

**ECONOMETRIC ANALYSIS OF THE IMPACT OF PRODUCTIVE AND
UNPRODUCTIVE EXPENDITURES ON ECONOMIC GROWTH: CASE OF
REPUBLIC OF MACEDONIA**

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Abstract: Being aware of controversial evidence of the impact of public expenditures on economic growth in developing countries, the paper tries to address the significant nexus between productive and unproductive expenditures and economic growth in the Republic of Macedonia for the last 17 years and to address such results as further recommendation for eventually government changes in the future. In addition, the main aim of this paper is to specify whether productive expenditures have positive impact on economic growth in Republic of Macedonia and to evaluate the nexus between public expenditures and economic growth as well as the stage of significance of this relationship. Moreover, ADF test it is used for determining the stationarity of the time series 2000q1 – 2016q4, while Johansen co-integration test has been used to determine the existence of co-integrated vectors in this model. Further, VECM it is used to determine the long-run relationship between productive and unproductive expenditures and economic growth. The results of the empirical analysis reveal that the data are not stationary in their level but they become stationary in their first difference, while the results of Johansen test for co-integration indicate the existence of one co-integrating vector, thus indicating the existence of long-run significant effects of public expenditures in economic growth. Moreover, VECM suggest positive effects of productive expenditures on real GDP, while unproductive are shown to be insignificant in the model. Moreover, this study can be seen as further contribution on the existing literature regarding the impact of public expenditures on economic growth, as well as to the Macedonian policymakers for better efficiency usage of productive and unproductive expenditures in the country.

Keywords: Productive expenditures, unproductive expenditures, co-integration, VECM.

INTRODUCTION

The impact of public expenditures in the economic growth in developing countries has attracted the attention of many scholars, showing contradictory results of such nexus. In addition, the composition of public expenditures into productive and unproductive expenditures and its impact on the countries growth rate, it is not a common issue that has been analyzed so far, especially for the case of Republic of Macedonia. Therefore, the central question is determining the dilemma of the effect of public expenditures composition in the countries growth rate. Even though the size of the government it is a public choice issue, however the composition remains open to public discussion. There exist several studies that have been studied the distinction among productive and unproductive expenditures and suggest government improvements for better performance through the model of mixing or changing between the two of them. Lately, developing countries are facing difficulties facing hard choices when undertaking fiscal adjustments, such as which component of public expenditures should be cut first; education, health, defense, infrastructure? In most cases, the answer depends on the contribution of each of these items on the economic growth of the country. The main aim of this paper is express light over the impact of the public expenditure decomposition on the economic growth in Republic of Macedonia for the time period 2000 – 2016. It is clear that governments are undertaking public expenditures in order to pursue several different goals, even though and theory and empirical evidence does not offer clear answers to the uncertainty of the effects of productive and unproductive expenditures on growth rate, due to the variation of results on the level of development and strength of the governance.

Regarding the linkage of particular public expenditures on growth, there exist few studies investigating this nexus however there is lack of clear results, indicating positive, negative and no evidence of a significant relationship among the composition of public expenditures and economic growth.

Due to the lack of existing proper analysis in this field, the main aim of this paper is to investigate the relationship of expenditure composition and economic growth in the Republic of Macedonia as a developing country for the time period 2000 – 2016, by utilizing quarterly data and to address these results as future potential suggestions for government policy changes.

The paper is structured as follows: the first section cover the part of introduction, where it is explained the main objective of the paper and certain aspects of the linkage of the composition of public expenditures and economic

growth; the second section covers the part of literature review of the nexus between expenditure composition and countries growth rate; the third section covers the methodology and data specification of the econometric analysis; fourth section represents the results of the empirical analysis and the last section reveals the recommendations and conclusions of this paper.

LITERATURE REVIEW

Relationship among public expenditures and economic growth has been a long debatable issue present at several papers, however recent studies based on the exogenous growth, revealed different models of the linkage of public expenditures with the long-term economic growth, even though results have indicated distinction among productive and unproductive expenditures (Aschaur 1989, Barro 1990).

Existing debate regarding the impact of public expenditures and economic growth is one of the main reasons for attraction of many scholars interest in analyzing the nexus between these two variables. Although the existing findings are controversy, the seems to achieve an agreement to the existence of this relationship but disagreement for the direction of such linkage in the long run and short run and in the level of development and governance of the countries.

According to Barro (1990), (1991) and Kneller et al (1999), empirical evidence for the relationship between public expenditures and economic growth have shown positive effects of productive governmental expenditures on growth. Moreover, Barro and Sala-i-Martin (1995), use the Cobb – Douglas production function and they show that there exist a positive effects of productive government expenditures on growth and negative effects of distortive taxes on economic growth.

The results of the Devarajan et al (1993) study show that health and transport expenditures of government can make positive impact on economic growth while expenditures for education and military have no significant impact on economic growth. A positive and significant correlation between public expenditures and economic growth is present in the study of Albala and Mamatzakis (2001) for time series data for the period 1960 – 1995, for the case of Chile.

Specification of the data of this paper is be based on the framework of Barro and Sala-i-Martin (1995), where public expenditures are taken as an independent variable and are divided into productive (positive impact on economic growth) and unproductive (neutral or no significant effect on economic growth), and from where we refer our public expenditures composition in this paper.

In addition, Eicher and Turnovsky (2000) in their study investigate productive government spending as a flow in a nonscale endogenous growth model in the spirit of Jones (1995).

It is accepted that public expenditure on infrastructure such as roads, ports, public research spending and the provision of basic education and medical services raises the economic potential of economy, where influential studies such as that of Aschauer (1989) and de Haan and Romp (2007) for a recent survey of this empirical literature argued that a rise in productive government activity increases growth. Moreover, authors Easterly and Rebelo (1993); Canning and Pedroni (2004) also find evidence for long-run growth effects associated with public investment in infrastructure.

In addition, by the usage of endogenous model, government expenditures on education have positive impact on economic growth in the long run while a negative effect on the short run, while on the other hand expenditure for agriculture have no effect on economic growth (Gregorous and Ghosh, 2007). Moreover, in the study was suggested that expenditures on defense and health have negatively effects in economic growth in the long run period.

Moreover, Wilkin (2004) has done a narrower study by demonstrating the impact of defense expenditure on economic growth through three sector Feder-Ram model for 85 countries over during the time period 1988 -2002 regarding annual data and there was seen no consistent relation between defense expenditure and economic growth among the studied countries and studied period.

Further, public infrastructure can positively influence the productivity of the private physical capital explained by Caning and Pedroni (1999) in e theoretical way or as empirically shown by Zou et al (2008), Fedderke and Bogetic (2006) and Demetriades and Mamuneas (2004). Yet, the productivity of the human capital is mainly influenced by public education as shown by Bils and Klenow (2000), de la Fuente (2003), Blankenau and Simpson (2004), Creedy and Gemmel (2005)) as well as by publicly provided health services shown on the studies of Arora (2001) and Agénor(2008)). Therefore, we can say that public expenditures with general services, national defense, public order and national security, housing and community amenities represents “core” expenditures that are so necessary for limiting the inefficiencies induced by diverse market failures and good function of the economy.

EMPIRICAL ANALYSIS

In order to analyze the relationship between public expenditure composition and economic growth in the case of Republic of Macedonia, quarterly time series have been employed for the time period 2000q1 to 2016q4. Main aim is to determine the relationship between productive and unproductive expenditures and economic growth rate in Macedonia, and for this purpose the null hypothesis has been set as follows:

H1: productive expenditures have positive impact on economic growth in Republic of Macedonia.

Moreover, data are taken from official reports of Ministry of Finance and Central Bank, where the composition of public expenditures is made of productive and unproductive expenditures as indicated in the following table:

Table1. Public expenditure composition

PRODUCTIVE EXPENDITURES	UNPRODUCTIVE EXPENDITURES
General public services	Social security contributions
Education	Recreation, culture and religion
Health	Other economic actions
Justice	
Housing	
Transport and communications	

Source: Barro's model of public expenditure composition (1990)

Moreover, it is used the neoclassical growth theory, where in the model, productive and unproductive expenditures, Gross fixed capital formation and labor force participation rate are independent variables, while real GDP is the dependent variable. In addition, time series are checked for stationarity, therefore Augmented Dickey Fuller test has been employed to investigate if time series have or not unit root in their level, thus if are nonstationary and if yes do they become stationary in their first difference. Further, Johansen test for co-integration has been used to determine whether there exists at least one co-integrating vector among the variables in the model, thus if there exist a significant long-run relationship between the included variables in the following basic regression model:

$$rGDP = \beta_0 + \beta_1 Pex + \beta_2 UPex + \beta_3 GFCF + \beta_4 LF + \varepsilon \quad (1)$$

Further, it is determined the lag structure level of the time series through the following FPE, AIC, SBIC and HQIC criteria. Based on the results presented in table2, we can suggest the number of lags in this model to be equal to one, since and HQIC and SBIC suggest such results.

Table2. Lag structure

Lag	LR	FPE	AIC	HQIC	SBIC
0		197.901	19.4771	19.5436	19.6458
1	386.31	1.03626	14.2222	14.6209*	15.2342*
2	62.575	.863813	14.0258	14.7566	15.881
3	53.643	.846687*	13.9688*	15.0319	16.6674
4	45.734*	.972488	14.0355	15.4308	17.5774

Source: author's source.

The results of ADF test are presented in the table 3 for the level as well as for the first difference of each of variable. The result shows that the null hypothesis that the series contain unit root cannot be rejected in all cases at zero order levels. But the hypothesis of a unit root is strongly rejected for the differenced series of all variables.

Given the consistency and ambiguity of the results from this testing approach, we conclude that all variables are non-stationary in their level and stationary in their first difference.

Table3. Unit root – Augmented Dickey Fuller test

	Variable	Augmented Dickey Fuller	Comment
Level	rGDP	-2.717 (-2.917)	H ₀
	Pex	-2.015 (-2.917)	H ₀

	UPex	-2.022 (-2.917)	H₀
	GFCF	-2.210 (-2.917)	H₀
	LF	-2.743 (-2.917)	H₀
First difference	rGDP	-9.201 (-2.918)	H₁
	Pex	-5.961 (-2.918)	H₁
	UPex	-6.789 (-2.918)	H₁
	GFCF	-3.415 (-2.918)	H₁
	LF	-7.891 (-2.918)	H₁
Notes: † numbers in brackets represent lag length in ADF test			

Source: author's source.

Table 4 presents the result of trace test (λ_{trace}) statistics for the existence of long run equilibrium between the public expenditure composition, GFCF, LF and real GDP growth rate. The null hypothesis of no co-integration ($r=0$) based on the trace test between these variables is rejected at (5%) level of significance and accept at $r \leq 1$ for both variables, thus claim the existence of one co-integrating vector between the variables, indicating the existence of a significant long-run relationship among the variables included in this model.

Table4. Johansen test for co-integration

Null hypothesis	Alternative hypothesis	λ - trace	95 % critical value
$r = 0$	$r > 0$	57.0358	47.21
$r \leq 1$	$r > 1$	28.6904*	29.68
$r \leq 2$	$r > 2$	6.8751	15.41

Source: author's source.

Findings of VECM presented in the following table reveal that productive expenditures have positive effect on real GDP in the long run, while unproductive expenditures have negative but statistically not significant effect on real GDP growth rate in the long-run in Republic of Macedonia. Table 5 shows that the real GDP moves positively according to changes in productive expenditures, thus *we accept the hypothesis that productive expenditures have positive impact on real GDP in the long run in Republic of Macedonia*. An increase of 1 % of productive expenditures will generate an increase in the real GDP level of 0.113 %.

Table5. Vector error correction model

Variables (co-integration vector 1)	β	α
Real GDP	1	0
Productive expenditures –Pex	-0.113 (-0.012)	1.404 (0.000)
Unproductive expenditures –UPex	.0199 (0.287)	-1.157 (0.176)
Gross Fixed Capital Formation - GFCF	.0118 (0.156)	-0.0297 (0.976)
Labor Force Participation rate - LF	-.058689 0.017	2.668 0.000

Source: author's source.

Further, the long run regression test results are indicated as follows:

$$\text{Real GDP} = 0.113\text{Pex} - 0.199\text{UPex} - 0.0118 \text{GFCF} + 0.058\text{LF}(2)$$

In addition, positive effect of productive expenditures in real GDP growth rate in the long run is due to investments in projects of economic infrastructure with a long term nature of the financing of the investment cycle. Moreover, it is clear that such findings are consistent with many other scholar's observations and findings.

CONCLUSIONS AND RECOMMENDATIONS

This paper investigated the effect of public expenditure composition on real GDP growth rate in a small open transition economy from 2000 to 2016, through utilization of quarterly data. In order to examine such effect, types of public expenditure are examined based on Barro division, through employing of Vector error correction model for assessing their impact on Real GDP in the long run. Moreover, it is crucial to indicate that in transition countries, with short spans of data and their questionable quality, the character of the empirical results is rather to be indicative than definite. Finally, crucial findings of this paper are indicated in the following paragraph.

In this research, empirical findings based on VECM results of co integrating vector show that productive expenditure have long run positive effect on real GDP in the long run, thus implying the acceptance of the null hypothesis, thus productive expenditures have positive impact on real GDP growth rate in Macedonia, while unproductive expenditures have long run negative but insignificant effect on real GDP in the long-run.

Moreover, the positive effect of productive expenditures in real GDP in the long run is due to investments in projects of economic infrastructure (mainly highways, sanitation, energy) where such nature of the investment cycle financed by public spending is long as well. Undoubtedly, these findings are consistent with many observations and other findings to date.

This confirms the paramount necessity for the changed structure of capital investment, based on the local economic impact elements (with low-cost products, increased competition in the regional export markets, chain effects and value recreated, the involvement of local potential local companies, multiplier of these commitments).

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