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Empirical Evidence of Fiscal Policy Impact on Endogenuos Models of Economic Growth - the Case of Albania

Authors: **Olta Milova,** Faculty of Economy, University of Tirana – Albania, oltamilova@feut.edu.al, **Arjeta Vokshi – Abazi,** Faculty of Economy, University of Tirana – Albania. arjetavokshi@fakultetiekonomise.edu.al

According to Mankiw (2000), fiscal policy in major macroeconomic models adversely affects the behavior of private agents as consumers and firms and they affect economic growth through investment and savings decisions. Increasing government spending will increase the aggregate demand for goods and services and money demand in the money market leading to an increase of interest rates while markets tend towards equilibrium. The increased interest rates affect negatively the level of private investment. To assess the effect of fiscal policy on economic growth generally are used the endogenous growth models, which include technological progress as an integrated part of this model. These models were called endogenous because they were taking into account long-term economic growth and were using endogenous mechanisms to explain its main source which is the technological progress. Endogenous growth models developed by Barro (1990), Mendosa, Milesi-Ferreti and Asea (1997) or even by other economists, predict that the fiscal policy can affect the level of product and the long run economic growth. This conclusion is analyzed in the theory of Barro (1990), which extends the model by including the fiscal policy. The Barro's model is the model used in this paper to analyze the effect of the fiscal policy on economic growth in the case of Albania. The empirical work shows that all the variables, except inflation which according to theoretical expectations should have a negative effect, affect positively the economic growth. This positive relation between these variables can be

explained by investments in infrastructure and other priority sectors that the government has done during all this period.

Keywords: *fiscal policy; public debt; economic growth*

Introduction

Fiscal policy is an instrument with a significant impact in a number of macroeconomic indicators, among which the economic growth. In recent decades, fiscal policy has faced pressures of increasing spending and moderate tax cuts in order to stimulate the economy in many countries of the world causing this way budget deficits and debts which have controversial effects on economic growth. In this context, fiscal policy analysis is a debated issue among the economists. The idea for writing this paper derives precisely from this debate, also due to the fact that Albania has accumulated a very high public debt in recent years as a result of not very careful fiscal policies. Based on the theoretical background and literature, the purpose of this paper is to show empirically the impact of the fiscal policy on the economic growth over the last decade in Albania.

Literature implications

Fiscal policy in major macroeconomic models adversely affects the behavior of private agents as consumers and firms and they affect economic growth through investment and savings decisions Mankiw (2000). Increasing government spending will increase aggregate demand for goods and services and money demand in the money market leading to an increase of interest rates while markets tend towards equilibrium. The increase of interest rates negatively affects private investment, which is a major source of economic growth. Also financing government spending through borrowing affects the increase of interest rate again narrowing the private investment and thus economic growth. This process is known in the macroeconomic literature as the effect of "crowding out". Also tax rates affect investment, consumption and savings and therefore economic growth.

To assess the effect of fiscal policy on economic growth is used endogenous growth model, which includes technological progress as an

integrated part of this model. Endogenous growth models have their origin in the 1980s, (Romer 1986). These models were called endogenous because they were taking into account long-term economic growth and were using endogenous mechanisms to explain its main source which is the technological progress. In this context, sustainable growth is influenced by the increase in the aggregate level of savings, the accumulation of production factors (labor, physical and human capital), the increase of efficiency in the production process, the support of technology and the increase of research - development (R&D) investments.

The endogenous models link the behavior of economic agents to the rate of economic growth. They create a suitable framework for studying the effects of fiscal policy on growth. All the sources of growth mentioned above can be influenced by the fiscal policy and other economic policies. In this way governments can influence economic growth through policies that they draw up and implement. However, let us return once again to the negative effect of fiscal policy on growth. Other studies in this field Barro (1990) Barro and Sala-i-Martin (1992, 1997, 2002), Devarajan et al. (1996), Baier and Glomm (2001), have concluded theoretically and empirically that not all kind of spending realized by the government have the same effect on economic growth. For example government spending on infrastructure, Agenor and Moreno-Dodson (2007) assist in the performance of private businesses contributing positively to economic growth. Also taxes affect the decision of firms to invest and expand their activity (Gareth 2009). Spending on research - development and innovation are part of the firm's investment, which actually are seen as the main source of economic growth, Howitt (2000). They improve technology and increase the quality and quantity of output produced, as well as reduces costs. Offering fiscal facilities to firms that develop innovation or orienting public spending towards this sector will contribute positively to economic growth. On the other hand, human capital Feldstein (1995a) Blankenau and Simpson (2004), is a major contributor to economic growth. For example government spending can encourage or discourage investment in human capital through training subsidies or through taxing the returns from these investments.

However, the theory does not provide adequate information about the positive or a negative effect, significant or not significant effect of fiscal policy toward growth, or variables that affect it. It is therefore necessary an

empirical analysis, the results of which vary along a model[1], and also through comparing models between them.

Theoretical aspects of the model

Endogenous growth models developed by Barro (1990), Barro and Sala-i-Martin (1992.1995), Mendosa, Milesi-Ferreti and Asea (1997) predict that fiscal policy can affect the level of product and the long run economic growth. This conclusion is analyzed in the theory of Barro (1990), which extends the model by including the fiscal policy. In the analysis of the effect of fiscal policy on economic growth I'm based on Barro's model applying the data for Albania.

Model assumptions:

- Denoted with G - public spending level, by abstracting from externalities and benefits from public services.
- The level of spending is considered as an input to private production, because this productive role of spending creates opportunities for a positive correlation between economic growth and government spending.
- There are assumed constant returns of scale for capital and public spending together. And there are assumed decreasing returns of scale for capital as separate factor of production, if public spending does not lie as a complementary factor to it.
- There is assumed a Cobb-Douglas production function and an iso - elastic utility function.

$$Y = f(K, G) = AK^{1-\alpha}G^{\alpha}$$

where $0 < \alpha < 1$

In the equation, k represents the amount of capital of private producers, and G represents inputs provided publicly. Public expenditures are financed by a flat income tax rate (Hall, Rabushka. 1983, 1985.)

$$G = T = \tau Y = \tau AK^{1-\alpha}G^{\alpha}$$

Where T is the total government revenue and τ is the flat tax rate. After successive transformations final shape of the regression equation would be like this:

[1] Bleaney Michael, Gemmell Norman, Kneller Richard (2001) Testing the Endogenuos Growth Model: government expenditure, taxation and growth over the long run, Canadian Journal of Economics, Vol. 34, No.1, February

$$\varphi_t = \alpha + \sum_{i=1}^{k} \beta_i Y_{it} + \sum_{j=1}^{m} \gamma_j X_{jt} + u_t$$

Where the rate of economic growth will note by ϕ. Y_{it} includes non-fiscal variables that have an impact on economic growth and X_{jt} includes fiscal variables. Some of the non-fiscal variables are inflation, private investment, exports, imports, unemployment, etc. which according to major macroeconomic theories Mankiw (2000) influence economic growth.

Empirical Evidence

In this study will be treated the role of the fiscal impact on economic growth in Albania. With the help of time-series analysis we well meet the relationship between fiscal variables and economic growth which will be measured by the growth rate of gross domestic product.

Data and Methodology

For building the empirical model I have taken in consideration the period from 2005 to 2012 using quarterly data obtained by INSTAT[2] . Some of the independent variables that will be introduced in the model are: government spending, foreign direct investment, inflation, exports and tax revenues. The dependent variable is gross domestic product. All my analysis will pass through some econometric tests to achieve just that what the purpose of my study is: The impact of fiscal policy on economic growth. Questions that arise during the study are: Does fiscal policy influences economic growth? How much does it influences and which are the means? How does? What are the recommendations for the implementation of policies for stimulating the economy? These are questions whose answers will provide by the empirical analysis. The analysis will include tests such as ADF (unitary root test), Johansen test, and Granger causality test.

[2] Albanian Institute of Statistics

Empirical analysis

To study the effect of fiscal policy on economic growth we build a model through which enable the connection of fiscal variables and economic growth. After testing the importance of variables, the included variables in regression are: government spending (G), tax revenues (TRtax) as fiscal variables and foreign direct investment (FDI), exports (EX) and inflation (INF), as non-fiscal variables. Then build regression function and find coefficients in front of each variable. Further find out the coefficient R2 which measures that how much the dependent variable is explained by the independent variables. Also see the statistical significance of variables. Then we pass other tests as ADF, Johansen and Granger who will be explained ongoing.

The function of the model is, GDP = f (G, IHD, INFL, X, TRtax), and the regression:

$$GDP = a0 + a1G + a2FDI + a3INFL + a4\ X + a5TRtax + U$$

where:

G - government spending, FDI - foreign direct investment, INF – inflation, X - exports TRtax - tax revenues, a0, a1 ,a2, a3, a4, a5 - coefficients in front of each variable, U – residuals error term

After analyzing the data the concrete form of the regression is:

$$\mathbf{PBB = 73502.81 + 0.709*G + 0.223*FDI - 577127.1*INF + 0.9225*X + 0.918*TRTAX}$$

(0.158) (0.228) (0.878) (0.244) (0.162) (0.254)

R2 = 94 %

By processing the data in Eviews 7 we found out the above results of the regression. R2 is 94% which means that 94 percent of the depended variable is explained by the independent variables. Also all variables are statistically significant, exempt FDI. Even whole model is statistically significant (Probability = 0:00 < 0:05). The statistical significance is shown by the probability values. Regarding autocorrelation value we referred to Durbin-Watson (dw = 1.96) which indicates that there is no problem with autocorrelation between variables in the model.

From equation is noted that all variables affect positively economic growth, except inflation which according to theoretical expectations should

have a negative effect. Specifically if G increases by 1 point percent then we will have an increase of 0.709 point percent drop in GDP. This positive relation between these variables can be explained by investments in infrastructure and other priority sectors that the government has done during all this period. The stage of economic development in Albania over the years has been full weaknesses in terms of necessary infrastructure to have a developed private sector. This is the main reason for the positive effect of government spending on gross domestic product. FDI also increased by 1 point percent has affected the increase of GDP by 0.223 points percent. It is obvious that foreign investment will have a positive contribution; however, the effect is not very high. If exports increase by 1 point percent, the GDP will increase by 0.9225 point percent. And for every increase with 1 point percent of tax revenues contribute to an increase of 0.918 points percent of GDP.

Heteroscedasticity and Normality Tests

Table 1: Breusch-Pagan / Cook-Weisberg test for heteroscedasticity
Ho: Constant variance
Variables: fitted values of G
chi2(1) = 0.01
Prob > chi2 = 0.9216

Source: Authors calculations

Ho: Constant variance (homoscedasticity)
Ha: Non-constant variance (heteroscedasticity)

According to the table above Probability = 0.9216 < 0.05 → Ho cannot be dropped, so the variance is constant and there is no heteroscedasticity
Normality is another test that we must do in this model. We will see whether the residuals have a normal distribution or not. We will do Skewness/Kurtosis test.
Ho : $\mu \sim N\ (0,\sigma 2)$ normal distribution
Ha: $\mu \neq N\ (0,\sigma 2)$ not normal distribution

Table 2: Skewness/Kurtosis tests for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
uhat	32	0.0531	0.1646	5.69	0.0580

Source : Authors calculations

Looking at the table above have prob = 0.0580 > 0.05, which means that Ho can not be rejected and further say that the residuals have a normal distribution. Në distribution other than The normal distribution can also be seen in the values of skewness and kurtosis:
Pr (Skewness) = 0.0531 > 0.05, which means that Ho can not be rejected, the residuals have normal distribution.

Pr (Kurtosis) = 0.1646 > 0.05 Ho can not be rejected, the residuals have normal distribution. Finally we say that the residuals have normal distribution.

When the data are in the form of time series we use several statistical techniques to analyze the specificity of the series. We start with the unit roots test to see whether the series are stationary or not. If there is no unit root the series is stationary, if the series has a unitary root it shows that it is not stationary and turns as such with a difference. To perform such analysis, we used the Dickey-Fuller test generalized as ADF regarding our series.

Dickey-Fuller Test:

We used Augmented Dickey-Fuller test for every variable to see wether each series is stacionary. The hipothesis that can be arised are:
Ho : $\delta = 0$ (has a unit root, nonstacionary)
Ha : $\delta \neq 0$ (stationary)

Table 3: The results of stacionarity test for each series

	PBB	G	IHD	INF	X	TRTAX
t	-7.23344	-6.60304	-12.46380	-5.37346	-9.83630	-5.85776

Source : Authors calculations

We see that the value of ADF test-statistic is -7.233344 < critical value, which mean that the serie of gross domestic product (GDP) is turned to stacionarywith trend. We use the same logic even for the other variables as we see that their ADF statistic – test values are above the critical values.

After testing stacionarity of the series, we will now proceed to Johansenit test through which we will see if there cointegretation between variables in the long run. And if there cointegretation, how many cointegretation vectors are?

Johansen Test

Table 4: Johansen Test

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.767386	125.3912	83.93712	0.0000
At most 1 *	0.706155	81.63996	60.06141	0.0003
At most 2 *	0.488593	44.89884	40.17493	0.0155
At most 3 *	0.416881	24.78113	24.27596	0.0432
At most 4	0.171467	8.600193	12.32090	0.1938
At most 5	0.093872	2.957233	4.129906	0.1012

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level

*** denotes rejection of the hypothesis at the 0.05 level**

****MacKinnon-Haug-Michelis (1999) p-values**

Source : Authors calculations

To find the number of cointegretation vectors we depart from the comparison of trace statistic with critical value 0.05 but also we can use the probability value. There are at least three vectors of cointegretation, for

which the trace statistic > critical value at the level 0.05. And on the other hand for the same number of vectors the value of probability is less than 0.05.

Granger Cause Test:

Traditional practices for testing dependency direction between two variables use the standard Granger analysis. Granger Cause test is applied to variables: G, FDI INF, X, TRTAX on gross domestic product (GDP) and also gross for the depended variable domestic product (GDP) on the variables mentioned above. Causality can be determined by evaluation of the equation and by testing the following hypotheses:
Ho: There is no Granger cause
Ha: There is Granger cause

Table 5: Granger Cause Test

Pairwise Granger Causality Tests			
Sample: 1 32			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
G does not Granger Cause PBB	30	13.7710	9.E-05
PBB does not Granger Cause G		6.54507	0.0052
IHD does not Granger Cause PBB	30	2.84552	0.0770
PBB does not Granger Cause IHD		0.70459	0.5039
INFL does not Granger Cause PBB	30	6.67135	0.0048
PBB does not Granger Cause INFL		1.24840	0.3042
X does not Granger Cause PBB	30	2.75701	0.0828
PBB does not Granger Cause X		18.8793	1.E-05
TRTAX does not Granger Cause PBB	30	0.39308	0.6791
PBB does not Granger Cause TRTAX		**4.33454**	**0.0242**

Source: Authors calculation

The null hypothesis can be rejected if the values of probability for each relation between variables are less than 0.05. We see from the table that there is a mutual granger cause of G and GDP as the values of probability are less than 0.05. There is no granger cause between IHD and GDP. And the other four relationships between variables have a biased granger cause.

Conclusions

The state can directly affect the economy through fiscal policy. When he decides to collect taxes, transfers, purchases of goods and services, financing deficit, etc affects the decision of economic agents. Any change in the level of these fiscal instruments has direct effects on key macroeconomic variables and economic development in general. Fiscal policy can negatively affect private investment through interest rates and the level of taxation, but also positively through spending on education, infrastructure, innovation, etc. In Albania, fiscal policy throughout the period under study had the tendency to keep low tax rates and to spend towards the primary sector to give positive impulses to business climate and economic development. The results of the model speak for a positive impact of fiscal policy on growth. This is explained as a consequence of spending orientation in such sectors as infrastructure, low tax rates, facilitating the procedures for opening businesses, etc. Also, these results show a strong link between fiscal policy and economic growth in Albania. From the tests is revealed causality between fiscal policy and economic growth, as well as a long-term relationship between them. However, these conclusions relate to a specific period of time and totally depend on the method of construction of the model.

References

[1] Agenor Pierre-Richard, Moreno-Dodson Blanca (2006), *Public Infrastructure and Growth: New Channels and Policy Implication, World Bank Policy Research working paper*, WPS4064, November

[2] Baier Scott L., Glomm Gerhard (2001) *Long-run growth and welfare effects of public policies with distortionary taxation*, Journal of

Economic Dynamics and Control, Elsevier, vol. 25(12), pages 2007-2042, December

[3] Barro Robert J. (1991), *Economic Growth in a Cross Section of Countries NBER Working Papers* 3120, National Bureau of Economic Research, Inc.

[4] Barro Robert J., Sala i Martin Xavier (1990), *Public finance in models of economics growth*, NBER Working Paper Series, WP No. 3362

[5] Barro Robert J, Sala-i-Martin Xavier (1992), *Convergence across countries and regions* Journal of Political Economy University of Chicago Press, vol. 100(2), pages 223-51, April.

[6] Barro Robert J, Sala-i-Martin Xavier (1997), *Technological Diffusion, Convergence, and Growth* Journal of Economic Growth, Springer, vol. 2(1), pages 1-26, March

[7] Blankenau William F., Simpson Nicole B. (2004) *Public education expenditures and growth*, Journal of Development Economics, Elsevier, vol. 73(2), pages 583-605, April.

[8] Bleaney Michael, Gemmell Norman, Kneller Richard (2001*) Testing the Endogenuos Growth Model: government expenditure, taxation and growth over the long run*, Canadian Journal of Economics, Vol. 34, No.1, February

[9] Devarajan Shantayanan, Swaroop Vinaya, Heng-fu Zou (1996). *The composition of public expenditure and economic growth*, Journal of Monetary Economics. Elsevier, vol. 37(2-3), pages 313-344, April.

[10] Feldstein Martin (1995) *Tax Avoidance and the Deadweight Loss of the Income Tax*, NBER Working Papers 5055, National Bureau of Economic Research, Inc.

[11] Howitt Peter (2000), *Endogenous Growth and Cross-Country Income Differences*, American Economic Review, American Economic Association, vol. 90(4), pages 829-846, September.

[12] Mankiw Gregory (2007) *Macroeconomics*, Sixth Edition, Worth publisher

[13] Mendoza Enrique G., Milesi-Ferretti Gian Maria, Asea Patrick (1997), *On the ineffectiveness of tax policy in altering long-run growth: Harberger's superneutrality conjecture*. Journal of Public Economics, Elsevier, vol. 66(1), pages 99-126, October

[14] Myles D. Gareth (2009), *Economic Growth and the Role of Taxation* – Theory, Economics Department Working Paper No 713, ECO/WKP(2009)54, july