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CAUSAL RELATIONSHIP BETWEEN ECONOMIC GROWTH AND GOVERNMENT SPENDING: EVIDENCE FROM THE GAMBIA

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Abstract
This empirical paper analyzed the relationship between government Spending and Economic growth in the Gambia during the period 1970-2014. For this, the study employed the unrestricted Vector Autoregressive (VAR) model to investigate the causal relationship between government size and economic growth and whether there is a long-run and short-run associations between these economic variables of interest. The results of the study showed that the causality runs from government expenditure to economic growth in the case of the Gambia which is in conformity with Keynesian theory.
Keywords: Economic Growth, Government Expenditure, Vector Autoregressive, The Gambia

INTRODUCTION

The patterns and trends of government expenditures in the world, more importantly in developing countries, have evolved dramatically over a number of decades now. Globally, at both theoretical and empirical levels, the issue of a causal relationship between economic growth and government expenditures had attracted the concerns of several economists and policymakers over a long period of time. Thus, the reverse causality of government spending and economic growth is still an ongoing issue theoretically as well as empirically. Notwithstanding, the theoretical positions on the subject are quite distinctive; the conventional

Keynesian wisdom states that a large government fiscal expansion results from economic instability or stagnation.

Several empirical research has been carried out, however, inconclusively support the conventional wisdom. The investigation of this relationship has received two divergent views from Wagner and Keynesian economists. In his research (Wagner, 1883), found out that there was no impact of an increase in government expenditure on economic growth. However, he predicted that an increase in economic growth would increase government expenditure. Hence, according to Wagner's law, the causality runs from economic growth to government expenditure. On the other hand, (Keynes, 1936) argues that there is a direct relationship between government expenditure and economic growth, meaning an increase in government expenditure increases national income and ultimately results in economic growth. Therefore, the granger causality is running from government expenditure to economic growth (Saiyed, 2012).

Governments make several expenditures in areas such as national defense, agriculture, health, education, communication, transport, energy, social services, national debt servicing, capital investment, on other countries and governments and its own maintenance as well.

Hence, government expenditure constitutes the spending of the government for its own maintenance, society, and the economy as a whole. Recently, governments are progressively involving themselves in economic activities and transfer payments to other governments or countries. In view of this, public expenditure has assumed upward trend patterns over the years virtually in all the countries of the world (Maku, 2009).

Most developing countries, specifically, African countries have been through a number of challenging historic economic evolutions as far as their economic growth and development efforts are concerned, such as the transition from distorted and command markets towards capitalist market systems. In view of such circumstances, most economists and policymakers across the world have expressed keen and sustained interest in the role of public spending in promoting economic growth and development (Twumasi, 2012). It can also be realized that while all the developing countries are striving towards sustained growth and development, government expenditure seems to be progressively increasing alongside and has not translated into meaningful development in most African countries. Thus, trends in government spending have been receiving upward projections over the years, particularly in these countries. The reasons behind such increasing trends have been rapid rates of population growth and the government's desire to meet the general demand for improvements in the standards of living of its populace.

Economic growth is the steady process by which the productive capacity of the economy is increased over time to bring about rising levels of national output and income (Todaro, 2000).

The Gambia is a small open economy with a relatively liberal policy regime; the greater portion of GDP is from exports of goods and services. In 2004, the percentage of GDP accounted for by exports of goods and services amounted to 46.7%, earned mainly from the re-export of groundnuts and the fisheries sector. However, the recession in the early 1980s witnessed export fluctuations over time. From 1989 to 1993, real exports rose by 67.2% following the recovery from the recession. Nonetheless, the years 1993 to 1998 witnessed political disorder leading to the overthrow of the first Republic which has been in power for over thirty (30) years in the country, leading to a huge fall in real export of 342.2% or by GMD604.73 million to GMD136.74 million which is a big declined in GDP growth.

The government of The Gambia over the years has endeavored to ensure sustained growth of the economy. This can be seen in the efforts of the government to improve infrastructure, sanitation, health care, education, defense, and energy supply, among others. After the economic instability in the 1970s and early 1980s, The Gambia has been experiencing fairly economic growth over the past two decades, although there were some fluctuations in the growth rates.

Fundamentally, this development can be attributed to the International Monetary Fund (IMF) and World Bank (WB) sponsored reform programs, such as the Economic Recovery Program (ERP) and Structural Adjustment Programs (SAP), adopted in the early 1980s with the support of the rest of the donor community. Growth has averaged 4.8 percent annually since the commencement of the reforms, with the second half of the 1980s witnessing higher growth compared to the 1990s. The recent economic growth in The Gambia has been characterized by a series of external shocks. The impact of the regional Ebola outbreak on tourism and delayed summer rains in 2014, together with Government intervention in support of State-owned Enterprises in difficult times, resulted in the widening of the balance of payment and fiscal deficit. The effects of these two shocks led to a contraction in the real GDP growth to 0.9 percent, down from the initial growth estimate of 5.0 percent in 2014.

In recent years, the fiscal challenges of government expenditure were the hosting of both the African Union (AU) summit meeting held in Banjul and the presidential elections in 2006, which resulted in a decrease in the share of expenditures in other key government sectors. The management of domestic public debt is a major critical policy issue of any nation. In The Gambia, the domestic public debt as a percentage of GDP tripled in a little over a decade from 12.3% in 1994. Its explosive growth has mainly been due to the government borrowing to execute some projects when Yahya's government came into power in 1994 by toppling the Jawara regime (the first Republic), which lead to world financial institutions and donor partners suspending their aid until the government return to a democratically elected government. Since

such a study to my knowledge has not been conducted in The Gambia, it will avail the empirical relationship between government expenditure and economic growth.

Problem Statement and Motivation

Most of the empirical studies have focused on the interrelationship between government fiscal policies and economic growth. The debate on the topic is ongoing with diverse findings. Thus, no definite conclusion has been reached so far by the written literature. The findings seem to be supporting the theoretically inconclusive, controversial views of Wagner and Keynes.

From a Keynesian perspective, government policy could reverse economic recession by borrowing money from the private sector and then returning the borrowed money to the private sector through various government spending programs such as infrastructural development. Keynes is of the view that increased government consumption has a high potential or possibility of increasing employment, profitability, and investment via multiplier effects on aggregate demand. Hence, economic growth can be influenced positively by government expenditure, both recurrent and capital expenditures. But endogenous growth models predict that only those productive government expenditures will positively affect the long-run growth rate (Barro, 1990 as cited in Chude and Chude, 2013). However, Wagner's Law presupposes that government expenditure has no impact on economic growth, but instead economic growth has an effect on government spending.

The Gambia in particular on the topic of research, to the best of my knowledge nothing has been studied. To this effect, I am motivated to investigate this important topic in the case of the Gambia for informed decision-making and better policy implementation that will lead to sustainable economic growth and development. This study, therefore, seeks to fill this gap in knowledge in the Gambia which has been neglected by virtually all studies conducted on the relationship between government expenditure and economic growth.

Specific objectives

To examine the causal relationship between economic growth and aggregate government expenditures.

To explore the direction of causality between economic growth and aggregate government expenditures.

To determine the short and long-run relationship between economic growth and aggregate government expenditures.

To determine when shock on aggregate government expenditures will fizzle out on economic growth.

Research questions

Is there any causal relationship between economic growth and aggregate government expenditures?

Would there be any short-run or long-run relationship between aggregate government expenditure and economic growth?

Would the shocks on aggregate government expenditures fizzle out on economic growth?

Significance of the study

This study signifies an attempt to explore the nature and extent of the interrelationship between economic growth and government expenditures in The Gambia. It is hoped that the findings of the study would provide detailed information for economists and policymakers in developing countries specifically in The Gambia. More importantly, this is the first effort geared towards filling the gap of lack of empirical study on the interrelationship between The Gambia's economic growth and government expenditure which seems to have been neglected by the existing empirical literature.

Structure of the paper

This study is structured as follows. The first part is the "Introduction section" Second part is the "review of the literature section." The third part consists of the "Data, methodology, adopted for the study. Specifically, it highlights the research design and theoretical and empirical model specifications section. The fourth part which is the "Results and discussion section deals with the estimation procedures, findings, and results, while the conclusion and recommendation are presented in the "Conclusion and Policy Implications" section.

LITERATURE REVIEW

Many studies have attempted to empirically test the endogenous growth model since it gives a theoretical basis for government active intervention in the development process in developing countries (Buti and Van den Noord, 2003; Fatas et al, 2003; Hughes-Hallet et al, 2004; Gali and Perotti, 2003 and Suleiman, 2010). The driving force behind these studies is the need to empirically uncover the nexus between government expenditure and growth, thus promoting an understanding of issues regarding increasing public expenditure in the short and the long run (Nworji et al., 2012).

Liu et, al. (2008) studied the relationship between growth and expenditure in the United States for the period 1947-2002 and their results show a unidirectional causality running from government expenditure to economic growth which is in support of the Keynesian hypothesis. Similarly, (Hondroyiannis and Papapetrou, 1995) and (Chletsos and Kollias, 1997) used the same methodology for Greece but their results are mixed. Yildirim et al, (2011) used causality analysis conducted by (Toda and Tamamoto, 1995) to investigate the causal relationship between government expenditure and economic growth for Turkey for the period 1973-2009. Their results showed causality running from economic growth to educational expenditure and not the other way round. Research conducted by (Albala and Mamtzakis, 2001) using time series data over the period 1960-1995 on the impact of external debt on economic growth for Kenya concludes that current investment in human capital development has a positive impact on economic growth (Muthui et al., 2013). Fanand et al, (2004) investigated the effects of different types of government expenditure on agricultural growth in Uganda and their findings showed that government spending on agriculture improved agricultural productivity positively (Al-shatti, 2014). In determining the relationship between economic growth and government expenditure in Nigeria (Abu and Abdullah, 2010) used disaggregated annual time series data to unveil the impact of government spending on growth. Their results showed a negative relationship between government capital and recurrent expenditures and education on economic growth while telecommunication, transport, and healthcare have a positive impact on output (Al-shatti, 2014). In their study of time series data of 32 observations (Josaphat et al, 2000) investigated the impact of government size on economic growth in Tanzania and the results revealed that physical investment has a negative impact on growth while consumption expenditure has a positive impact on economic growth (Muritala and Taiwo, 2011). (Nurudeen and Usman, 2010) showed that total capital expenditure, total education expenditure, and total recurrent expenditure have adverse effects on economic growth in Nigeria for the period 1970-2008. However, government spending that goes into transportation, communication, and health is associated with a positive effect on growth. However, it is noted that the detailed disaggregation used in this study has been criticized because transportation, education, communication, and health expenditures which showed positive impact must have been part of total capital and recurrent expenditures. In their study (Egbetunde and Fasanya, 2013) used the ARDL estimation approach to determine the long-run associations between economic growth and public expenditure in Nigeria using annual time series data for the period from 1970 to 2010. The bound test concludes that government expenditure and economic growth have a long-run equilibrium, but the impact is negative on economic growth. By using the techniques of VAR, cointegration and VECM (Alshrani and Alsadiq, 2014) determined the long-run and short

run-on different types of government spending on economic growth in Saudi Arabia over the period 1969- 2010 and they found that private domestic investment, public investment, and health enhances economic growth in the long run while trade openness and spending on housing sector enhance growth in the short run. Peter and Simeon (2011) used a VAR estimation approach to investigate the effect of public expenditure on economic growth in Nigeria covering the period 1970 to 2009. Their study revealed the existence of long-run equilibrium associations between economic growth and fiscal policy (Olasunkanmi, 2013). In his findings (Srinivasan P. 2012), investigated the causal nexus between government spending and growth for India covering a period of 1973 to 2012. His study used cointegration techniques and error correction term and the results found the existence of a long-run association between government and economic growth.

Other papers used panel data: In their study of disaggregated time series data analysis for developing countries by (Noloy Bose, M Emranul Haque, and Denise R Osborn, 2003) to examine the relationship between economic growth and public expenditure, found that the share of government expenditure on capital has a positive impact on growth, but current expenditure is insignificant (Mwafaq M., 2011). A study on Sub-Saharan Africa in which (Yasin, 2013) examined the effect of government expenditure on economic growth using panel data. He found that government expenditure, trade openness, and private investment spending all have positive and significant impacts on economic growth. In determining the causal relationship between government expenditure and economic growth for Egypt, Syria, and Israel (Abu-Bader and Abu-Qarn, 2003) included the share of government on output, defense, and economic growth using multivariate cointegration and FEVD estimation techniques and found that there exists a bidirectional causality and a long run negative associations between government spending and economic growth (Nworji et al., 2012). In trying to investigate both fiscal policy austerity and structural changes (Hilderbrand, 2013). A study was conducted by (Dogan and Tang, 2006) for five South East Asian countries to determine the direction of causality between government expenditure and economics. Their results showed a unidirectional causality running from government spending to growth for only the Philippines which conforms with Keynesian theory, while in Indonesia, Singapore, Thailand, and Malaysia, there was no causality between the two variables (Ebaidalla, 2013). The causality was unidirectional running from economic growth to government size in both the short run and long run confirming Wagner's law. From the discussions above, the empirical literature on the causality between government expenditure and economic growth is extensive and diverse. However, there is a scarcity or not at of studies on such issues in The Gambia. Therefore, this study would significantly contribute to ongoing

literature on the relationship between government spending and economic growth in the Gambia specifically and in developing countries.

METHODOLOGY

In this paper, our objective is to unveil the interrelationship that exists between these variables in the Gambia, thus the model adopted for this study was based on the modified version of the (Barro, 1990) growth model of production function in which the government sector variables are embedded in the growth model.

Table 1: Variable description

Variable	Variable Description
ln GDP_t	GDP (constant 2015 US$)
ln GE_t	General government final consumption expenditure (% of GDP)
ln EDU_t	General government expenditure on education (current, capital, and transfers) is expressed as a percentage of GDP.
ln AGR_t	Agriculture, forestry, and fishing, value added (% of GDP)
ln OPN_t	Trade (% of GDP)
ln DFN_t	Military expenditure (% of GDP)
ln FD_t	Broad money (% of GDP)

The modified version of Barro's model (1990) for the validation of Keynesian is shown below.

$y = K^{\alpha}1\ L^{\alpha}2\ G^{\alpha}3$ … … … … … … … … … … … (1)

Where: Y = gross domestic product (GDP, G = Government Sector Variables K = Capital employed, L = Labour employed.

This modified version of the model constitutes the variables of interest as GE (government expenditure), whereas capital (K) and Labour (L) were other government expenditures to be included as a vector Z.

$GDP = f(GE, Z)$ … … … … … … … … … … … … . (2)

Thus, the interrelationship between economic growth and government expenditure was examined using the model below (equation 4) which is in line with Keynes's argument:

$GDP = (GE, EDU, OPN, DEF, AGR)$ … … … … … … … … (3)

Where: GDP = gross domestic product, GE = Total government expenditure, EDU = Education expenditure, OPN = Trade openness, DEF = Expenditure on defense, AGR = Expenditure in agriculture.

To examine Wagner's law, a variety of econometric models have been estimated and many proxies have been used to test the relationship between growth and government size (Bird, 1971; Gadhi, 1971; Michas, 1975; Abizadeh, 1988) and the Law states that government spending as a percentage of GDP is a function of real per capita GDP (Michas, 1975). According to (Abizadeh, 1988), the law can be stated as:

$GE = f(GDP, FD, OPN)$ … … … … … … … … … … …. (4)

Where: GDP = gross domestic product, GE = Total government expenditure, OPN = Trade openness, FD = Financial Development (M2). A modified version of which (equation 4), is shown below.

$GE/GDP = (RGDP/POP)$ … … … … … … … … … … … … … … … … (5)

Where: POP = Population RDGP = Real Output

Goffman and Mahar, (1971); Musgrave, (1969), who investigated the same law used the formulation shown below:

$GE = (GDP)$ … (6)

GE and GDP are either in real or nominal terms. Here the relationship of the elasticity value of GE concerning GDP is expected to be greater than one to conform to Wagner's law, (Mann, 1980), also formulated the model below to empirically test Wagner's law.

In equation (8) below, for Wagner's law to hold, the elasticity value should exceed one while in equation (9) the value should exceed zero. The models above are expressed in the relation of linear function using the variables in natural logarithm to minimize the scale effect of numbers, thus we arrived at the following econometric model.

$$\frac{GE}{POP} = (GDP/POP) \text{ … … … … … … … … … … … … … (7)}$$

$$GE = f(GDP/POP) \text{……(8)}$$

$$GE/POP = f(GDP) \text{……(9)}$$

$\ln GDP_t = \beta_0 + \beta_1 \ln GE_t + \beta_2 \ln EDU_t + \beta_3 \ln AGR_t + \beta_4 \ln OPN_t + \beta_5 \ln DFN_t + \varepsilon_t$ … (10)

$\ln GE_t = \alpha_0 + \alpha_1 \ln GDP_t + \alpha_2 \ln OPN_t + \alpha_3 \ln FD_t + \vartheta_t$ … … … … … … … … … … … … … … … … … … (11)

Where: Ln = logarithm form, GDPt= Gross Domestic Product, GEt= Government expenditure, EDUt= Education Expenditure, AGRt= Agricultural Expenditure, PNt= Trade Openness, DFNt= Defense Expenditure, Ɛt= the stochastic term at time t, α's and β's are parameters to be estimated. Equation 10 is the econometric model based on Keynes's theory while equation 11 is one based on Wagner'.

Stationarity Analysis

This study used the Augmented Dickey-Fuller test to determine the stationarity of variables. This test is robust even if the model is suffering from serial correlation. The Augmented Dickey-Fuller test, autocorrelation in the residuals. In addition, the Dickey-Fuller test does not correct autocorrelation in the residuals. The following parameters αo and γt, represent the drift (intercept) and linear deterministic trend in the data generating processes. The number of optimal lags is determined by the model that minimizes the Schwartz Bayesian Information criterion (SBIC) and Akaike Information Criterion (AIC).

Test of Cointegration and VAR

When we finish exploring the order of integration of the variables, we can proceed by testing whether the variables are cointegrated (Engle and Granger, 1987). The cointegration test is a technique used to test for the existence of equilibrium relationship among variables that are nonstationary at level but are integrated of the same order, meaning they are stationary after first differenced and if they are not integrated of the same order, an unrestricted VAR model is estimated.

This is done by running a regression of your dependent variable on the explanatory variables and then applying the Augmented Dickey-Fuller (ADF) test on the residuals. If the ADF rejects the null hypothesis of a unit root in the residuals, then we can say that the two series are cointegrated. In other words, if the estimated residuals are stationary, there exists a long-run relationship between the two or more variables (Enders, 2004). Under these conditions, a Vector Error correction model (VECM) can be done, which has the advantage of using variables that do not differ as differencing can lead to information lost from the original variables. The other method that involves testing the cointegration is by using the Johansen maximum likelihood approach which is more appropriate when dealing with more than one cointegrating relationship (Johansen, 1988; Johansen and Juselius, 1990, 1992).

In this study, we use the Vector Autoregressive model (VAR) developed Engle-Granger (1969) and Sims (1980) in specifying our empirical model. Sims has issues with the conventional simultaneous equation modeling method which is too restrictive, and the selection of endogenous and exogenous variables is inconsistent and judgmental. He posited that in a VAR model all the variables as endogenous and each variable can be written as a function of its lag and the lag of all other variables and these solve the problems of simultaneity. The VAR model has the advantage of modeling variables that are not cointegrated.

According to (Engle and Granger, 1987), two nonstationary variables could be examined whether there exists a long-run association (i.e., in the long run, the variables move together) by

cointegration tests. If we perform the cointegration test using Engle-Granger and Johansen methods and reject the null hypothesis of unit root and the variables are integrated of order one, if the linear combination between the variable is stationary, then the variables are cointegrated.

The Johansen method which uses a VAR model is specified as follows:

VAR (P) = Pth order Vector Autoregression yt = C + ϕ1yt-1 + ϕ2yt-2 + ---------- + ϕpyt-p + εt

Where; yt = n x1 vector of variables, C = n x1 Vector of Coefficients ϕj = n x n matrix of coefficients and εt = n x1 white noise error term.

To make the analysis of the VAR meaningful due to the limitation of over-parametrized coefficients to be estimated and will render some of them insignificant, and since the coefficients cannot be interpreted like those of the traditional methods because they do not make economic sense, we use the impulse response functions and variance decomposition to make a meaningful analysis. For suitable estimation techniques, both the unit root test and Cointegration test were used, and the estimated equations are equations (10) and (11) above

Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD)

Granger causality does not guarantee full information about the relationship between the variables in our model. We will also establish the response of our variables to an impulse in each of the variables in the system of equations. Thus, if there is feedback from one variable to an impulse in another variable, we may conclude that the latter causes the former. We will investigate this kind of causality by tracing out the effect of a shock or innovation in one of the variables on the other variables. Empirically such an effect may be due to exogenous factors from outside the system such as demand and supply shocks. It is specified as follows:

$$Y_{t+n} = \sum_{i=0}^{\infty} \emptyset_i \in_{t+n-i}$$

$$IRF_i = \frac{\partial y_{it+n}}{\partial \in_{jt}}$$

The response of Y_{t+n} to a one-time impulse in Y_{jt} with all other variables dated t or earlier held constant. The response of variable i to a unit shock (forecast error) in variable j, is sometimes depicted graphically to get a visual impression of the dynamic interrelationships within the system. We will consider shocks of one standard deviation rather than unit shocks since many variables have different scales of measurement. We expect the variables to granger cause each other, without which there are no impulse responses. Since a shock in one variable

has no effect on another variable if the first variable does not granger causes the other remaining variables.

Variance decomposition

Variance decomposition splits the variation in an endogenous variable into the component shocks to the system of equations. Therefore, the variance decomposition provides information about the relative importance of each random shock in affecting the variables in our model. The FEVD equation is specified as follows:

$$Var_{\in i,t+s} = \sum_{j=1}^{m} \sum_{l=0}^{s-1} \emptyset_{ij}$$

Where, the second summation accounts for the error variance generated by innovations in Y_j. Comparing this to the sum of innovations we would get a relative measure of how important the variable j's innovations are in explaining the variation in the variable i at different forecasting horizons. The forecast error variance decomposition is specified as follows:

$$R^2_{ijl} = \frac{\sum_{l=0}^{s-1} \emptyset_{ij}}{\sum^{m} \sum^{s-1} \emptyset_{ik}}$$

RESULTS AND DISCUSSION

Unit Root Test for Stationarity

The time series data which are nonstationary and or cointegrated cannot be used in any meaningful empirical research and could lead to spurious results. Since the empirical model employed in this study is a VAR model which can only handle stationary variables. Therefore, before carrying out any estimation techniques, augmented Dickey-Fuller (ADF) tests were conducted to determine the order the variables are integrated. The variables which are covariance at the level are GDP, AGR, DEF, and OPN. While the variables which are covariance after the first difference are EDU, GE, and FD (M2).

Table 2: Unit Root Test

At Level			At Δ first difference		
Variables	ADF Statistics	P- Values	Variables	ADF Statistics	P- Values
LGDP	-10.84450***	0.0000	ΔLGE	-5.278598***	0.0005
LAGR	-3.768011***	0.0280	ΔLEDU	-15.13457***	0.0000
LDEF	-4.804296***	0.0018	ΔLFD(M2)	-5.252639***	0.0005
LOPN	-4.342324***	0.0065			

Var and Cointegration test

For one to be able to use VECM, first the variables of interest should be integrated of the same order I(1), and then the linear combination of these variables should yield a stationary residual. When this happens, we say the variable are co-integrated, meaning a long-run equilibrium relationship. But since our variables are integrated at different orders, VECM cannot be used to estimate the empirical model. Thus, for this study, we will resort to a VAR analysis that is robust even if the variables are not cointegrated.

The results of our VAR (shown in the Appendix) showed that some vectors are significant while others are not. One such significant vector is the effect of GE on GDP; however, these vectors do not have any economic meaning. Thus, to unveil the direction and impact of the relationship among these variables, co-integration, granger causality, impulse response, and variance decomposition tests are conducted.

A co-integration test after a VAR model is meant to test for cointegration or long-run relationship that might exist among the variables in the VAR models. In our case, Johansen's co-integration test was conducted since the variables GE, EDU, and FD(M2) are integrated of order one, i.e. I(1). While variables such as GDP, AGR, DEF, and OPN are integrated of order zero, i.e. I(0) which is a condition that there must exist a linear combination or a long-run association among the variables. In model 1, the trace test statistics indicate 6 cointegrating equations while the maximum eigenvalue test statistics indicate 1 cointegrating equation, and in model 2, the trace test statistics indicate 4 cointegrating equations while the maximum eigenvalue test statistics indicate 2 cointegrating equations, there exists a linear combination among variables at 5% level of significance.

Thus, from the results in tables below, there exist some long-run equilibria among the variables in both models.

Table 3: Johansen test of Cointegration results for model 1

Hypothesized No. of CE(S)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability**
None*	0.777484	152.9592	95.75366	0.0000
At most 1*	0.504175	88.37070	69.81889	0.0008
At most 2*	0.384472	58.20485	47.79707	0.0040
At most 3*	0.373220	37.33806	29.79707	0.0058
At most 4*	0.188515	17.25021	15.49471	0.0269
At most 5*	0.174923	8.267983	3.844466	0.0040

Trace Test indicates 5 cointegrating equation(s) at 0.05 Level

Table 4: Johansen test of Cointegration results for model 2

Hypothesized No. of CE(S)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability**
None*	0.647381	81.09403	54.07904	0.0000
At most 1*	0.524890	47.73830	35.19275	0.0014
At most 2*	0.361271	23.92363	20.26184	0.0150
At most 3*	0.258691	9.578819	9.164546	0.0417

Trace Test indicates 3 cointegrating equation(s) at 0.05 level

VAR Regression Analysis Results

The VAR (1) model was estimated using lag 1 as recommended by the lag selection criteria and the results are shown in table below. To better reveal the interrelationship that might exist among these variables in both models, a Granger causality, IRFs and FEVD were conducted which are discussed in the preceding sections of this chapter.

Granger Causality

Since the VAR Model posed great challenges in interpreting its vectors (coefficients), it was necessary to run a Granger Causality test to determine the relationship between the variables in the models. Tables 5 and 6 below show the results obtained by carrying out the tests. As mentioned in the methodology, granger causality implies a variable is significant in forecasting another variable if the former granger causes the latter.

Table 5: Granger Causality

Variables	Chi-Sq	P-Value
LGE→ LGDP	11.57609	0.0007∗∗∗
	1.067880	0.3014
LEDU ≠ LGDP	0.009543	0.9222
	0.0219590	0.8822
LGDP → LAGR	77.99440	0.0052∗∗∗
	0.480654	0.4881
LGDP → LOPN	9.218539	0.0024∗∗∗
	0.033091	0.8557
LGDP → LDEF	3.161648	0.0754∗
	0.279470	0.5970
LGE ↔ LFDM2	. 968426	0.0307∗∗
	6.828866	0.0329∗∗

LGE → LOPN	9.527440	0.0085***
	1.869935	0.3926
LFDM2 → GDP	7.963257	0.0187***
	1.551037	0.4605

Note: LGE, LGDP, LEDU, LAGR, LOPN, LDEF, and LFDM2 represent government expenditure, gross domestic product, education, agriculture, trade openness, defense, and financial development (broad money- M2).

The results in the tables above show associations that exist between the variables in the first model. The causal relationship between total government expenditure and economic growth is unidirectional causality which runs from government spending to GDP. Some of the reasons that lead the government to spend are to improve public services or provide public goods and services that the private sector fails to provide. In addition, governments spend to reduce the negative effects of externalities and reduce inequalities in society. The above result supports the Keynesian relationship between government expenditure and economic growth. This result is in line with a study conducted by (Liu et al.2008), who examined the causal relationship between GDP and public expenditure in the United States for the period 1947- 2002 and revealed a unidirectional causality running from total government expenditure to economic growth. However, this contradicts the findings of (Kolluri et al, 2008), who modeled a bivariate framework to estimate the long relationship between GDP and government spending in G7 countries for the period 1960-1993. In essence, their findings confirmed Wagner's law which is the opposite of our findings. The findings on the causal relationship between the share of government expenditure on education and GDP in the Gambia under the period of study is that there is no causality running from both direction. This contradicts previous findings of (Toda and Yamamoto, 1995) who explore the causal relationship between public expenditure's share of education and economic growth in Turkey from 1973-2009 and found a unidirectional causality that runs from economic growth to educational spending. This also contradicts our expectations because education has a positive impact on growth. The results also showed that there is a unidirectional causal relationship between economic growth and the share of public spending on agriculture running from economic growth to agricultural spending. In addition to the above, the results showed that there is a unidirectional causality running from GDP to trade openness (OPN) and GDP to the share of public spending on defense (DEF). Therefore, we can say that economic growth is indeed vital for it is very significant in forecasting the share of public spending on defense and trade openness. The results of our second model in table 4 above shows a unidirectional Causality running from public spending to economic growth which also

confirms Keynesian theory and not Adolf Wagner's law. The study shows that there is bidirectional causality between government size and financial development (M2). This situation prevails because if the government spends excessively and forces the central bank to print more money when there are no other sources of revenue for the government and whenever this happens, it leads to inflation which in turn reduces the purchasing power of the dalasi. On the other hand, if the monetary policy committee (MPC) of the central bank realized that there is a need to print money that will not result in inflation and will stimulate economic growth through government spending in productive sectors then they will increase M2 thus the bidirectional causality. The causality between government expenditure and trade openness is unidirectional, that the size of the government has an impact on trade openness. When the government works hand in glove with the private sector, there will never be a problem of the government crowding out the private sector. The economic activities will be on a large scale and the country will open up with its trading partners for an easy flow of goods and services to and from the country which makes a country to be competitive in the world market and this leads to economic growth. The causality between economic growth and broad money is unidirectional as shown in table 4, i.e., money supply Granger causes economic growth. When there is a large reserve of foreign currency in the central bank, this will lead the government to spend more to develop infrastructure and viable projects and these will promote business, and hence the economy booms up.

Table 6: Granger Causality for VECM

Variables	Chi-Sq	P- Value
LGE ≠ LGDP	0.174469	0.6762
	2.106686	0.1467
LEDU → LGDP	46.38305	0.0000***
	0.494787	0.4818
LGDP → LAGR	3.496497	0.0615*
	0.559463	0.4545
LGDP ≠ LOPN	0.665978	0.4145
	0.039702	0.8421
LGDP ↔ LDEF	11.59260	0.0007***
	9.923513	0.0016***

The Granger causality test after a VAR usually shows the long-run causality among the variables. Thus, to know if there is short-run causality, a granger causality test is conducted

after a VECM (i.e., after confirming co-integration), the results of which (see appendix) showed that there is no short-run causality between total government size and economic growth. One justification for such findings might be related to the fact that the Gambia is not endowed with mineral resources and has to rely heavily on taxes and foreign assistance. There is always a problem of tax compliance in the country during tax collection and most tax authorities abscond with a lot of money collected from a tax also before the assistance comes from the donor partners, it takes time, and all these limits the operations of the government which causes a slowdown in economic growth. When there is no economic prosperity, the government will find it difficult to fully implement its projects. The granger causality after VECM of model 2 confirmed the same findings. The same VECM granger causality test results showed that there is a short-run unidirectional causality running from education to GDP, this situation could be associated with poor remuneration of workers. When fresh graduates are absorbed into the workforce, they work extensively, and this leads to the growth of the economy. When they realized that the pay scale is not good, they begin to search for greener pastures which had shown on a large scale, a great number of well-qualified Gambians leaving the country and traveling abroad for better pay to have a good standard of living, as well as improve the lives of their relatives and loves ones who are residents in the Gambia. Also, for political reasons, most of our educated folks are not given a conducive environment in their workplaces and politically they are not given the freedom to explore their potential which led to brain drain to the rest of the world.

The results also showed that there is short-run causality running from agriculture to GDP. This could be the due to the least attention paid to this sector by the government and agriculture which is the backbone of the country. Agriculture needs to be mechanized to achieve food self-sufficiency in the country as enshrined in the policy document: “Eat what you grow and grow what you eat”. The insufficient rainfall conditions that are encountered season always lead to poor crop yield and there will be neither enough food for domestic consumption, nor there will be for export which is a major determinant of economic growth.

The Gambia was a major re-exporter to countries like Senegal, Guinea Conakry and Guinea Bissau. When Senegal devaluated their currency, its commodities became cheaper as compared to goods in the Gambia. Then the re-export trade shifted to the ports of Senegal and the Gambia is now encountering serious problems in its trade. Another issue is, there have been political problems between the Gambia and Senegal governments, this has been there since time immemorial which led to the border closure by the Senegalese government, and this has hampered the business operations in the Gambia. These could be among other factors that lead to no short-run causality between trade openness and the growth of GDP as shown by the results above. Finally, the results showed that there is bidirectional short-run causality between

GDP and defense. This is because when a country experiences peace and stability, it attracts private investors who come to invest in the country, and this leads to economic growth. When there is economic prosperity, the government will recruit more people for security to protect and nurture the ever peace that is being enjoyed by the resident of the country. There is a unidirectional causality in the short-run, running from financial development (M2) and total government spending. When the government has an excess reserve of foreign currency in its account, the government is poised the spend more on the implementation of projects to achieve its development target goals. There is a unidirectional causality running from total government spending to trade openness which is an indication that government and trade bring about positive economic activities. There is Granger causality running from economic growth to financial development (M2 in the short run. While there is no effect between government size and growth in the short run as shown in table 6 above.

Forecasting with Impulse Response Functions and Forecast Error Variance Decomposition

The impulse response functions were generated from the Vector Autoregressive one, i.e., AR (1) results. The IRFs model the response of the dependent variable to a one positive standard deviation shock for a duration of 10 years and the ordering was Cholesky degrees of freedom adjusted which is shown below. Impulse Response Functions for Model 1

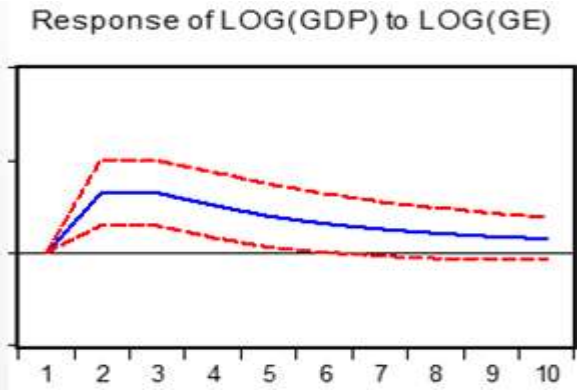

Figure 1: Impulse is log(GE) and the Response is log(GDP)

A one standard deviation shock on government expenditure will lead to an increase in economic growth by 0.065 percent over two years and fall to a minimum of 0.015 percent over 10 years. This indicates that there is a long-run relationship between government expenditure and economic growth. This is in line with previous studies by (Yasin, 2013), who examined the effect of government expenditure on economic growth in Sub-Saharan Africa (SSA) using panel data and found that government expenditure has a positive relation with economic growth.

However, this contradicts the findings by (Abu and Qarn, 2003), who used a bivariate framework to study the relationship between government expenditure and economic growth for Egypt, Israel, and Syria and found a bidirectional and long-run relationship between these two variables.

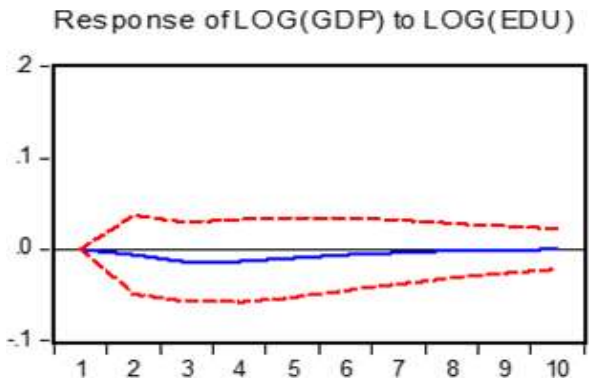

Figure 2: Impulse is log(EDU) and Response log(GDP)

A one standard deviation innovation on education expenditure leads to positive economic growth in the first two years and becomes negative till after the sixth year and converges to equilibrium. This result is in line with studies done by (Devarajan, 1993), who have also shown that there is a negative relationship between economic growth and the share of government expenditure on education. However, this finding is contrary to our expectations as well as studies done by (Donald and Shuanglin, 1993), found that in a sample of 58 countries, education expenditure has a positive impact on growth.

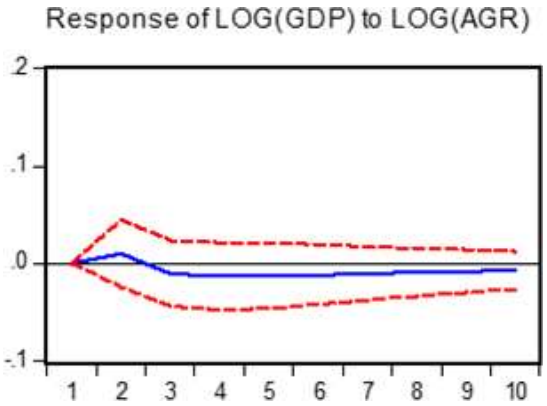

Figure 3: Impulse is log(AGR) and the Response is log(GDP)

A one standard deviation shock on agricultural expenditure will lead to an increase in economic growth by 0.010% over two years, however, after 3 years a one standard deviation shock to agricultural spending will lead to a fall in economic growth by 0.012% over five years

and reduce to a minimum of 0.0007% over 10 years. Since agriculture is the main backbone of the Gambian economy comprising about 75% of the population depending on crops and livestock and yet this has not translated into a positive impact on economic growth in the long run. This show that agricultural expenditure in the Gambia is neglected by the government, and this sector should have contributed highly to growth.

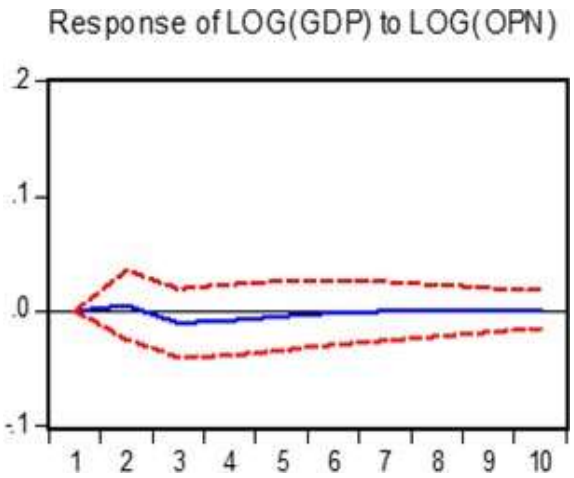

Figure 4: Impulse is log(OPN) and the response is log(GDP)

A one standard deviation innovation on trade openness leads to no response in growth in year 1 after which it increases economic growth by 0.005% after 2 years. However, the response becomes negative in the third year and dies out after the fifth year. This is in line with the findings of the granger causality test which showed that there is no short-run causality between trade openness and growth and is also in line with the findings by (Yasin,2013) who found that trade openness has a positive and significant impact on economic growth.

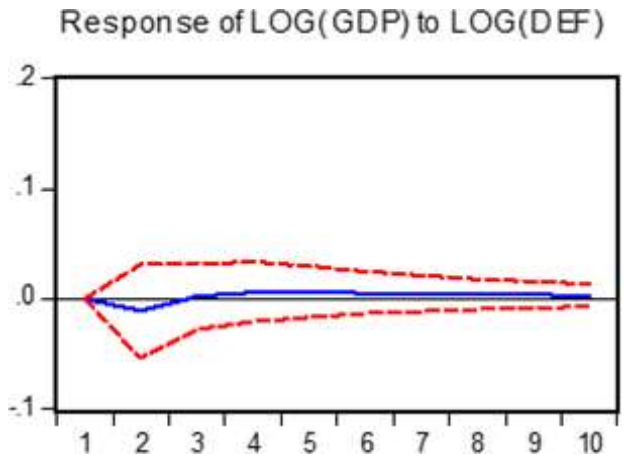

Figure 5: Impulse is log(DEF) and the Response is the log(GDP)

A one-standard-deviation defense expenditure will lead to negative economic growth until after the second year, it becomes slightly positive and dies out after the ninth year. Our finding is in line with the previous studies by (Qarn and Abu, 2003), who analyzed the causal relationship between government expenditure and economic growth for Syria, Egypt, and Israel and, the results showed that military expenditure hurts economic growth in all countries.

Impulse Response Functions for Model 2

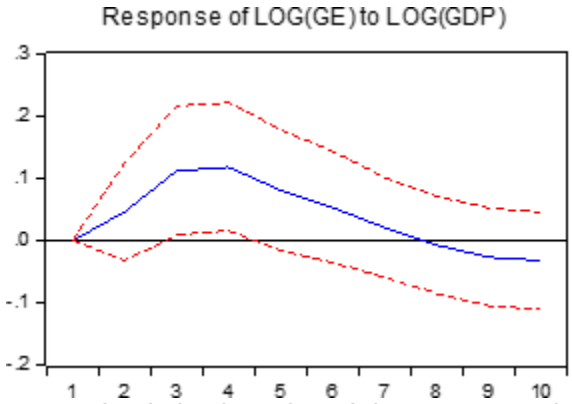

Figure 6: Impulse is log(GDP) and the Response is log(GE)

A one-standard deviation innovation on economic growth will lead to a positive government expenditure from the first year to the eighth and it becomes negative throughout which shows that in the long run economic growth will lead to negative government size. This confirms the results given by model 1 up to the eighth year but contradicts it afterward. These findings are in line with (Barro, 1991), who found that economic and government spending on data from 98 countries was negative and significant.

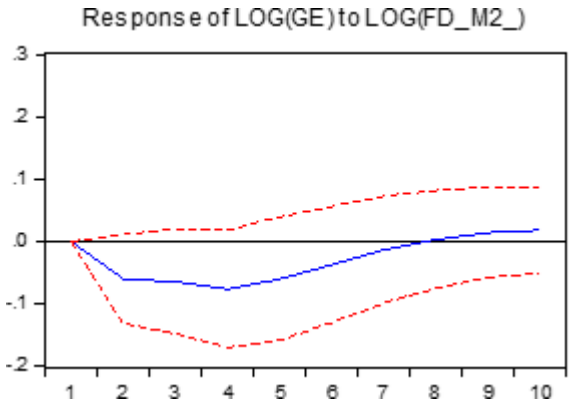

Figure 7: Impulse is log(FDM2) and the Response is log(GE)

A one standard deviation shock on financial development will lead to an inverse relation with government expenditure after one year up to the eighth year then it becomes positive in the years ahead.

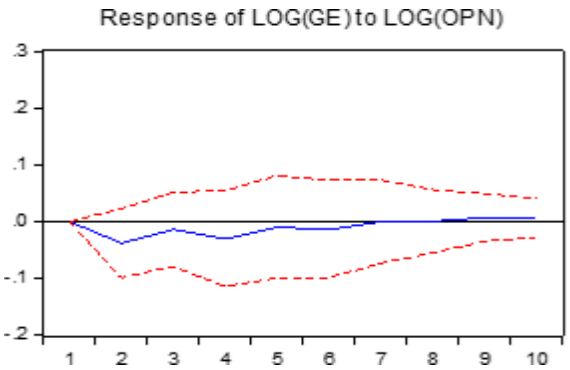

Figure 8: Impulse is log(OPN) and the Response is log(GE)

A one-standard deviation innovation on trade openness will hurt government expenditure and dies out after the seventh year.

Forecast Error Variance Decomposition (FEVD) for Model 1

Table 7: Forecast Error Variance Decomposition (FEVD) for Model 1

Variance Decomposition of LOG(GDP)							
Period	S.E.	LOG(GDP)	LOG(GE)	LOG(EDU)	LOG(AGR)	LOG(OPN)	LOG(DEF)
1	0.147620	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.172817	84.69998	14.28872	0.124108	0.370604	0.095054	0.4211538
3	0.191938	75.21480	22.87090	0.621204	0.575115	0.365300	0.352683
4	0.204027	70.67770	26.55864	0.956810	0.914318	0.488340	0.404191
5	0.211440	68.45969	28.31157	1.083089	1.192887	0.493625	0.459136
6	0.216227	67.25171	29.24931	1.107465	1.414097	0.477080	0.500342
7	0.219482	66.53299	29.78986	1.096776	1.585807	0.4463064	0.531504
8	0.221776	66.077490	30.11857	1.079100	1.715261	0.454279	0.555216
9	0.223432	65.77490	30.32813	1.063658	1.810906	0.449303	0.573102
10	0.224647	65.56624	30.46766	1.052209	1.880874	0.446547	0.586471

The Forecast Error Variance Decomposition (FEVD) is a measure of the percentage of variation in economic growth that is explained by shocks in the independent variables. The variation of growth due to its shocks in the first period is 100%. Consequently, this reduced to 65.56% in the tenth period. The FEVD results indicate that 29.78% of the variation in economic growth is attributed to government expenditure and this increase to a maximum of 30.46% over ten years. The variation in economic growth attributed to education is 1.08% over five years and falls to a minimum of 1.05% over 10 years. The relationship between agricultural expenditure and economic growth indicates that 1.19% of the variation in economic growth is attributed to agricultural expenditure and the effect increases to 1.88% over ten years. Economic growth variation due to shock in trade openness is 0.49% over five years and it falls to 0.446% over 10 years. Defense expenditure accounts for 0.459% of the variation in economic growth and this increases to a maximum of 0.58% over 10 years. Based on the above results, the policy variables that the government should embark on to achieve economic growth in their priority order are government expenditure, expenditure on agriculture, and expenditure on education.

Forecast Error Variance Decomposition (FEVD) for Model 2

Table 8: Forecast Error Variance Decomposition (FEVD) for Model 2

Variance Decomposition of LOG(GE)					
Period	S.E	LOG(GE)	LOG(GDP)	LOG(FD(M2))	LOG(OPN)
1	0.192761	100.0000	0.000000	0.000000	0.000000
2	0.266544	89.90262	3.043635	5.040842	2.012900
3	0.316479	75.96459	14.78331	7.634894	1.617207
4	0.353056	64.09987	23.13520	10.72215	2.042788
5	0.367560	59.27761	26.23474	12.53908	1.948568
6	0.374459	57.63309	27.32627	13.04144	1.999191
7	0.378764	58.16557	27.01766	12.86273	1.954044
8	0.383120	59.06938	26.44040	12.58002	1.910201
9	0.387721	59.38615	26.27865	12.43375	1.901450
10	0.391205	59.18295	26.48968	12.43276	1.894616

The results in table 8 above show that the variation in government expenditure due to its shocks in the first period is 100%. Consequently, this reduced in the tenth period to 59.18%. The variation in government expenditure due to shocks in economic growth is 26.23% over five years and increases to 27.32% over six years. FD(M2) accounts for 12.53% of the variation in

government expenditure and it increases to 13.04% over six years. Trade openness accounts for 1.94% of the variation in government expenditure and it increases to 1.99% over six years. Thus, the policy variables that the government should embark on to achieve fiscal expansion in their priority order are economic growth, financial development, and trade openness.

CONCLUSION

Since the government is a major player in the development of any nation and also creates a conducive environment for the private sector to operate in economic activities that led to the efficient production of goods and services, it will in turn brings about economic prosperity. This paper reveals that causality runs from government expenditure to economic growth which confirms the Keynesian hypothesis for the case of Gambia. It also shows that there is a cointegration relationship running from government expenditure to economic growth. Also, the shares of government expenditures such as agriculture, education, and defense, as well as trade openness and financial development (M2) have a positive impact on economic growth. Therefore, we can conclude that government expenditure is positively cointegrated with economic growth, meaning that there is a long-run association between these two variables.

POLICY IMPLICATIONS

The fiscal policy variable that needs the most attention in terms of achieving the desired economic growth and development is government spending for the Gambia. However the government of the Gambia has experienced several challenges in agriculture and tourism and the allocation of resources to various key government sectors to achieve Vision 2020 and the Millennium Development Goals (MDGs) enshrined in the policy document which aims: “To transform The Gambia into a financial Centre, a tourist paradise, a trading, export-oriented, agricultural and manufacturing nation, thriving on free market policies and a vibrant private sector, sustained by a well-educated, trained, skilled, healthy, self-reliant and enterprising population, and guaranteeing a well-balanced eco-system and a decent standard of living for one and all, under a system of government based on the consent of the citizenry.”

As seen in the analysis above, that government expenditure has a positive impact on growth. Therefore, the government should prioritize its spending according to the policy variables that bring economic growth and allocate more resources to those sectors for economic prosperity.

The government of the Gambia should mechanize agriculture which is the backbone of the economy to achieve higher growth.

Trade liberalization is a key policy tool for economic growth and development. Trade openness brings about trade competitiveness among emerging economies which lowers the prices of tradeable goods and services in the market, thereby lowering the prices of goods consumed locally and encouraging the consumers to purchase such cheap goods which in turn enhances economic growth.

When there is political stability and law and order through a vibrant military and police force, the country will attract foreign direct investment (private investors), and that will create employment and the earning capacity of the citizens rises and influence the consumption of goods and services produced locally and the private firms will earn more profit and this profit will plough back into the business to expand which will enhance growth. This will lead to the government recruiting more security personnel to maintain peace and stability for businesses to flourish.

The study was limited to a span period from 1970 to 2014 (45 years) due to the inadequate data for most of the variables to cover the intended period of 50 years (1965-2014). Also, the financial development (M2) was not adequate and could be available for only a period of 35 years from 1980 to 2014 which is a further reduction in the sample size from 45 years to 35 years. This also limited the use of the Elliot- Rothenberg- Stock Point-Optimal (ERS) test which has a high-power stationary test to distinguish better if the series is stationary but will not be accurate with a sample size of less than 50 observations.

The study could not examine the government size that could be optimal for economic growth. If the optimal government size is established, it will help the government in areas of priority rather than spending the limited available resources on white elephant projects.

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