

## **IMPACT OF PUBLIC INVESTMENT ON ECONOMIC GROWTH IN NORTHERN MACEDONIA**

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### **Abstract**

This paper will summarize the conclusions of a review of public investment management (MIP) practices in the Republic of Northern Macedonia, with the aim of improving practices over the medium term, exchanging experience on a regional basis, providing some specific initial recommendations and identifying of fields for a further more detailed analysis. The report is based on state statistical data provided in detail by the relevant institutions in the Republic of Northern Macedonia, which are given in various formats to facilitate comparison, but which can also be read as a separate section. The whole analysis is organized around some of the following headings and subheadings which reflect a structured study questionnaire designed to prepare this paper such as: • Identification, Preparation and Evaluation of Capital Investment Projects • Impact of Public Investments on Economic Growth • Impact of public expenditures negatively on economic development. • And empirical analysis on testing of investments and public expenditures. Econometric and small square estimation (OLS)

***Key word: Public investment, economic growth, OLS estimation***

### **Introduction**

In the conditions of globalization, the Macedonian economy functions as an open market economy. In all modern economies, the state has an indisputable, and often even primary role in economic activity. The basic task of the state in relation to the economy of each country is creation and maintenance of the functioning of the legal and institutional platform on which the economic activity takes place.

Investment is a central factor in determining gross domestic product, which is the overall measure of a country's economic output. As a society, it needs to invest more, because

increasing its capacity to produce more goods and services at a lower cost means greater productivity and economic growth.

Public investment is closely linked to the state and its functions. They are an important instrument used in the economic, political and social life of a country. An important role in providing public investment is played by foreign donors

Public investment is an important factor influencing the growth of the economy. On the one hand, public investment facilitates and stimulates private investment through the provision of infrastructural support. As a result it increases capital productivity and increase output.

Public investment is the part of national income that is intended to cover public expenditure, which is general and special.

Public investments directly affect the production of new assets such as. for the construction of railways by the state, for reclamation, for afforestation, energy systems, advanced technology, quality education, etc., which have a productive character, but on the other hand they have an indirect impact on the growth of the private economy through the provision of goods and services such as bridges, telecommunications networks, roads, etc.

By public investment we mean the destination of public revenues to "produce" public services. Between public and private investment there is a complementarity link in satisfying public, collective and individual needs at the time of "production" of property, as well as that of its distribution and consumption.

Public investments also play an important role in the redistribution of assets that is ultimately carried out between public expenditures and public revenues, because the state with the public expenditures provided in the budget and that it performs effectively can meet those needs which citizens - private individuals do not they can satisfy them with their tools. So, public investments are expenditures in money made by the state and other legal-public entities to meet collective needs and public interests.

Also, public investments play an important role in the relocation and redistribution of wealth and income both within the country, from one district to another, as well as in relations with other countries. The public sector policy in the government of the Republic of Macedonia in the medium and long term is based on investments. The expected results are: reconstruction and modernization of public infrastructure in order to ensure higher efficiency taking into account lower costs.

We ask the research question whether the increase of public investments will have an impact on the growth of a country's economy. The answer to this question can be obtained through the following hypothesis:

- **H1 / 1: Increasing public investment would have a positive impact on economic growth.**

To determine the validity of the hypothesis we will apply the method of small squares respectively regression analysis. Therefore, through regression analysis, the hypothesis in question will be confirmed or rejected.

After entering and defining the hypothesis, the paper is organized as follows: in the second part we will review the literature; in the third part by means of mathematical formulas we will specify the econometric model and clarify the evaluation method. Then, with the help of calculations and the specialized STATA program, we will replace the values of the variables found in the formula and test the selected model; in the fourth part we will interpret the results and the last part is the conclusion and limitations of the model with recommendations for policy makers and further research on this issue by other authors.

### **Literature Review**

Despite the fact that the relationship between public investment and economic growth has a long period of research and there is voluminous literature, again this area has a lot of space and far from a definite answer.

Part of the literature has a positive direction, where it is argued that public investment leads to economic growth, not only through positive effects on the economy, such as the provision of education, health, research, advanced technology, but they also encourage the growth of private investment. , which directly affect real economic growth.

On the other hand, other studies question the efficiency of public investment on the one hand and its relationship with private investment on the other, and argue that public investment does not necessarily have a favorable impact on a country's economic growth.

Khan (1966) examines the relative importance of public and private investment in fostering economic growth in a large group of developing countries. The results of the study show that private and public investment have a different impact on economic growth, private investment has a much greater and more direct impact than public investment. Also, changes have been encountered in terms of the effectiveness that public and private investments generate.

Davarjan (1996) presented data on 43 developing countries, which showed that government spending has no significant effect on economic growth.

Pritchett (1996) suggests another explanation for Davarajan, he discovers the "White elephant" hypothesis, according to which he argues that public investment in developing countries is often used for unproductive and inappropriate projects. Consequently, the share of public investment can be a very weak measure to influence the current growth of public capital.

Public investment should be a source of endogenous growth. According to the exogenous balanced growth hypothesis, public spending in the long run has no impact on economic growth, King (1991). An endogenous economic growth where output is stochastic, temporary policy changes has long-term consequences for output.

Barro (1991) examines the effect that public investment and public consumption expenditures have on countries' economic growth. After analysis with several variables, he confirmed that public investment did not have a significant effect on economic growth rates, while the rate of economic growth is negatively related to the share of consumer spending in government. In 1993 Canning and Fay, while in 1992 Easterlu and Rebelo, used panel data to research the contribution of transport networks to economic growth. They came to an important conclusion from the study that there is a strong link between economic growth and public investment in transport networks.

Nazmi and Ramirez (1997) analyzed the impact of public and private investment on economic growth. They concluded that public investment spending had a positive and significant effect on increasing overall output. At the same time they concluded that the impact of public investment was statically identical to the impact of probationary capital expenditures.

The question of whether additional public investment is an effective policy strategy will depend largely on the nature of the economic growth process, as well as levels of public investment and other types of public spending. A fiscal policy strategy would be reasonable if an increase in public investment would have a positive effect and increase the country's economy.

Public investment must be measured by the marginal effects it brings. The fact that a public investment has a positive effect does not mean that increasing public investment will be an effective strategy for economic growth.

## **Empirical analysis on testing investment and public spending**

After reviewing the empirical evidence of public investment in relation to economic growth, now through an econometric model we will examine how the growth of public investment and public spending will affect the economy of the Republic of Macedonia. First we will present the specification of the econometric model and the evaluation method and after that we will analyze the data in the empirical work and we will perform the calculation of the econometric model and as a result we will interpret the result. In the continuation of this part we will check the validity of the hypotheses which we defined in the introduction of the paper.

### **Econometric model specification and small squares estimation (OLS)**

Based on the simple linear regression method as well as through the application of the small squares method (OLS), we will test the effect of public investment and public spending on the economic growth of the Republic of Macedonia.

In the following we will present the three-dimensional linear regression model:

$$Y = B_1 + B_2X_1 + B_3X + u_i$$

Y - Represents the dependent variable - (variable to be clarified, regressive, endogenous, predicted, etc.), in our case of research as a dependent variable is economic growth (GDP)

X - Represents the independent variable (regressor, exogenous, predictive, etc.), in our case as independent variables are Public Investment (IP) and public spending (G).

B1, B2 and B3 are known as parameters, or otherwise can be called as evaluation coefficients, where B1- the parameter of the constant, while B2 and B3 represent the evaluation parameters of the independent variable.

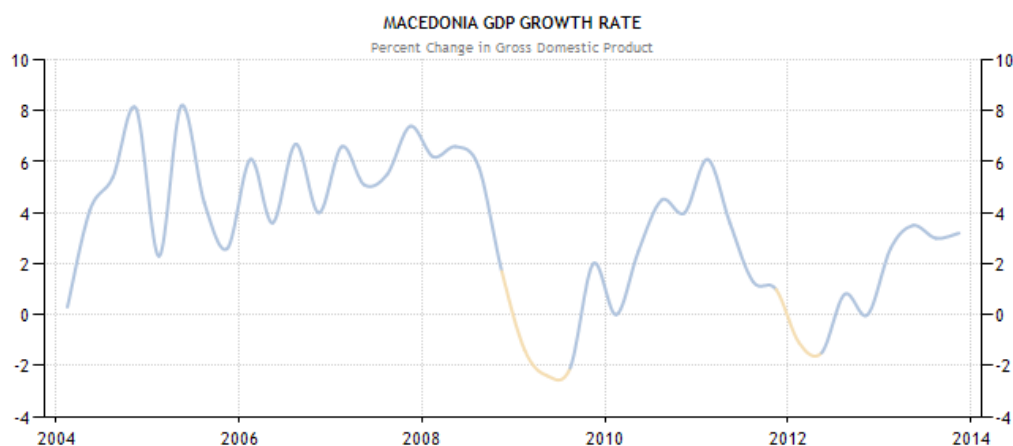
U<sub>i</sub> - is a stochastic variable or in various literatures can be encountered with the term Error Term, this component itself contains all the factors or variables that affect the model but are not provided in the model, is a random variable not observed which can take positive or even negative values.

## Small Squares Assessment (OLS)

The simplicity of this model is derived from the assumption for the term error: which is assumed to be  $e \sim N(0, \sigma^2)$ . In other words, knowing the value of the error term which in the model does not explain anything about the other variables (the distribution of the error term is independent of the other variables), as well as the observations of the error term are uncorrelated with each other. In principle only  $e$  is normally distributed where  $E(e) = 0$  (the error term has an average of 0) and a constant change. And for a given  $X$  there is no series correlation between observations moreover the error terms are not heteroskedastic. In other words individual observations over time are different individual observations and such an approach may be reasonable in cases where the magnitude of samples from indirect data is very small.

However, ignoring the data panel structure assuming that the term error is independent and identically distributed leads to results that are not appropriate in many models. After the concerns mentioned by the classical linear regression model, efficient estimation can be achieved using the small squares (OLS) method. Despite numerous biases, similar to other studies in this study the data collected will be evaluated using small squares (OLS) in our empirical analysis

## Data in the econometric model



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### Calculating the econometric model and interpreting the results

We will now evaluate the econometric model of the impact of public (capital) investments and public spending on the real economic growth of the Republic of Macedonia. Our goal is that through regression analysis we check the validity of the hypothesis presented at the beginning of this paper. Since in our case the data are in percentage (%), then it is not necessary to enter this data into the logarithm. In the model we have included three variables, where we have one dependent or exogenous variable which is GDP and two dependent variables which are Public Investments and Public Expenditures. In the following we will present the model as a multiple regression.

The econometric model is presented as follows:

$$Y(\text{GDP real}) = B1 + B2(\text{public inv}) + B3(\text{public spending}) + Ui$$

Where Y represents real GDP or regressor, B1 the coefficient of the constant: B2, B3 and B4 the partial coefficients of evaluation of public investment and public expenditure and u-which represents the standard error.

Using the STATA\_12 software we will calculate the estimation coefficients in the equation of the regression sample function.

After calculating the estimation coefficients B1, B2 and B3, making the substitutions of the respective values we will present the three-dimensional regression function.

$$\text{GDP} = 36.79 + 0.355 \text{ public inv.} - 0.762 \text{ public spending}$$

(se)	13.52	0.28	0.68
(t)	2.72	1.26	-1.12

According to the results of empirical research, we suggested that public investments have a moderately high impact on the real growth of the economy of the Republic of Macedonia. With this we conclude that the eventual increase of Public Investments by 1%, would affect the GDP growth by 0.35%. Since the t-test, shows that  $t = 1.26$ , is greater than 0.05 we can conclude that this coefficient has significance. Based on this result we can confirm the hypothesis presented at the beginning of the paper which states that:

**- H1 / 1: Increasing public investment would have a positive impact on economic growth.**

Whereas, regarding the impact of public spending on the real economic growth of the Republic of Macedonia, the result can show the non-significant effect of public spending on the economy. Namely, during the calculation of the model, it is shown that an eventual change of public expenditures by 1%, will negatively affect the economic growth by -0.76%. Considering that the t-test has a value of 1.12, which is less than 0.05 accordingly, we can see that this coefficient has no significance.

With the results achieved above, we are in agreement with most of the studies done in developing countries such as Davarjan (1996), presented data for 43 developed countries, which turned out that government spending has no significant effect on economic growth, Pritchett (1996) suggests another explanation for Davarajan, he discovers the "White elephant" hypothesis, according to which he argues that public investment in developing countries is used often for unproductive and inappropriate projects. Consequently, the share of public investment can be a very weak measure to influence the current growth of public capital, Barro (1991) examines the effect that public investment and public consumption



expenditures have on the economic growth of countries. After analyzes with several variables, he confirmed that public investment did not have a significant effect on economic growth rates, while the rate of economic growth is negatively related to the share of consumer spending in government. All these results of this research and others reflect the real situation in Macedonia.

## **Conclusion**

The main purpose of this paper is to analyze the impact that would increase the increase of public investment and public spending in the economy of the Republic of Macedonia.

Based on the empirical results achieved by the model, we concluded that public investment has great effects on the country's economy, where according to these econometric estimates we support our hypothesis formulated at the beginning, which states that: H1 / 1: Increase investment public would positively affect economic growth. As most authors have found in their studies that public investment has a significant effect on the economic development of a country, our results are of the same assessment. Where, we found that the eventual increase of Public Investments by 1%, would affect GDP growth by 0.35%. Since the t-test, shows that  $t = 1.26$ , is greater than 0.05 we can conclude that this coefficient has significance.

However, the figures presented to the public by the government and the reality we live in are very different, because not every public investment is efficient and effective. Based on the data, we mean that the more public investments we have, the more the Macedonian economy would grow, but this would only happen if the investments were profitable in the long run and any additional investment would bring economic growth. In addition, only then could the fact be accepted that the more the state invests, the higher the economy would be. This is evidenced by the fact that Macedonia has high public investment, but not high economic growth, so not with the same proportion, as public investment must be productive, such as investments in infrastructure, power plants, education, health, technology , where all these would provide easier conditions for private businesses which have a direct impact on the country's economy, where instead of these investments, they are oriented towards the construction of Skopje 2014, unnecessary monuments and which have twice the negative effect as they too are imported from other countries.

Like any other research, this research contains certain limitations where we can mention the non-inclusion of all the variables needed to more accurately determine the impact of public investment in the economy, as we can say that if public investment is made distributed

throughout the country (investment distribution), the source of financial means used are from debts or accumulation from the country's economy, etc.

### Reference

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### Apendix

	var1	var2	var3
1.	.	18.67	19.05
2.	-6.17	17.68	21.66
3.	-6.56	15.49	19.52
4.	-7.47	15.99	21.08
5.	-1.76	15.47	19.04
6.	-1.11	20.76	18.58
7.	1.18	20.09	18.13
8.	1.44	20.97	19.73
9.	3.38	22.26	20.26
10.	4.34	19.7	20.58
11.	4.55	22.25	18.2
12.	-4.53	19.08	24.8
13.	.85	20.61	22.39
14.	2.82	19.14	20.27
15.	4.63	21.99	19.64
16.	4.35	21.32	18.43
17.	5.03	21.5	18.13
18.	6.15	24.64	17.12
19.	4.95	26.82	18.24
20.	-.92	26.2	19.12
21.	2.9	25.52	19.11
22.	2.8	26.22	18.31
23.	-.4	36.78	18.48
24.	3.1	31.14	18.73

GSJ

Source	SS	df	MS	
Model	100.247147	1	100.247147	Number of obs = 23
Residual	449.229169	21	21.3918652	F( 1, 21) = 4.69
Total	549.476316	22	24.9761962	Prob > F = 0.0421
				R-squared = 0.1824
				Adj R-squared = 0.1435
				Root MSE = 4.6251

.nvestkapi~y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
gdp	.5309549	.2452708	2.16	0.042	.0208862	1.041024
_cons	21.7007	.9965693	21.78	0.000	19.62822	23.77318

Source	SS	df	MS	
Model	126.697278	2	63.3486391	Number of obs = 23
Residual	422.779038	20	21.1389519	F( 2, 20) = 3.00
Total	549.476316	22	24.9761962	Prob > F = 0.0727
				R-squared = 0.2306
				Adj R-squared = 0.1536
				Root MSE = 4.5977

var2	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
var3	-.7629306	.6820447	-1.12	0.277	-2.185651	.6597897
var1	.3556792	.2898262	1.23	0.234	-.2488877	.9602461
_cons	36.79214	13.52777	2.72	0.013	8.573703	65.01058