust standard errors in parentheses.*

[1] Fiscal balance is defined as (1 + fiscal balance/100) because of which increase in the variable of fiscal balance means improvements in fiscal balance, i.e. reduction in deficit.

On the other hand, a small positive growth effect of an increase in government investment achieved by a reduction in current expenditure, which was found in the fixed effects model, disappears in the dynamic model (column 6). Furthermore, the dynamic model does not confirm the positive growth effect of a decrease in distortionary taxes accompanied by a reduction in unproductive expenditure. The negative growth effect of volatility in government investment is confirmed.

TABLE 7

Growth effects of disaggregated components, controlling for reverse causality

Estimation method: first-differenced GMM

Dependent variable: real output growth rate

Omitted fiscal variable	Functional classification of expenditure			Economic classification of expenditure		
	Non-distortionary taxes	Unproductive expenditure	Non-dist. tax. and unprod. expen.	Non-distortionary taxes	Current expenditure	Non-dist. tax. and current exp.
1	2	3	4	5	6	7
Growth rate, lagged	-0.189	-0.131	-0.094	-0.176	-0.058	0.007
	(0.175)	(0.141)	(0.166)	(0.160)	(0.139)	(0.140)
Investments	0.135**	0.133**	0.127**	0.085*	0.107**	0.098**
	(0.061)	(0.057)	(0.064)	(0.043)	(0.042)	(0.039)
Labour force growth	0.278***	0.314**	0.240**	0.366***	0.258**	0.211
	(0.117)	(0.081)	(0.104)	(0.107)	(0.105)	(0.137)
Openness	0.143***	0.096***	0.135***	0.140***	0.158***	0.171***
	(0.036)	(0.038)	(0.041)	(0.033)	(0.025)	(0.032)
Inflation, lagged	-0.399***	-0.289***	-0.305**	-0.448**	-0.288*	-0.306
	(0.134)	(0.105)	(0.145)	(0.222)	(0.167)	(0.211)
Distortionary taxes	0.199	-0.006	0.064	0.121	-0.037	-0.131
	(0.126)	(0.077)	(0.107)	(0.152)	(0.102)	(0.050)
Non-distortionary taxes	–	-0.109	–	–	-0.070	–
		(0.070)			(0.056)	
Other revenues	0.025	-0.024	-0.055	0.049	-0.030	-0.039
	(0.024)	(0.017)	(0.027)	(0.046)	(0.025)	(0.018)
Expenditure on health	-0.082***	-0.006	-0.009			
	(0.029)	0.044	0.043			
Expenditure on education	-0.077	0.030	0.008			
	(0.060)	(0.076)	(0.076)			
Other productive expenditure	-0.196***	-0.064	-0.074*			
	(0.073)	(0.047)	(0.041)			
Unproductive expenditure	-0.193**	–	–			
	(0.084)					
Fiscal balance[1]	-0.535	0.697*	0.441*	-0.606	0.679**	0.636**
	(0.388)	(0.375)	(0.246)	(0.494)	(0.284)	(0.274)
Current expenditure				-0.546***	–	–
				(0.192)		
Government investment				-0.056	-0.143	-0.005
				(0.037)	(0.019)	(0.016)
Volatility of capital exp., lagged	-0.0029**	-0.0034***	-0.0030***	-0.0030**	-0.0029***	-0.0033***
	(0.0012)	(0.0009)	(0.0010)	(0.0013)	(0.0008)	(0.0007)
Number of observations	129	112	112	129	129	129
Sargan test, χ^2 p-value	0.30	0.14	0.48	0.27	0.13	0.16
Instrument set	Investment, fiscal variables lag 2-4	Investment, fiscal variables lag 2-5	Investment, fiscal variables lag 2-5	Investment, fiscal variables lag 2-4	Investment, fiscal variables lag 2-4	Investment, fiscal variables lag 2-4

*Note: ***, ** and * indicate that the variable is significant at 1%, 5% and 10% respectively. Robust standard errors in parentheses.*

[1] Fiscal balance is defined as (1 + fiscal balance/100) because of which increase in the variable of fiscal balance means improvements in fiscal balance, i.e. reduction in deficit.

5.2 ALTERNATIVE CLASSIFICATION OF PRODUCTIVE EXPENDITURE

As noted above, the functional classification of productive and unproductive expenditure has some weaknesses. To check whether our classification affects the results, we reclassified general public services as productive expenditure. The results of fixed effects as well as dynamic GMM estimations with this new classification are presented in table 8.

TABLE 8

Reclassifying expenditure on general public services
Dependent variable: growth rate of real output

Estimation method	OLS, two-way fixed effect			GMM, first differenced		
	Functional classification of expenditure			Functional classification of expenditure		
Omitted fiscal variable	Non-distortionary taxes	Unproductive expenditure	Non-dist. taxes and unprod. exp.	Non-distortionary taxes	Unproductive expenditure	Non-dist. tax. and current exp.
1	2	3	4	5	6	7
Distortionary taxes	0.048	-0.079**	-0.040	0.211	0.009	0.072
	(0.053)	(0.041)	(0.056)	(0.150)	(0.083)	(0.121)
Non-distortionary taxes	–	-0.093**	–	–	-0.095	–
		(0.044)			(0.067)	
Other revenues	0.024	-0.004	0.002	0.023	-0.003	0.040
	(0.012)	(0.011)	(0.012)	(0.035)	(0.020)	(0.031)
Productive exp._health	-0.028	0.004	-0.013	-0.121*	-0.028	-0.021
	(0.018)	(0.019)	(0.019)	(0.041)	(0.029)	(0.039)
Productive exp._education	0.007	0.027	0.070	-0.038	0.039	0.015
	(0.035)	(0.041)	(0.041)	(0.069)	(0.074)	(0.064)
Other productive expenditure	-0.132***	-0.035	-0.071**	-0.256**	-0.050	-0.133*
	(0.027)	(0.030)	(0.023)	(0.098)	(0.065)	(0.067)
Unproductive expenditure	-0.131***	–	–	-0.109	–	–
	(0.040)			(0.084)		
Fiscal balance[1]	-0.202	0.448**	0.370**	-0.0367	0.786*	0.484*
	(0.241)	(0.194)	(0.188)	(0.372)	(0.407)	(0.284)
Volatility of capital exp, lagged	-0.0024***	-0.0027***	-0.0029***	-0.0029***	-0.0032***	-0.0032***
	(0.0006)	(0.0006)	(0.0006)	(0.0014)	(0.0009)	(0.0013)
R2˜	0.835	0.819	0.803			
Number of observations	156	156	156	129	112	112
Sargan test, χ2 p-value				0.51	0.19	0.39
Instrument set				Investment fiscal var. lag 2-4	Investment, fiscal var. lag 2-5	Investment, fiscal var. lag 2-5

*Note: ***, ** and * indicate that the variable is significant at 1%, 5% and 10% respectively. Robust standard errors in parentheses.*
[1] Fiscal balance is defined as (1 + fiscal balance/100) because of which increase in the variable of fiscal balance means improvements in fiscal balance, i.e. reduction in deficit.

The coefficients on macroeconomic control variables are not reported as their signs and levels of significance remained unchanged.

The reclassification of expenditure on general public services from unproductive to productive did not change the results much. The coefficient on expanded productive expenditure remains negative and statistically significant. However, the negative coefficient on the now narrower unproductive expenditure is not statistically significant in the new specification.

6 CONCLUSION

The empirical results presented in this paper provide only weak support for the potential impact of government expenditure on growth in the new member states of the EU. We do not find evidence of a positive impact of expenditure on health and education on growth. The effects of government investment expenditure on growth are weak and are not present in the dynamic specification. When the effect of government investment on growth is observed, it is due to changes in the structure of total expenditure, i.e. it is present only if total expenditure is reduced, so that that the negative effects of government size on growth are lower. These results are surprising and require further investigation and possibly a more detailed breakdown of data on health, education and investment expenditure. On the other hand, we find evidence that the high volatility of government investment has its own direct negative effects on growth, which are independent of the growth effects of the level of investment expenditure.

We find no support for the conjecture in the literature that shifts toward non-distortionary taxes such as indirect taxes on goods and services have a positive effect on growth. Relying on non-distortionary taxes to increase public investment or reduce fiscal deficits has more or less the same negative effect on growth as relying on distortionary taxes.

On the other hand, when improvements in fiscal balance are achieved by either cutting unproductive expenditure or a combination of a reduction in unproductive expenditure and an increase in non-distortionary taxes, then one can observe a strong positive effect of fiscal policy on growth in this group of countries.

FINANCIAL THEORY AND PRACTICE
37 (4) 335-360 (2013)

APPENDIX

DATA SOURCES AND DESCRIPTION OF VARIABLES

The countries included in the analysis are Slovenia, Hungary, Poland, Slovakia, Czech Republic, Bulgaria, Romania, Estonia, Lithuania, Latvia, Malta and Cyprus, i.e. the new member states plus Croatia. Data sources include Eurostat data base, WDI data base and national sources for Croatia.

If not otherwise stated, the source of data for non-fiscal variables is the Eurostat data base available at http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database.

Growth rate of real output is calculated as the difference in the logarithm of real GDP in constant local currency units (with 2005 as the base year). Data for Malta in 1999 and 2000 are not available from the Eurostat database so the WDI database was used.

GDP per capita is the real GDP per capita in constant euro.

Investments are measured by the share of gross fixed investment in GDP.

Growth of labour force is the difference in the logarithm of the activity ratio, defined as the share of active working age population (15-65 years old) in total population of that age group.

Openness is defined as the GDP share of exports plus imports of goods and services (source: WDI, http://databank.worldbank.org/data/home.aspx).

Inflation is defined as (1 + the annual percentage change in consumer prices/100). We use lagged inflation because changes in indirect taxes affect current inflation rate when one works with annual data (source: WDI).

All fiscal variables, except those for Croatia, are from the Eurostat database (http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database). National sources and author's calculations are used for Croatia. All fiscal variables are related to general government and correspond to the ESA95 statistical standard. All are expressed as logarithms of the ratio to GDP.

Total revenue is the share of total general government revenue in GDP.

Total expenditure is the share of total general government expenditure in GDP.

Fiscal balance is defined as (1+fiscal balance/GDP).

FINANCIAL THEORY AND PRACTICE
37(4) 335-360 (2013)

Distortionary taxes, non-distortionary taxes and other revenues are expressed as percentage of GDP and represent reclassified components of total revenue as described in table 1.

Productive expenditure_health, productive expenditure_education, other productive expenditure and unproductive expenditure are reclassified components of total expenditure according to functional classification as described in table 1. All variables are expressed as a share of GDP.

Current expenditure and investment expenditure are reclassified components of total expenditure based on economic classification as described in table 1. Both are expressed as a share of GDP.

METHODOLOGICAL NOTE ON THE CROATIAN DATA

Croatian fiscal statistics is based on the GFS2001 standard and data are available after the year 2002. The Ministry of Finance's estimates of fiscal aggregates (total expenditure, total revenue and fiscal balance) in line with the ESA95 standard are available in EU related documents since 2003. As the GFS2001 standard is close enough to the ESA95 standard to allow an appropriate comparison of disaggregated components of revenue and expenditure, it is used for disaggregated variables, while the ESA95 data are used for the overall government activity.

Missing GFS2001 observations for the period 1999-2001 were calculated by the author through an adjustment of data based on the GFS1986 standard. The adjustment was mainly related to the treatment of employers' contributions and the GFS1986 item *Net lending and repayments*. In comparison to the ESA95 total expenditure, this adjustment underestimates the level of total expenditure in 1999-2003, because called government guarantees are not included due to the lack of reliable data.

A functional classification of general government expenditure in Croatia is not publicly available, either. The author's calculations are based on central government data and intergovernmental flows. Central government expenditure accounts for 93% of total general government expenditure, so this adjustment seems appropriate.

REFERENCES

1. Acemoglu, D. and Robinson J. A., 2012. *Why Nations Fail*. New York: Crown Business.
2. Adam, C. S. and Bevan, D. L., 2005. Fiscal deficits and growth in developing countries. *Journal of Public Economics*, 89(4), pp. 571-597. doi: 10.1016/j.jpubeco.2004.02.006
3. Afonso, A. and Furceri, D., 2008. Government Size, Composition and Economic Growth. *ECB Working Paper*, No. 849 [online]. Available at: <http://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp849.pdf>.
4. Aghion, P. [et al.], 2005. Volatility and Growth: Credit Constraints and Productivity-Enhancing Investment. *NBER Working Paper 11349* [online]. Available at: <http://www.nber.org/papers/w11349.pdf?new_window=1>.
5. Aghion, P. and Durlauf, S., 2009. From Growth theory to Policy Design. *The Commission on Growth and Development* [online]. Available at: <www.growthcommission.org>.
6. Aghion, P. and Howitt, P., 1990. A Model of Growth through Creative Destruction. *NBER Working paper 3223* [online]. Available at: <http://www.nber.org/papers/w3223.pdf>.
7. Aghion, P., 2009. Growth and Education. *The Commission on Growth and Development* [online]. Available at: <www.growthcommission.org>.
8. Akitoby, B. [et al.], 2004. The Cyclical and Long Term Behaviour of Government Expenditures in Developing Countries. *IMF Working Paper 04/202* [online]. Available at: <http://www.imf.org/external/pubs/ft/wp/2004/wp04202.pdf >.
9. Alesina, A. [et al.], 2002. Fiscal Policy, Profits and Investment. *American Economic Review*, 92(3), pp. 571-589. doi: 10.1257/00028280260136255
10. Alesina, A. and Ardagna, S., 2009. Large Changes in Fiscal Policy: Taxes vs. Spending. *NBER Working Paper 15438* [online]. Available at: <http://www.nber.org/papers/w15438.pdf?new_window=1>.
11. Arellano, M. and Bond, S., 1991. Some Tests of Specification for Panel data: Monte Carlo Evidence and an Application to Employment Equations. *Review of Economic Studies*, 58(2), pp. 277-297. doi: 10.2307/2297968
12. Aschauer, D. A., 1988. Is Public Expenditure Productive? *Journal of Monetary Economics*, 23, pp. 177-200. doi: 10.1016/0304-3932(89)90047-0
13. Barlevy, G., 2003. The Costs of Business Cycles under Endogenous Growth. *NBER Working Paper 9970* [online]. Available at: <http://www.nber.org/papers/w9970.pdf?new_window=1>.
14. Barro, R. J., 1990. Government Spending in a Simple Model of Endogenous Growth. *Journal of Political Economy*, 98 (5), pp. 103-117. doi: 10.1086/261726
15. Barro, R. J., 2003. Determinants of Economic Growth in a Panel of Countries. *Annals of Economics and Finance*, 4(2), pp. 231-271.

16. Barro, R., 1974. Are Government Bonds Net Wealth. *Journal of Political Economy*, 82(6), pp. 1095-1117. doi: 10.1086/260266

17. Blanchard, O. J., 1990. A Comment in O. Blanchard and S. Fisher, eds. *NBER Macroeconomic Annual 1990*. Cambridge: MIT Press, pp. 111-115.

18. Bleaney, M., Gemmell, N. and Kneller, R., 2001. Testing the Endogenous Growth Model; Public Expenditure, Taxation and Growth Over the Long Run. *Canadian Journal of Economics*, 34(1), pp. 36-57. doi: 10.1111/0008-4085.00061

19. Bloom, D. E., Canning, D. and Sevilla, J., 2001. The Effect of Health on Economic Growth: Theory and Evidence. *NBER Working Paper 8587* [online]. Available at: <http://www.nber.org/papers/w8587.pdf?new_window=1>.

20. Bond, S., 2002. Dynamic Panel Data Models: A Guide to Micro Data Methods and Practice. *Portuguese Economic Journal*, 1(2), pp. 141-162. doi: 10.1920/wp.cem.2002.0902

21. Canning, D. and Pedroni, P., 2004. The Effect of Infrastructure on Long Run Economic Growth. *Department of Economic Working Paper*, 2004-04 [online]. Available at: <http://web.williams.edu/Economics/wp/pedronniinfrastructure.pdf>.

22. Dalić, M., 2013. Cyclical Properties of Fiscal Policy in NMS. *Journal of Post-Communist Economies*, 25(3), pp. 289-308. doi: 10.1080/14631377.2013.813144

23. de Avila, D. R. and Strauch, R., 2003. Public Finance and Long Term Growth in Europe – Evidence From Panel Data Analysis. *ECB Working Paper 246*.

24. Devarajan, S., Swaroop, V. and Zou, H., 1996. The Composition of Public Expenditure and Economic Growth. *Journal of Monetary Economics*, 37(2-3), pp. 313-344. doi: 10.1016/0304-3932(96)01249-4

25. Easterly, W. and Rebelo, S., 1993. Fiscal Policy and Economic Growth: An Empirical Investigation. *Journal of Monetary Economics*, 32(3), pp. 417-458. doi: 10.1016/0304-3932(93)90025-B

26. Fatas, A. and Mihov, I., 2003. The Case for Restricting Fiscal Policy Discretion. *The Quarterly Journal of Economics*, 118(4), pp. 1419-1448. doi: 10.1162/003355303322552838

27. Fatas, A. and Mihov, I., 2009. Macroeconomic Policy: Does it Matter for Growth the Role of Volatility. *Commission on Growth and Development, Working paper*, No. 48 [online]. Available at: <http://www.gcbpp.org/files/Academic_Papers/fatas/AP_MacroeconomicPolicy_WorldBank_112009.pdf>.

28. Gemmell, N., 2001. Fiscal Policy in a Growth Framework. *WIDER Discussion paper*. 84 [online]. Available at: <https://www.econstor.eu/dspace/bitstream/10419/53009/1/335132111.pdf>.

29. Gemmell, N., Kneller, R. and Sanz, I., 2011. Fiscal Policy Impact on Growth in the OECD: Are They Long-Run? *The Economic Journal*, 121(55), pp. F33-F58. doi: 10.1111/j.1468-0297.2010.02414.x

30. Gupta, S. [et al.], 2002. Expenditure Composition, Fiscal Adjustments and Growth in Low Income Countries. *Working paper 77* [online]. Available at: <http://www.imf.org/external/pubs/ft/wp/2002/wp0277.pdf>.

31. Hnatkovska, V. and Loayza, N., 2004. Volatility and Growth. *World Bank Policy Research Paper*, 3184. Washington D.C.: The World Bank.

32. Irmen, A. and Kuehnel, J., 2009. Productive Government Expenditures and Economic Growth. *Journal of Economic Surveys*, 23(4), pp. 692-733. doi: 10.1111/j.1467-6419.2009.00576.x

33. King, R. G. and Rebelo, S., 1990. Public Policy and Economic Growth: Developing Neoclassical Implications. *Journal of Political Economy,* 98(3), pp. 126-150. doi: 10.1086/261727

34. Kneller, R., Bleaney, M. and Gemmell, N., 1999. Fiscal Policy and Growth: Evidence from OECD Countries. *Journal of Public Economics*, 74(2), pp. 171-190. doi: 10.1016/S0047-2727(99)00022-5

35. La Porta, R. [et al.], 1996. Law and Finance. *NBER Working Paper 5661* [online]. Available at: <http://www.nber.org/papers/w5661.pdf?new_window=1>.

36. Levine, R. and Renelt, D., 1998. A Sensitivity Analysis of Cross Country Growth Regressions. *American Economic Journal*, 82(4), pp. 942-963.

37. Lucas, R., 1988. On the Mechanics of Economic Development. *Journal of Monetary Economics*, 22(1), pp. 3-42. doi: 10.1016/0304-3932(88)90168-7

38. Romer, P. M., 1990. Endogenous Technological Change. Journal of Political Economy, 98(5), pp. S71-S102.

39. Zagler, M. and Dürnecker, G., 2003. Fiscal Policy and Economic Growth. *Journal of Economic Surveys*, 17(3), pp. 397-418. doi: 10.1111/1467-6419.00199