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The Impact of Economic Growth on Government Expenditures in Sub-Saharan African Countries: A Panel Data Analysis for Wagner Law and Keynesian Approach

Sahra Altı Afrika Ülkelerinde Ekonomik Büyümenin Kamu Harcamalarına Etkisi: Wagner Yasasının ve Keynesyen Yaklaşımın Panel Veri Analizi

Eylül Kabakçı Günay ^{a,*} & Betül Aygün ^b

^a Assist.Prof., İzmir Democracy University, FEAS, Department of Economics, 35140, İzmir/Türkiye

ORCID: 0000-0001-5547-4316

^b Ph.D., Softtech Research&Development Company, İstanbul /Türkiye

ORCID: 0000-0001-9610-9235

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ÖZ

Bu çalışma, 1990-2019 döneminde 30 Sahra Altı ülkesi için Keynesyen yaklaşımın mı, yoksa Wagner yasasının mı geçerli olduğunu araştırmayı amaçlamaktadır. Bu nedenle, Sahra Altı Afrika ülkelerinde Wagner yasasının ve Keynesyen yaklaşımın geçerliliği Payne -Ewing modelinden türetilen bir ekonometrik model kullanılarak test edilmiştir. Panel katsayı tahmincisi olarak ise, Eberhardt ve Teal (2010) tarafından türetilen ve genişletilmiş ortalama grup tahmincisi olarak bilinen (Augmented Mean Group Estimator) tercih edilmiştir. Analiz neticesinde, Sahra Altı Afrika ülkelerinde kamu harcamalarının ekonomik büyüme üzerinde etkisi olduğu sonucuna varılmıştır. Bu nedenle denilebilir ki, Sahra Altı Afrika ülkeleri için Keynesyen Yaklaşım geçerlidir. Bu etkinin yönü ve büyüklüğü incelendiğinde, Sahra Altı Afrika ülkelerinde kamu harcamalarının ekonomik büyümeyi düşürdüğü tespit edilmiştir. Söz konusu Afrika ülkelerinde, kamu harcamalarında yapılan her 1 birimlik artış; ekonomik büyümede 0.3 birimlik azalmaya yol açmaktadır. Bu bulgu, Robert Barro'nun (1990) araştırmasıyla tutarlıdır. Barro (1990) çalışmasında kamu harcamalarının ekonomik büyüme üzerinde etkisinin olabileceğini, ancak bu etkinin her zaman olumlu yönde olmayacağını ifade etmiştir.

ABSTRACT

This study aims to research whether Keynesian approach or Wagner Law is valid for 30 Sub-Saharan countries between the period of 1990-2019. The validity of the Wagner law and Keynesian approach has been tested by using an econometric model, which is derived from the Payne -Ewing model. As a panel coefficient estimator, the AMG estimator has been preferred that derived by Eberhardt and Teal (2010). As a consequence, it is concluded that government expenditure affects economic development in Sub-Saharan African countries. It is determined that government expenditure affects economic growth, and the direction of this effect is negative. This means government expenditure decreases economic growth in Sub-Saharan African countries. Consequently, Keynesian approach is valid for Sub-Saharan African countries. Each 1-unit increase in public expenditures in the African countries in question; it causes a 0.3-unit decrease in economic growth. The finding is consistent with that of Robert Barro's (1990) research that stated public expenditures may have an effect on economic growth, but this effect will not always be positive.

1. Introduction

The problems faced by countries in the Africa represent the unique nature of the continent. The continent's countries,

which have been struggling with colonialism for many years, are also struggling with political and economic problems, especially severe poverty.

* Sorumlu yazar/Corresponding author.

e-posta: eylul.kabakci@idu.edu.tr

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When African countries started to gain their independence, expectations from new administrations were very high and it was thought that all problems such as education, health, infrastructure would be eliminated with independence. However, these expectations could not be met in many countries that gained their independence and the economic exploitation system continued. The economic activities of foreign companies and the exploitation of the rich natural resources of the continent continued. The main reasons for this are the authority gap seen throughout the countries, the inability of the central government to dominate the country, corruption and incompetent administrators. In this new exploitation order, where poverty continues violently and the rich natural resources of countries cannot be utilized by the people of the country, it is an important question that should be answered how it is possible to ensure rapid economic growth and increase the welfare levels of Sub-Saharan African countries. Another problem in front of economic growth is the lack of sufficient savings to finance companies to be established in African countries that want to industrialize with liberal methods. Especially in the period when independence was gained in the African continent, many Africans could only make autonomous consumption and could not accumulate savings because a market economy had not yet been formed. Besides, trained manpower was one of the major obstacles to industrialization. The goods were produced with simple technologies at that time, and it was not possible to use technological tools in the continent. In the face of all this picture, the states primarily opted for an import substitution policy. Multinational companies, on the other hand, have invested only in agriculture and mining to obtain resources in Africa because the markets of African countries are small, they did not want to take part in the production of consumer goods. In the African continent, the large distances and insufficient transportation facilities have been some of the factors that prevented these companies from investing.

For such reasons, it has been discussed what the government's duties are to achieve economic growth in the African continent. It is very important to ensure economic growth for the countries in Sub-Saharan Africa because many of the people living in these countries have great difficulties in meeting basic needs such as access to clean drinking water, access to health services, education, access to adequate food resources which have been addressed by sustainable development goals. In this region where poverty is deeply experienced, countries need to achieve rapid economic growth and then to ensure their development.

According to some opinions, to grow rapidly in economics, competitiveness should be supported, and the state should not interfere with the economy for Africa. This means incentives should be supplied to the private sector to enhance economic growth. According to another view, the state should have direct intervention in the economy. Government should invest to productive areas and decide to what will be produce for whom and how much will be produced. Wagner and Keynesian approaches in the

literature can be used to investigate which of these two views is correct for Sub-Saharan African countries. According to Wagner's law, government expenditure and national income have a long-term relationship where government expenditure is considered a result of national income growth and is thus regarded as endogenous in economic policy formation. But according to the Keynesian approach, public expenditures have an impact on economic growth. In other words, Keynesian theory considers government expenditure as an exogenous policy tool, as Keynesians assume public expenditure supports economic growth (Ghafoor, 2004: 60). As can be seen, although it is known that there is a nexus with government expenditures and economic growth; therefore, in the direction of causality, there is no agreement.

It is thought that investigating the validity of the Wagner Law, which expresses the presence of a relationship between economic growth and government expenditure with a direction from economic growth to government expenditures, and the Keynesian Hypothesis, which expresses the existence of a relationship between economic growth and government expenditure. According to Keynesian hypothesis, the direction is from government expenditures to economic growth. Testing this controversial situation for Sub-Saharan countries, will create a crucial contribution to the literature. Besides, revealing which policies should be adopted will put forward a policy suggestion to combat poverty.

In this study, we tried to reveal whether Wagner law or Keynesian approach is valid for 30 Sub-Saharan African countries by using data from 1990-2019. Thus, long term correlation for economic growth and government expenditure detected by cointegration analysis, and then the direction of the relationship between the variables revealed by causality analysis, and it was understood with coefficient estimators whether increasing public expenditures is a correct policy for Sub-Saharan African countries to ensure economic growth. As a result, Keynesian approach is valid for Sub-Saharan countries.

This paper, therefore, fills the gap about debates that to reveal the correlation between economic growth and government expenditure for Sub-Saharan countries. Our findings reveal that adopting Keynesian approach would be the appropriate one to ensure the economic growth of Sub-Saharan African countries.

The rest of the study has represented an order as follows. The second section briefly presents background information about the Wagner Law, government expenditure and Keynesian Approach. The third section explains the theoretical and empirical literature. The fourth section reviews the data and methodology used. In the last section, results and conclusions are represented.

2. Two Opposite View: The Wagner's Law and Keynesian Approach

Investigating the linkage between government expenditures and economic growth has become an attractive topic recently. After the Great Depression in 1929, the increase in the share of the public sector in the economy led to discussions on efficiency and effectiveness. There are two opposite views about government activity in the economy. The Wagner's Law and Keynesian approach. In his book on "Allgemeine und theoretische Volkswirtschaftslehre" (1886), Adolph Wagner first expressed his "law of increasing state activity", and he claimed government expenditures tend to grow faster than the economy (Wagner, 1886: 21). Thus, an assumption was formed that the economic growth achieved will increase public expenditures. The Wagner's law advocates that the increasing existence of the public sector in the economy will decrease efficiency and cause decreasing economic growth. But economic growth can cause an increasing effect on government expenditure. According to Wagner; during the industrialization and urbanization cycles, the public sector's share of the economy, as calculated by the ratio of government expenditures to gross national income, would accumulate. As a result, the causality chain runs from economic development to government spending.

However, some hold the opposite view. These holders argue that the public sector is the motor force for a developed economy and plays a crucial role in economic growth. This approach is called as Keynesian Approach (Ram, 1986: 191). According to Keynes, increasing government expenditure leads to rapid economic growth (Keynes, 1936: 186). Keynesian economists have argued that government expenditures will have a complementary effect (crowding in) on private investment, as it is directed towards the production of public goods such as infrastructure services, social security services, security, defense services, education and health services that are not performed by private entrepreneurs. According to the Keynes and Keynesian economists, government expenditure is an external factor that can be used to affect economic growth and correct short-term fluctuations. According to Keynesian economists, the budget deficits resulting from the increase in government expenditures have a feature that provides expansion in the economy by increasing domestic production and encourages private sector investments (Sancar, 2012: 5). So, causality is from government expenditure to economic growth. As a result, there is a controversial situation between the causality of economic growth and government expenditure depending on countries and aggregates.

3. Literature Review

There are a lot of studies about government expenditure and economic growth relationship that resulted in being an advocate of Wagner or Keynesian approach. The research has shown that there is no absolute consensus; it may differ

according to the countries and the period in which the study was conducted. The Keynesian approach may be more effective than Wagner law under some conditions or vice versa. Some of the studies on this subject are as follows:

Barro (1990) discussed on this topic that a reverse correlation between government expenditures and economic growth. According to Barro with a rise in utility-type governmental spending, growth and saving rates decline (Barro, 1990: 103).

Loizides and Vomvoukas (2005) used data from Greece, the United Kingdom, and Ireland. In their report, income was expressed by Gross National Product, government spending was represented by consumption, and gross fixed capital formation. In terms of different countries, the study shows that both the Wagner and Keynesian methods are correct (Loizides and Vomvoukas, 2005: 125).

For the period 1970-2008, Nurudeen and Osman (2008) analyzed the impact of government spending on GDP growth in Nigeria. The findings indicate that total capital expenditures, total recurrent expenditures and government education expenditures all have a negative impact on economic development. Increasing public spending on transportation and connectivity (TRACO) and health (HEA), on the other hand, leads to increased economic development. As a result, they argue that the Keynesian approach is correct (Nurudeen and Osman, 2008: 1).

Samudram et al (2009), discussed the Keynesian perspective and the Wagner Law on the role of public spending in Malaysia's economic growth (1970-2004). The study also found supporting evidence for both the view of Keynes and the Wagner Law (Samudram et al, 2009: 697).

Wu, Tang, and Lin (2010) used panel data analysis on a dataset that covers the years 1950 to 2004 and involves 182 countries. According to the findings, empirical evidence clearly supports Wagner's law and the theory that government spending stimulates economic growth (Wu et al, 2010: 804).

Ansari et al. (2010), investigated the income-expenditure hypothesis for Ghana, Kenya and South Africa. They revealed the public expenditure does not effects and cause national income for Ghana, Kenya and South Africa (Ansari et al, 2010: 543).

Kesavarajah (2012) used time series annual data for cointegration and error correction modeling (ECM) methods to see if Wagner's Law is valid for Sri Lankan economy between 1960 and 2010. Although there is a short-run connection between government spending and economic development, there is no consistent evidence in the long-run findings to support the Wagner law's validity for the Sri Lankan economy, according to the findings of this report (Kesavarajah, 2012: 1).

Wagner's law of expanding state activities for Ghana is endorsed by Kamasa and Abebrese (2015). As a result of this finding, GDP growth must be considered when

estimating government spending to avoid misspecification and bias in estimates produced (Kamasa and Abebrese, 2015: 117).

Subair and Okoro (2018), used the autoregressive distributed lag (ARDL) technique of estimation and control for structural breaks for 1981-2016 to analysis Wagner's law in Nigeria in both the short and long-run. The Wagner rule was not confirmed by the findings. The findings showed that both short and long-term evidence suggested a negative but insignificant relationship between government expenditure and economic growth (Subair and Okoro, 2018: 7).

Ebaid and Bahari (2019) used time-series data from 1970 to 2015 in Kuwait to investigate the validity of Wagner's law hypothesis. As a result, they concluded that Wagner's Law does not extend to Kuwait's economy, and that the Keynesian method of government expenditure leading to economic growth is endorsed (Ebaid and Bahari, 2019: 1).

Arestis et al (2020), aimed to check the Keynesian view of the relationship between government spending and production according to Wagner's rule, for Turkey. As a result, the empirical results provide evidential support for the Keynesian theory, instead of Wagner's law (Arestis et al, 2020: 265).

Jobarteh (2020), aimed to bring Wagner's law to the test for a group of sixteen Sub-Saharan African countries from 2002 to 2015. When "productive" government expenditure is used as a measure of public spending, the results support Wagner's rule. As opposed to "productive" government spending, total government spending offers less support for Wagner's law's validity (Jobarteh, 2020: 125).

Albayrak (2021), conducted a study to analyze the relationship between economic growth and public final consumption expenditures for Turkey, using 1961-2019 data by ARDL cointegration analysis. Consequently, the study claims no clue to support neither Keynesian theory nor Wagner's law. According to the study structural breaks effect economic growth in Turkey.

As can be seen, the results differ according to different periods and different country samples. Hence, testing each country and aggregates individually is essential to make appropriate policy recommendations. Every country needs separate diagnosis in Wagner and Keynesian approach.

4. Data and Methodology

Our empirical estimation is based on annual observations that cover the period 1990-2019 for 30 Sub-Saharan Countries (Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Ivory Coast, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Togo, Uganda, Zimbabwe). The data are obtained from World Bank Open Data Source (The World Bank, 2021). The paper's objective is determining the

validity of Wagner Law or Keynesian Approach for Sub-Saharan African countries.

Payne-Ewing model which is a model to explain Wagner's law has been used to investigate the correlation between government expenditure and economic growth. Payne Ewing uses the model to investigate the relationship:

$$\ln(\text{GOV}/\text{GDP})_t = \beta_0 + \beta_1 \ln(\text{GDP}/P)_t + \varepsilon_{it} \quad (1)$$

According to the Payne-Ewing model, there is a relationship between the ratio of government expenditure to national income and per capita national income; As the national income per capita increases, the share of government expenditures in national income increases. Based on this model, the study's economic model was derived.

$$\text{Model 1: } \text{GOVEXP} = \alpha_1 + \beta_1(\text{GDP}\%) + \varepsilon_{it} \quad (2)$$

For the Keynesian approach the model is derived as;

$$\text{Model 2: } \text{GDP}\% = \alpha_1 + \beta_1(\text{GOVEXP}) + \varepsilon_{it} \quad (3)$$

The variables in this model are as follows;

GOVEXP: Both government current expenses for purchases of goods and services are included in general government final consumption expenditure. This variable is a percentage that reflects the ratio of government spending to GDP (The World Bank, 2021).

GDP %: Annually percentage growth rate of GDP per capita based on constant local currency at market rates (The World Bank, 2021).

As a first step, cross-section dependency was determined by using Pesaran (2004) Cross-Section Dependence (CD) test. Whether the series are stationary or not can be examined with the Pesaran's (2007) Cross-Sectional Augmented Dickey Fuller (CADF) panel unit root test, which is one of the second-generation panel unit root tests that consider the cross-section dependence. A homogeneity test was applied to the model to determine which of the cointegration tests to be used to determine the existence of a long-term relationship between variables. The homogeneity of the models was tested with the Delta test established by Pesaran and Yamagata (2008).

The Westerlund (2007) Error Correction Model (ECM) panel cointegration test, which considers cross-sectional dependence and heterogeneity of the models, was used to evaluate the cointegration relationship between variables. Regarding the cointegration study, the causality between variables was determined using the Dumitrescu-Hurlin (2012) panel causality test, which also takes into account the cross-sectional dependence and heterogeneity of the models. Finally, the long-term coefficients between variables were estimated using the Augmented Mean Group Estimator (AMG) test developed by Eberhardt and Bond (2009).

4.1. Cross Section Dependence Test

The test of cross-sectional dependency is a requirement for estimating panel data models. In the study, before the unit

root test, panel cointegration, and causality test, it was tested whether there was dependence between the horizontal sections (countries) that create the panel. Considering the dependence of the cross-section may affect the differentiation of the results to be obtained. Therefore, the unit root test and cointegration tests to be applied to the variables and the model should be determined according to the cross-section dependency.

The cross-sectional dependency shows whether a shock to the cross-section units of the study would affect all series equally. It will be ensured that the different levels of the units are influenced by a shock from one of the cross-section units that produces the panel by measuring the existence of cross-sectional dependence in the series and cointegration equation.

To determine whether the cross-sectional dependency is among the series; Breusch-Pagan (1980) LM or Pesaran (2004) CD test can be used. Breusch-Pagan (1980) LM test can be used in cases where the time dimension of the panel is greater than the horizontal section size of the panel ($T > N$) and Pesaran (2004) CD test can be used when both the time dimension is greater than the cross-section dimension and the cross-section dimension is larger than the time dimension ($T > N, N > T$).

Table 1. Cross Section Dependence Tests Results

Cross Section Dependence Tests and Variables	Breusch Pagan LM	Pesaran Scaled LM	Bias-Corrected Scaled LM	<i>Pesaran CD</i>
GDP%	608.7542 (0.000)*	5.890818 (0.000)*	5.373577 (0.000)*	7.468906 (0.000)*
GOVEXP	1825.217 (0.000)*	47.13277 (0.000)*	46.61552 (0.000)*	3.021465 (0.025)**

Statistically significant at * %1, ** %5 and *** %10.

As seen in Table 1, the null hypothesis was rejected because the probability values of the variables were less than 0.05, and it was found that there is cross-sectional dependency in all series. To do so, it is clear that we must use a 2nd generation unit root test that considers cross-section dependency. In this study, Pesaran (2003) was preferred as the unit root test.

4.2. Slope Coefficient Heterogeneity

Pesaran and Yamagata (2008), based on Swamy's (1970) study, proposed asymptotically normal distribution standardized distribution statistics for panel data models where unit size N and time dimension T are large. According to Pesaran and Yamagata's novel approach if N greater than T , a seemingly unrelated regression equation cannot be applied, so their suggestion is to use the developed version of Swamy's heterogeneity test (Pesaran and Yamagata, 2008: 50). It is necessary to analyze whether data can be aggregated across countries and whether country-specific heterogeneity of the panel estimates can be considered. In addition, the homogeneity of the series should be tested in

order to make appropriate cointegration analysis for the models.

Table 2. Slope Coefficient Heterogeneity for Models

	Slope Coefficient Heterogeneity	Null Hypothesis	Adjusted Delta	p-value
For Model 1	<i>Pesaran-Yamagata Test</i>	H ₀ : Slope coefficients are homogenous	8.918	0.000*
For Model 2	<i>Pesaran-Yamagata Test</i>	H ₀ : Slope coefficients are homogenous	9.943	0.000*

Statistically significant at * %1, ** %5 and *** %10.

According to table 2, the p-value is smaller than 0.05, so we have to reject the null-hypothesis. As a result, slope coefficients are heterogeneous for both models. It should be used a test that taken into account the heterogeneity.

4.3. Unit Root Test

Unit root tests developed for the absence of correlation between units in the literature are called first-generation tests; tests used in the presence of a correlation between units are called second-generation unit root tests. Since there is a correlation between units in the study, a second-generation unit root test will be used. In this study, Pesaran (2003) was preferred as the unit root test. Pesaran (2003) introduced a simple and new process to test unit roots in dynamic panels that serially depend on correlated errors and have cross-section dependence. In the unit root test of variables, the Cross-Sectionally Augmented IPS-CIPS which can be used in cases where there is a dependency between horizontal sections was used. This test is derived from the CADF (Cross-Sectional Augmented Dickey-Fuller) test. Pesaran expanded the standard DF (or ADF) regressions with the first differences of individual series and cross-sectional averages of lag levels.

When applying the Pesaran CADF-CIPS statistics to find the appropriate lag lengths for the variables, Schwarz Info Criteria (SIC) has taken into consideration.

H₀: has unit root (Non-Stationary)

H₁: no unit root (Stationary)

Table 3. Unit Root Test Results for Variables

	Test	Variable	Prob Value
I(0)	Pesaran CADF	GDP	0.000*
I(0)	Pesaran CADF	GOVEXP	0.372
I(1)	Pesaran CADF	GDP	0.000*
I(1)	Pesaran CADF	GOVEXP	0.000*

Statistically significant at * %1, ** %5 and *** %10.

To eliminate the unit root, the first differences of the series are taken. As a result, all series became stationary at the first differences. That all the series become stationary at their first differences enables cointegration analysis.

4.4. Panel Cointegration

To determine the appropriate cointegration test, homogeneity and cross-section dependency tests were used in the study. As we mentioned before; there is the existence of cross-section dependency and heterogeneity.

To define if the cointegration is existing or not, the panel cointegration test will be done by Westerlund (2007) Error Correction Model (ECM). The reason why this test is used is that: it is a test that can be used both in case of cross-sectional dependence and in case of heterogeneity in the model. The main feature that distinguishes this test from other cointegration tests is that all other tests are based on the prerequisite that all variables in the model should not be stationary while determining the cointegrated relationship between variables, while Westerlund works with the prerequisite that at least one of the variables in the model is not stationary. If it is suspected that the cross-sectional units are correlated, robust by bootstrapping, critical values can be accessed. First, Westerlund ECM has been done for Model 1.

Table 4. Westerlund ECM Panel Cointegration Test for Model 1 (Wagner Law)

Hypothesis	Test	Bootstrap Prob.	Statistics
H ₀ : No cointegration	Gt	0,640	-2.224
	Ga	0,880	-9.253
	Pt	0,560	-10.972
	Pa	0,560	-7.859

According to table 4, bootstrap probabilities are greater than 0,05 critical value. So, we have to accept the null hypothesis. By acceptance of H₀, we can say that there is no cointegration between variables. This means there is no long-term relationship between variables.

Table 5. Westerlund ECM Panel Cointegration Test for Model 2 (Keynesian Approach)

Hypothesis	Test	Bootstrap Prob.	Statistics
H ₀ : No cointegration	Gt	0,000	-3,621
	Ga	0,000	-20,447
	Pt	0,000	-19,421
	Pa	0,000	-18,205

According to table 5, when we tested cointegration for model 2, bootstrap probabilities are smaller than 0,05 critical value. So, we have to reject the null hypothesis. By rejection of H₀, we can say that there is cointegration between variables. This means there is a long-term relationship between variables.

There is no cointegration between the variables in model 1. In this way, it has been determined that there is no long-term relationship between government expenditure and economic growth in Sub-Saharan African economies according to Wagner's law. This result shows that short-term causality between variables should be tested within the framework of the Panel VAR analysis.

There is cointegration between the variables in model 2. To do so, we can state that there is a long-term relationship between government expenditure and economic growth in Sub-Saharan African economies.

Since it was previously determined that the model includes inter-unit correlation and heterogeneity assumptions, Panel VAR analysis should be performed with Dumitrescu-Hurlin panel causality test, which are compatible with these assumptions.

4.5. Panel Causality Test

The presence of a causality relationship between the series was checked using the method developed by Dumitrescu and Hurlin (2012). This approach has the advantages of being able to account for both cross-sectional dependence and variability between countries, of being able to be used when the time (T) dimension is smaller than the cross-section size (N), and of generating successful results in unbalanced panel data sets (Dumitrescu and Hurlin, 2012).

Another feature of the Dumitrescu and Hurlin tests is that it can analyze both in the presence and absence of a cointegrated relationship. For this reason, Dumitrescu-Hurlin panel causality test was used for causality analysis in this data set where there is no cointegrated relationship.

While the causality analysis was performed in the study, data were used in stationary because the variables of the model used to test Wagner's law were not cointegrated. As a rule, while conducting causality analysis, the series should be stationary, but they do not need to be stationary in the same order (Tari, 2012: 437). For this reason, while conducting the causality analysis of Wagner's law that is represented by model 1, the first difference of government expenditures, which is the dependent variable, and the level value of the economic growth rate, which is the independent variable, are used. However, while conducting the causality analysis for model 2 that represents the Keynesian approach, because of the existence of cointegration in the model, it is not used the difference values, but the level values.

Table 6. Dumitrescu - Hurlin Causality Test

	Null Hypothesis	Z-bar	P-value
Model 1 (Represents Wagner Law)	GDP% does not Granger cause of GOVEXP	0,9035	0,3662
Model 2 (Represents Keynesian Approach)	GOVEXP does not Granger cause of GDP%	3,1413	0,0017*

In Table 6, we must accept the null hypothesis for model 1 due to p-value greater than 0.05. So, the annual percentage growth rate of gross domestic product (GDP%) does not cause government expenditure (GOVEXP). For model 2, the null hypothesis must be rejected. To do so, it is revealed that the direction of causality is from government expenditure (GOVEXP) to the annual percentage growth rate of gross domestic product (GDP%).

Therefore, we can say while Wagner Law is not valid for Sub-Saharan countries, in contrary Keynesian Approach is valid. To do so, while we are trying to estimate coefficients, we can use model 2 instead of model 1.

After the long-term causality determined from government expenditure to economic growth in Sub-Saharan African economies due to the existence of cointegrated series and causality, panel regression analysis is required to estimate the long-term coefficients.

4.6. Panel Coefficient Estimation

As mentioned before, there is inter-unit correlation and heterogeneity in the cross sections used in the analysis. In this case, the data should be tested with the awareness of that. Hence the estimator is the Augmented Mean Group estimator (Tatoğlu, 2020: 72).

The AMG estimator is derived by Eberhardt and Teal (2010) and was developed as an alternative to Pesaran's CCEMG (Common Correlated Effects Mean Group). AMG is an estimator that takes into account the cross-sectional dependency. This method can calculate a coefficient for the panel if cross-section dependence exists between cross sectional units. In addition, this estimator can be used for the heterogeneous panels. In this method, the first difference of the variables in the model is taken and estimation is made with classical OLS by adding time dummies to the model. Then the obtained dummy variable coefficients are added to the first model and the model is re-estimated (Eberhardt, 2012: 64).

Table 7. Augmented Mean Group Estimator Results

GDP	C	Std.Error	Z Value	P Value
DGOVEXP	-.3051792	0.1782436	-1.71	0.087***

Statistically significant at * %1, ** %5 and *** %10.

In table 7, we can see Augmented Mean Group estimator result. According to the results of our analysis for Sub-Saharan African countries, the relationship between government expenditures and economic growth is statistically significant at the 10% significance level. This means that government expenditures affect economic growth. But when we deliberate the direction of effect, this effect is negative. When the government expenditures increase by 1-unit, economic growth decreases by 0.3 units. According to the study, government expenditures create a decreasing effect on economic growth.

5. Conclusion and Suggestions

In the study conducted for 30 Sub-Saharan African countries between 1990 and 2019, we conclude that there is a linkage between government expenditure and economic growth. The direction of the relationship is from government expenditure to economic growth. With the detection of the situation, it has been understood that the Keynesian approach is valid for Sub-Saharan countries. However, it is seen that the increase in government expenditures for the

mentioned countries has a negative effect on economic growth. So we can claim the relationship between government expenditure and economic growth, but the direction is from government expenditure to economic growth. By the way, the effect occurs in a decreasing way.

The result supports Robert Barro. Barro (1990), in his study covering the years 1960-1985 for 98 countries, found that as the share of public expenditures in GDP increased, economic growth was affected negatively. However, if public investments create an increasing effect on productivity, it also increases economic growth. According to this approach, the impact of public expenditures on growth be influenced by the development level of countries, also it depends on expenditures affected productivity. It also varies depending on the spending segregation (Barro, 1990:103).

The fact that the portion of government expenditures in total national income has a negative relationship with economic growth shows that these expenditures are not directed towards investments for Sub-Saharan African countries. As a result, it is possible to conclude that public spending in the studied African countries do not go toward productive areas or areas that will boost to production. If the state makes investments in unproductive areas, it will create a backward resulted situation for economic growth. The direction of the impact of government expenditures on economic growth should be turned into positive to enhance economic growth. In this context, production level should be increased by directing savings to efficient investments. Also, governments should increase capital per labor to increase productivity.

It is also seen as a useful practice that the state establishes production facilities by taking a direct role in production, but then increases competitiveness in the market to increase production. In this context, it will be useful to re-evaluate this result by obtaining the assumptions of the infant industries thesis.

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