

# Real Government Expenditure and Economic Growth in the Southern Caucasus Countries: A Panel Data Analysis

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## Abstract

The primary purpose of this paper is to find out the relationship between real government expenditures and real gross domestic product (GDP) for three countries of the South Caucasus namely, Azerbaijan, Armenia, and Georgia. The relationship between the variables is essential for policy formation for these countries due to their transition to market economy. There are two main hypotheses related to real government expenditures and growth. The Wagner's hypothesis argues that growth of an economy leads more government spending while the Keynes's hypothesis proposes that government expenditures feed higher economic growth. From policy perspectives, Keynesian view gives a dominant role in government intervention for higher growth while Wagner view gives just a passive role to the government in economic policy. This paper is designed to investigate these hypotheses by using econometric panel techniques. The analysis covers the years 1990-2016. According to our empirical results, there is a mutually positive relationship between real government expenditures and economic growth in the South Caucasus. At the same time, we also find short and long-term bidirectional causality. These results confirm each other and in line with the existing literature. Our study contributes to literature as filling the gap by studying the South Caucasus countries.

**Keywords:** government expenditure, economic growth, Wagner's hypothesis, Keynesian hypothesis, the Southern Caucasus countries, panel data analysis

**JEL Classification:** H50, O40

## Introduction

Effects of resource allocation between public and private sectors have been subjects of many studies. On the one hand, Wagner's hypothesis states that growth of an economy leads people to demand more public goods which in return cause higher government expenditures. On the other hand, the Keynesian hypothesis states that expansionary government expenditures improve economic growth. Both of these

views are so important in forming economic policies to improve economic welfare. Accepting the former view gives no role to government expenditures in stabilizing the economy and contributing economic growth while adopting the latter view puts a significant role to use government expenditures as a powerful policy tool in economic stabilization and development processes.

There are many studies in the literature that provide a theoretical and empirical aspect of this problem. Among them Peacock and Wiseman (1961), Musgrave (1969), Goffman and Mahar (1971), Michas (1975), Mann (1980), Singh and Sahni (1984), Ram (1986, 1987), Barro (1990, 1991), Mankiw, Romer and Weil (1992), Barro and Sala-i-Martin (1992), Easterly and Rebelo (1993), Brons, de Groot and Nijkamp (1999), Chang (2002), Dar Atul and Amirkhilkhali (2002), Bagdigen and Cetintas (2003), Olomola (2004), Aregbeyen (2006), Ogundipe and Oluwatobi (2013), Biyase and Zwane, (2015), Funashima (2017) and Kiraz and Gumus (2017) can be mentioned. These studies have no clear-cut conclusions on supporting only one hypothesis. There are studies that support both hypotheses leading to mixed results. On the one hand, several studies have reported a positive and significant relationship between government expenditure and economic growth, on the other, some have not found significant, or some have found a negative relationship between economic growth and government expenditures. For example, Folster and Henrekson (2001), Pevcin (2003), Brady (2007), Liu, Hsu and Younis (2008), Pham (2009) and Maku (2009) supported the position that government expenditure affects economic growth negatively.

While the validity of Wagner's and Keynesian hypotheses have been subject of many studies using market-oriented economies data, it is curious to seek this validation in case of transition economies. Therefore, the subject of this study is to empirically investigate the effect of government expenditures on economic growth in the Southern Caucasus countries, which transitioned to the market economy with the dissolution of the Union of Soviet Socialist Republics in 1990.

This study aims to find out the relationship between government expenditure and economic growth of the South Caucasus countries employing panel data. The following parts of this study are organized as follows: short literature is provided in section 2. Section 3 hosts theoretical methodology. Some key information about the South Caucasus countries, data, and model specification are given in section 4. Section 5 presents an empirical finding, and the last section provides a conclusion.

## Literature Review

There are many studies that have been conducted to investigate the relationship between government expenditure and economic growth. Landau (1983), studied the impact of government consumption expenditure on economic growth for a sample of 96 countries and found that government expenditure had a negative impact on economic growth. Donald and Shuanglin (1993) investigate the effects of various government expenditures on economic growth in a sample group of 58 countries. They found that expenditure on education and defense had a positive impact on economic growth, while welfare spending had a very negative impact on economic growth.

Abu-Bader and Abu-Qarn (2003) used a multivariable cointegration and variance decomposition approach to examine the causal relationship between the government's public expenditure and military burden and economic growth for Egypt, Israel, and Syria. In a two-variable framework, they observed that there was a negative relationship between government expenditure and economic growth in a pairwise and long-run relationship. In addition, the three-way framework showed that military burden has a negative effect on economic growth in all countries. At the same time, civilian government expenditure has a positive impact on economic growth for both Israel and Egypt.

Halicioglu (2003) searched for the validity of Wagner's law for Turkey using data from 1960 to 2000 period. He used a time series econometric procedure and found no support for the Wagner's law in Turkey.

Olugbenga and Owoye (2007) investigated the relationship between government expenditure and economic growth for 30 OECD countries in the period 1970-2005. In 16 countries, there was a one-way and positive relationship from government expenditures to economic growth. Thus, the Keynesian hypothesis was supported. In 10 countries, they found a positive relationship to economic growth from government expenditure. Therefore, Wagner's law was confirmed. In 4 countries, no relation was found.

Jiranyakul and Brahmaasrene (2007) used Thailand data to test Granger causality in examining the relationship between government expenditure and economic growth. The results support the Keynesian hypothesis.

Esen and Bayrak (2015) interested in searching the same relationship between government expenditure and economic growth employing panel data analysis. They used data from 5 countries (Azerbaijan, Kazakhstan, Kyrgyzstan, Turkmenistan, and Uzbekistan) in 1990 and 2012. They concluded that government expenditure has a positive effect on economic growth.

Sedrakyan and Candamio (2017) analyzed the effect of government expenditure and taxes on economic growth for Spain and Armenia between 1996 and 2014 using the Pedroni cointegration and Granger causality tests. They also concluded that both variables have a positive effect on economic growth.

Kiraz and Gumus (2017) studied the relationship between government expenditures and economic growth using 29 OECD member countries data from 1995-2013. Specifically, they used subcategories of government defense-education-health expenditures to find out effect on economic growth through econometric panel methods and Granger causality testing. They found that there is bidirectional causation between economic growth and government expenditures. This result supports Wagner's and Keynesian hypotheses.

### **Theoretical Methodology**

This research uses panel data model. The panel data model equation is as follows (Baltagi, 2011:306):

$$y_{it} = \alpha_i + \beta x_{it} + u_{it} \quad (1)$$

First, we use unit root tests for data stationery. In panel data models, unit root tests of Levin, Li, and Chu (2002), Im, Pesaran, and Shin (2003), Maddala and Wu (1999) and Choi (2001) are commonly used. The Levin, Li, and Chu test allow constant, time-varying, residual variances, and higher-order autocorrelation structures to vary freely from country to country (Yilgor, 2008:p.35). Im, Pesaran, and Shin test are performing separate unit root tests for the same length of time series for each country (Yilgor, 2008:p.40). Maddala and Wu tests heterogeneity alternatives. The Choi test is based on the combination of the probability values of the unit root test applied to the panel (Choi, 2001:p.253).

Panel cointegration test was applied after ensuring the stationary of the variables. Here, Pedroni (2001) cointegration approach is adopted. The Pedroni test allows multiple explanatory variables. It allows the cointegration vector to vary along different parts of the panel. It also allows for the heterogeneity of faults along cross-sectional units (Asteriou and Hall, 2007:p.374). Seven different cointegration tests are presented to cover the within and between effects on the panel, and these tests are divided into two different categories. The Pedroni cointegration test is as follows:

$$Y_{i,t} = \alpha_i + \delta_i + \sum_{m=1}^M \beta_{mi} X_{mi,t} + u_{i,t} \quad (2)$$

$t=1, \dots, T$ ;  $i=1, \dots, N$ ;  $m=1, \dots, M$ .  $T$  is the total number of observations made over time,  $N$  is the total number of individual units in the panel,  $M$  gives the number of regression variables (Yilgor, 2008:p.63).

After reaching the cointegration result between the variables, we then employ Dynamic Ordinary Least Square (DOLS) method developed by Pedroni to obtain prediction coefficients. DOLS test is as follows:

$$y_{it} = \alpha_i + \beta x_{it} + \sum_{\alpha k=-K_i}^{K_i} \gamma_{ik} \Delta x_{it} + u_{it} \quad (3)$$

We also use Vector Error Correction (VEC) estimation technique to determine the causal direction between government expenditures (GE) and gross domestic product (GDP). Causality analysis is tested with the following equations:

$$\Delta \ln GDP_{it} = \delta_{1i} + \sum_{p=1}^k \delta_{11ip} + \Delta \ln GDP_{it-p} + \sum_{p=1}^k \delta_{12ip} + \Delta \ln GE_{it-p} + \varphi_{1i} \hat{\epsilon}_{it-1} + v_{1it} \quad (4)$$

$$\Delta \ln GE_{it} = \delta_{2i} + \sum_{p=1}^k \delta_{21ip} + \Delta \ln GE_{it-p} + \sum_{p=1}^k \delta_{22ip} + \Delta \ln GDP_{it-p} + \varphi_{2i} \hat{\epsilon}_{it-1} + v_{2it} \quad (5)$$

While the long-term causality is reached with the t-test in the VEC model, short-term causality is obtained by using the Walt test.

### Key Information, Data and Empirical Models

The purpose of the research is to analyze the relationship between the government expenditures and economic growth of the South Caucasus countries. Since both the Wagner hypothesis and the Keynes hypothesis have been addressed here, the relationship between government expenditure and economic growth has been tested mutually.

The null Keynes hypothesis can be stated as follows: increase in government expenditure does not lead to increase economic growth

The null Wagner hypothesis can be stated as follows: economic growth does not increase government expenditure

To test the hypotheses, the following models were established based on both the Keynes hypothesis and the Wagner hypothesis:

$$GDP = \alpha_0 + \beta_1 GE + \mu$$

(6)

$$GE = \alpha_0 + \beta_1 GDP + \mu$$

(7)

Where

GDP= Real Gross Domestic Product

GE= Real Government Expenditure

There are three countries in the Southern Caucasus: Armenia, Azerbaijan, and Georgia. Key information about these countries is given in table 1.

**Table 1.** Key Information about the Southern Caucasus Countries

	<b>Armenia</b>	<b>Azerbaijan</b>	<b>Georgia</b>
<b>Independence Date</b>	Sep.21.1991	Oct.18.1991	Apr.09.1991
<b>Area(km<sup>2</sup>)</b>	29.743	86.600	69.700
<b>Population*</b>	2.924.816	9.762.274	3.719.300
<b>Labor Force*</b>	1.402.998	4.968.882	2.034.777
<b>Unemployment</b> (%of total labor force)	%18.0	%5.0	%11.8
<b>GDP per capita*</b> (current US \$)	3,614	3,876	3,875
<b>GNI per capita*</b> (Atlas method, current US \$)	3,770	4,760	3,830
<b>GCE per capita*</b> (current US \$)	502.17	509.32	710.39
<b>Inflation*</b> (consumer prices, annual %)	-1.27	4.18	2.13

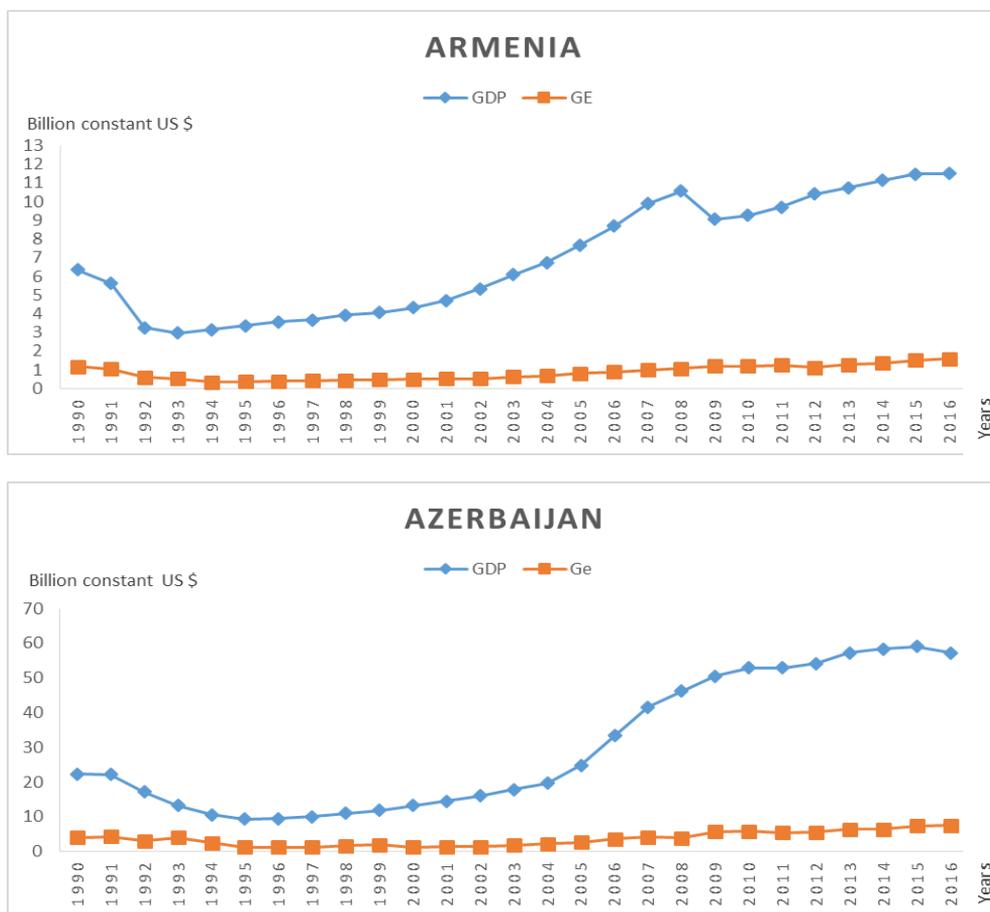
\* Figures are from the year 2016. Source: The Authors collected from World Bank and web pages of the statistical services of each country.

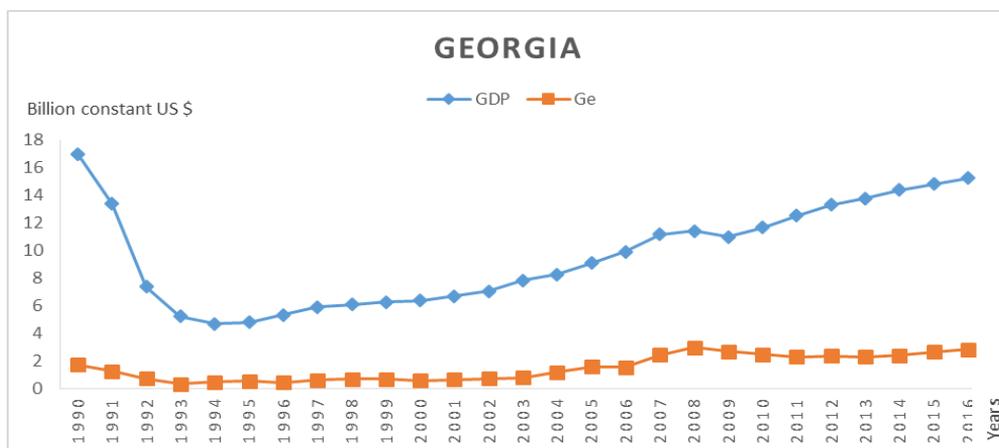
Data sources used in this study for the countries of Armenia, Azerbaijan, and Georgia are given in table 2. Government consumption expenditures treated as government expenditures variable and GDP are used. Both variables were at constant prices (US \$). The data cover 1990-2016 years.

**Table 2.** Data Sources

Variables	Source
GDP	Constant2010 price (\$), World Development Indicators (WDI) from <a href="http://www.data.worldbank.org">www.data.worldbank.org</a> , 17.12.2017
GE	Constant 2010 price (\$), Global Development Finance (GDI) from <a href="http://www.data.worldbank.org">www.data.worldbank.org</a> , 17.12.2017

Based on the obtained data, GE and GDP for each of the three countries are given in Figure 1.





**Figure 1.** GDP and GE: 1990-2016, Source: World Bank

We took the logarithm of the data to avoid the linearity problem. The descriptive statistics on the variables are given in table 3.

**Table 3.** Explanatory Statistics

	<b>lnGDP</b>	<b>lnGE</b>
<b>Mean</b>	23.124	21.049
<b>Median</b>	23.079	20.956
<b>Maximum</b>	24.801	22.740
<b>Minimum</b>	21.815	19.535
<b>Std.Dev.</b>	0.7779	0.8390
<b>Skewness</b>	0.6268	0.2080
<b>Kurtosis</b>	2.8781	2.1136
<b>Jarqua-Bera</b>	5.3541	3.2353
<b>Prob.</b>	0.0687	0.1983

Source: Authors' calculated.

## Empirical Results

As a beginning point, the stationarity test was performed, and the data were made stationary. Stationary tests are gave in table 4. As seen in the table, the variables became stationary at the first difference in all four tests.

**Table 4.** Results of Unit Root Tests

Level				
Variables	Levin, Lin & Chu (LLC) t-stat.	Im, Pesaran & Shin (IPS) w-stat.	Maddala and Wu (ADF-Fisher) $\chi^2$ -stat.	Choi (PP-Fisher) $\chi^2$ - stat.
<i>lnGDP</i>	-0.62057 (0.2674)	0.50311 (0.6926)	3.06762 (0.8003)	2.30648 (0.8895)
<i>lnGE</i>	1.50539 (0.9339)	1.91767 (0.9724)	0.85877 (0.9904)	1.41274 (0.9651)
1st Difference				
Variables	Levin, Lin & Chu (LLC) t-stat.	Im, Pesaran & Shin (IPS) w-stat.	Maddala and Wu (ADF-Fisher) $\chi^2$ -stat.	Choi (PP-Fisher) $\chi^2$ - stat.
<i>lnGDP</i>	-2.68438*** (0.0036)	-2.57139*** (0.0051)	16.9627*** (0.0094)	9.56890 (0.1440)
<i>lnGE</i>	-4.50053*** (0.0000)	-4.31521*** (0.0000)	28.4899*** (0.0001)	25.6387*** (0.0003)

\*\*\* 1%, \*\* 5%, \* 10% significance level. P-values are in parentheses.

Automatic lag length selection based on Schwarz Info Criterion, Newy-West automatic bandwidth selection, and Bartlett kernel.

After stationarity obtained, we conducted Pedroni cointegration test to find a long-run relationship between real government expenditure and real gross domestic product. The results are given in Table 5.

**Table 5.** Pedroni Cointegration Test Results

Null Hypothesis: No cointegration				
Within-dimension	Dependent variable: $\Delta \ln GDP$		Dependent variable: $\Delta \ln GCE$	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	0.707359	0.2397	-0.317442	0.6245
Panel rho-Statistic	-2.696107***	0.0035	-5.269263***	0.0000
Panel PP-Statistic	-3.228729***	0.0006	-7.619773***	0.0000
Panel ADF-Statistic	-3.406000***	0.0003	-6.962266***	0.0000

<b>Between-dimension</b>	<b>Statistic</b>	<b>Prob.</b>	<b>Statistic</b>	<b>Prob.</b>
Group rho-Statistic	-1.653143**	0.0492	-4.055771***	0.0000
Group PP-Statistic	-3.415600***	0.0003	-7.785157***	0.0000
Group ADF-Statistic	-3.423243***	0.0003	-7.067373***	0.0000

\*\*\* 1%, \*\* 5%, \* 10% significance level.

Automatic lag length selection based on Schwarz Info Criterion, Newy-West automatic bandwidth selection, and Bartlett kernel.

We have used both GDP and GE dependent variables respectively to understand long-run relationship from Wagnerian and Keynesian perspectives. As seen in the table we have found a cointegration relationship that there is a long run relationship between the two variables.

After having found the long run relationship between the variables, next step is to find the long run effects of one variable to the other. In other words, we are interested in finding income elasticity of government expenditures (supporting Wagner’s hypothesis) and government expenditures elasticities of income (supporting Keynes’s hypothesis) for Panel and individual countries in this study.

The Panel DOLS estimation coefficient was then calculated, and the results were reported in table 6. Across the table, we have found elasticities ranging from 0.50 to 1.17. For the panel, a 1% increase in government expenditures, ceteris paribus, leads to a 0.62% increase in GDP at the 1% significance level that supports the Keynesian hypothesis. We have also found strong support for Wagner’s hypothesis. A 1% increase in GDP, ceteris paribus, causes a 0.95% increase in government expenditures.

**Table 6.** Panel DOLS Results

		<b><u>Panel Result</u></b>		
<b>Dependent Variable</b>		<b>Coefficient</b>	<b>t-Statistic</b>	<b>Prob.</b>
$\Delta \ln \text{GDP}$		0.625436***	8.482288	0.0000
$\Delta \ln \text{GE}$		0.949433***	3.886705	0.0002
		<b><u>Individual Results</u></b>		
<b>Country</b>	<b>Dependent Variable</b>	<b>Coefficient</b>	<b>t-Statistic</b>	<b>Prob.</b>
	$\Delta \ln \text{GDP}$	1.168967***	6.953486	0.0022

Armenia	$\Delta \ln GE$	1.036934***	5.886270	0.0000
	$\Delta \ln GDP$	0.321890	1.986981	0.1853
Azerbaijan	$\Delta \ln GE$	0.693107	1.229087	0.3440
	$\Delta \ln GDP$	0.503760**	2.695007	0.0174
Georgia	$\Delta \ln GE$	0.850186	0.852740	0.4050

\*\*\* 1%, \*\* 5%, \* 10% significance level.

Automatic leads and lags specification (based on Schwarz Info Criterion), Long-run variances (Bartlett kernel, Newy-West automatic bandwidth) used for individual coefficient covariances.

On a country basis, a 1% increase in government expenditures leads a 1.17 % increase in GDP, and a 1% increase in GDP increases government expenditures by 1.03% in case of Armenia. This means that both Keynesian and Wagnerian hypotheses valid for Armenia. We have found positive coefficients for Azerbaijan even though these variables are not found statistically significant. That means that neither hypothesis holds for Azerbaijan. As for Georgia, there is an only one-way effect from government expenditures to growth. A 1% increase in government expenditures leads to 0.50 % increase in GDP. We have, therefore, found evidence in supporting the Keynesian hypothesis in case of Georgia.

The last test we consider in this study is to investigate the causality between the variables. We have performed Wald Test (short-term) and ECM test (long term) for causality between the variables. The short-term causality test is given in table 7, and the long-term causality test is given in Table 8.

**Table 7.** Wald Test (Short Term)

Variable	F-Statistic	Chi-square
$\Delta \ln GE$ to $\Delta \ln GDP$	2.427640* (0.0959)	4.855281* (0.0882)
$\Delta \ln GDP$ to $\Delta \ln GE$	5.305540*** (0.0072)	10.61108*** (0.0050)

\*\*\* 1%, \*\* 5%, \* 10% significance level. P-values are in parentheses.

According to the Wald test result shown in Table 7, there is bidirectional causality between GE and GDP in the short term that supports both hypotheses.

**Table 8.** ECM Test (Long Term)

Variable	Coefficient	t-Statistic	Prob.
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$\Delta \ln \text{GE}$ to $\Delta \ln \text{GDP}$	-0.277420***	-8.814014	0.0000
$\Delta \ln \text{GDP}$ to $\Delta \ln \text{GE}$	-0.245281***	-3.348199	0.0013

\*\*\* 1%, \*\*5%, \* 10% significance level.

According to the long-term causality test results, there exists a bidirectional causality across the panel supporting both hypotheses. Therefore, our short and long-term causality tests give us the strong causal relationship between real government expenditures and real gross domestic product.

### Conclusion

This research aims to analyze the relationship between the government expenditures and economic growth of Azerbaijan, Armenia, and Georgia, which are the countries of the South Caucasus. Specifically, our interest is to find evidence for Wagner and Keynes hypotheses. According to the Keynes hypothesis, the increase in government expenditure has a positive impact on economic growth. According to Wagner hypothesis, the increase in economic growth leads to an increase in government expenditure. We employed panel econometric technics and causality tests using the South Caucasus countries data from 1990 to 2016.

Our DOLS results support both the Wagner and the Keynes hypotheses for the South Caucasus countries across the panel. Our short and long-term causality test results also show bidirectional causality between real government expenditures and real gross domestic product.

Based on these results it can be said that, for the South Caucasus countries, real government expenditures affect economic growth and economic growth also affects real government expenditures, *ceteris paribus*.

As for individual countries in the panel, both Wagner and Keynes hypotheses are valid in case of Armenia. Government expenditures are important policy tool for economic growth and growth also leads more public spending. High-income elasticity may be an indicator of a dominant public-sector existence in Armenia that little progress may have taken toward a market economy.

Regarding Azerbaijan, there is a bilateral relationship between real government expenditures and economic growth. However, they are not statistically significant. Thus, use and structure of government expenditures in Azerbaijan may have problems indicating inefficient resource utilization.

In terms of Georgia, there is one-way relationship from government expenditures to growth, supporting Keynes's hypothesis. The income elasticity is 0.50 indicating more progress toward a market economy has been achieved.

Although our study investigates Keynes and Wagner's hypotheses in case of the South Caucasus countries, it does not claim to explain the whole relationship between government expenditures and economic growth. Our study is the first to cover the South Caucasus countries to investigate the validity of Wagner and Keynes's hypotheses and contribute to the literature. Therefore, further research may be conducted using different approach and technics.

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