GOVERNMENT SIZE AND ECONOMIC GROWTH IN NIGERIA: CAN THERE BE TOO MUCH OF A GOOD THING?

Mujidat Ahmed K. ALIAGAN

Department of Economics and Development Studies,
Kwara State University, Malete
ahmemujidat1@gmail.com
08035196533/08124555489

Abstract

Regardless of the several studies, there is a dearth of studies assessing the effects of government size using Armey's curve on economic growth in Nigeria. Hence, this study examines the effects of government size on economic growth in Nigeria from 1993 to 2022. The study employed time series techniques. Different combinations of 13 explanatory variables feature in the estimated equations. These 13 explanatory variables comprise 5 conditioning variables and 8 explanatory variables of primary interest because they serve as government expenditure measures. Drawing on data from CBN, IMF, and World Bank, the Autoregressive Distributed Lag (ARDL) estimation method was used in estimating all the models after ensuring the validity of the estimates through suitable diagnostic tests. The study found that government expenditure has a positive and significant effect on economic growth and any addition beyond the required threshold values of 14.089 per cent will retard growth. Accordingly, this study recommended that policymakers maintain a threshold level and encourage capital expenditure to foster economic growth in Nigeria.

Keywords: Armey's curve, Economic growth, Government expenditure

Jel Classification Codes: C24, F040, E6

1. Introduction

Historically, African countries have been faced with increasing government expenditure, and its impact on economic growth has become an emerging major public debate. However, the observed growth in public spending appears to apply to most countries regardless of their level of economic development (Akpan, 2005). Thus, the quest to better the lots of citizens through government expenditure has raised questions on the effects of public expenditure on the economic growth of nations. In most developing economies, over the years, there has been a steady increase in government spending without an appreciable increase in economic growth (Darko, 2015; Onifade et al., 2022). In Nigeria for instance, despite the huge amount of public expenditures, there is still an insignificant level of development witnessed. Public expenditure on all sectors of the economy is expected to lead to economic growth. The positions of economists who analyse developing economies on the role of government expenditure in these economies are still inconclusive. Hence, this study examines the effects of government size using Armey's curve on economic growth in Nigeria**.** This study employed time series techniques. Furthermore, this study distinguishes the effects of each of the four functional components of government expenditure on economic growth to know which one(s) have greater effects on economic growth, which could enhance the formulation and implementation of sound policies in Nigeria. Also, this study examines the threshold effect of total government expenditure, a proposition that was first put forward by Armey (1995) but which has not been much tested in the empirical literature, particularly the empirical literature on African economies, including the Nigerian economy is another issue that existing studies have not addressed.

The rest of the paper is structured as follows: Section 2 provides a review of relevant literature, and Section 3 presents the methodology, including a description of the data employed in the study. The analysis and discussions of results are undertaken in Section 4 while Section 5 concludes the paper.

2.0 Literature Review

2.1 Conceptual Review

Economic growth is affected by a wide number of factors, among which government expenditure plays a certain role. According to Kuznets (1973), a country's economic growth is a long-term rise in capacity to supply increasingly diverse economic goods to its population, with this growing capacity based on advancing technology and the institutional and ideological adjustments that it demands. It is conventionally measured as the per cent rate of increase in real GDP (Merriam-Webster, 2020). Technically, there is a distinction between the size of government and government expenditure. Government expenditure refers to the funds and resources allocated by the government to goods and services such as education, health care and infrastructure. Such expenditure can be classified into government investments or capital expenditure and government consumption or recurrent expenditure. Concerning government size, this is not only limited to the funds and resources being utilised by the government but it also includes funds generated and disbursed by government-owned agencies for public services that are not routed through and, hence, captured by the centralised government budget (Danladi, 2015; IMF, 2023).

2.2 Theoretical literature

The Keynesian theory, Ricardian equivalence theory, Armey's curve theory, and the neoclassical growth theory are the four prominent approaches to government expenditure in the literature and, hence, are the ones reviewed here.

In the Keynesian theory, public expenditures constitute an exogenous factor and a policy instrument that promotes economic growth. Hence, high levels of government expenditure increase employment, profitability and investment via multiplier effects on aggregate demand (Patricia & Izuchukwu, 2013). In contrast to Keynesian theory, the argument of the neoclassical theory developed by Solow (1956), fiscal policy does affect economic growth mainly in the short run, given that in the long run, economic growth is achieved via an exogenous process that determines the rate of technological progress (Halkos & Paizanos, 2015). Contrary to the neoclassical theory, the endogenous growth theory emphasizes the potential effect of public expenditures on economic growth (Barro, 1991; Barro & Sala-i-Martin, 1992). Armey's curve postulates a geometric expression that public spending below an optimal threshold level has an expanding effect, but that public spending above the threshold level affects economic growth adversely. According to Armey, the government is certainly necessary to ensure peace, prevent anarchy and provide public services. This dimension of the government is similar to the constitutional description, such as guaranteeing the protection of freedom and increasing general welfare. However, as the government starts to grow, after some point, it starts to erode the general welfare and liberty. The parabolic structure of Armey's curve is essential for estimating the government size (Armey, 1995; Yüksel, 2019).

2.3 Empirical Review

There have been flurries of empirical studies on government expenditure and economic growth globally, although there are only a few studies on Nigeria. Starting with studies outside Nigeria that are very recent (being post-2014 ones), among such studies are Nuru and Gereziher (2022). Zungu and Greyling (2021), Springer (2020), Meyer et al. (2018), and Saez et al. (2017).

Nuru and Gereziher (2022) used the bound test approach (ARDL) to investigate government expenditure and economic growth in South Africa over the sample period 2004Q2 to 2018Q1. The empirical findings revealed that variable like real effective exchange rate was found to have a positive effect on economic growth. Whereas, the inflation rate affects economic growth negatively. Zungu and Greyling (2021) used the wild cluster bootstrap-Lagrange Multiplier (WCL-LM) model in 10 African emerging economies. The findings revealed nonlinear effects of government expenditure and economic growth. Springer (2020) employed a panel estimate on 59 developing countries over the period 1990 - 2019. The findings revealed the negative effects of government expenditure on economic growth. Meyer, Manete and Muzindutsi (2017) used the VAR model and found that only the investment in the manufacturing sector had a positive effect on economic growth. The findings revealed unidirectional causality between government expenditure and economic growth. Saez et al. (2017), used the GMM technique to investigate the effect of government expenditure on economic growth in European Union countries from 1994 to 2012.

Studies that have examined the government expenditure and economic growth in Nigeria include, Sunny and Olufemi (2023), Adamu, and Musa (2021), Okoye and Ahmed (2019), Odubuasi (2018).

Sunny and Olufemi (2023), examined the relationship between government expenditure and economic growth in Niger. The Ordinary Least Square (OLS) estimation method was employed. Findings revealed that government expenditure on the security sector is statistically significant in predicting the economic growth of Nigeria. Adamu, and Musa (2021), investigated the relationship between government expenditure and economic growth in Nigeria using Autoregressive Distributed Lag (ARDL). The study found that capital expenditure has a positive effect on economic growth. Okoye and Ahmed (2019). The study employed Autoregressive Distributed Lag (ARDL). The study found no evidence of a long-run effect of government expenditure on economic growth in Nigeria. Odubuasi (2018), investigated the causal relationship between government expenditure and economic growth in Nigeria. The study employed the Autoregressive Distributed Lagged (ARDL) technique and Error Correction model. Findings revealed a causal relationship between government expenditure and economic growth in Nigeria.

Virtually all previous studies focused on testing for the effects of government expenditure on economic growth and, in some cases, the causal relationship between government expenditure and its postulated determinants. (See Odubuasi, 2018; Adamu & Musa, 2021; and Sunny & Olufemi, 2023). This study would add to the few empirical studies existing on the government expenditure on economic growth in Nigeria. Apart from the fewness of the studies on government size on economic growth in Nigeria, the present study has identified some gaps in them to be filled.

To begin, previous studies examined the effects of government expenditure on economic growth using the OLS approach (See Gukat & Ogboru, 2017). But, to the best of the researcher's knowledge, all existing studies mainly focused on capital and recurrent expenditures as the only variables of government expenditure and, thus, featured only these factors (e.g. Sunny & Olufemi, 2023, Springer, 2022 and Barlas, 2020). Therefore, there is a gap. To address this, the present study aims to add by estimating the models for four functional expenditures for Nigeria to have a robust result. Furthermore, most empirical studies, particularly in the Nigerian context, just limit their investigations to the effects of total government expenditure on economic growth without going the extra mile to identify whether the effects are linear or nonlinear. The present study departs from this apparent tradition by seeking to determine whether there is a threshold in the effect of government expenditure on economic growth beyond which the phenomenon of "too much of a good thing" will set in, whereby a further increase in the size of government expenditure starts to have an opposite or adverse incremental effect on the economy.

3.0 Methodology

3.1 Theoretical Framework

There are two measures of theory underlying this study: one is on the role of government expenditure on economic growth and the other is on the generalised growth theory.

The theoretical foundation of the role of government expenditure on economic growth can be found in the Ricardian Equivalence hypothesis theory that was first put forward by Ricardo (1817), as it provides a strong narrative and argument on the lack of any role of the composition of government expenditure on economic growth (Wahyudi, 2020).

Regarding the second part of the theory, which is on economic growth, the theoretical foundation of the growth of GDP (or economic growth) equation can be found in the neoclassical growth theory-based growth accounting framework, which is widely used in most empirical studies. According to Dornbusch et al. (2011), the derivation of the growth accounting equation is as follows:

$$Y = Af(K,\ N) \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \qquad (1)$$

where: A= technological progress, K= capital stock, N= labour and Y= output.

Assuming output changes as a result of the change in each of the input K, N and A multiplied by their marginal productivity gives Equation 2 below:

$$\Delta Y = MPN.\Delta N + MPK.\Delta K + F(K,N).\Delta A \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \qquad (2)$$

where MPN and MPK indicate marginal productivities of labour and capital respectively. If Equation 2 above is divided by Equation 1, then we arrive at:

$$\frac{\Delta Y}{Y} = \frac{MPN}{Y}.\Delta N + \frac{MPK}{Y}.\Delta K + \frac{\Delta A}{A} \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \qquad (3)$$

Multiplying and dividing the first and second part of the Right-Hand Side (RHS) by N and K respectively will give:

$$\frac{\Delta Y}{Y} = \left(\frac{MPN}{Y}N\right)\frac{\Delta N}{N} + \left(\frac{MPK}{Y}K\right)\frac{\Delta K}{K} + \frac{\Delta A}{A} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \qquad (4)$$

Assuming a perfectly competitive market, so that factors are paid their respective marginal products then, MPN = w and MPK = r, where w and r are the market wage rate and net capital rental rate. $\frac{MPN}{Y}N$ and $\frac{MPK}{Y}K$ indicate the share of labour and capital from the total income respectively as given in Equation (5). Replacing the labour and capital share with $1-\alpha$ and α respectively will give us the growth accounting equation below:

$$\frac{\Delta Y}{Y} = (1-\alpha)\frac{\Delta N}{N} + \alpha\frac{\Delta K}{K} + \frac{\Delta A}{A} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \qquad (5)$$

For notational convenience, the $1-\alpha$ and α in this Equation (5) are replaced by β_1 and β_2 respectively to arrive at Equation (5a) thus:

$$\frac{\Delta Y}{Y} = \beta_1\frac{\Delta N}{N} + \beta_2\frac{\Delta K}{K} + \frac{\Delta A}{A} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \qquad (5a)$$

The above is the derivation of the growth accounting equation which, in turn, is based on the neoclassical growth framework. It is this growth accounting equation that serves as the basis for the model specification adopted in this study.

$$\left(\frac{\Delta A}{A}\right)_t = \beta_3 GEXP_t + \beta_4 OPENS_t + \beta_5 FINDEV_t + \beta_6 INF_t + U_t \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

where:

t = time subscript;

$\frac{\Delta A}{A}$ = productivity growth;

GEXP = share of government expenditure in GDP;

OPENS = Trade openness, the share of exports and imports in GDP;

FINDEV = Financial development proxied by bank credit to GDP;

INFL = Inflation rate; and

The $\beta_{3,}$ $\beta_{4,}$ $\beta_{5,}$ and $\beta_{6,}$ are parameters of their respective explanatory variables, the a priori expectations in respect of the signs of these slope parameters are as stated mathematically, thus: $\beta_3 \gtrless 0$, $\beta_{4,} \beta_{5,} > 0$, $\beta 6 < 0$.

These variables, apart from the share of government expenditure in GDP, serve as the control variables, an absence of which may lead to some specification biases in the result.

3.2 Model Specification

To determine the effects of government expenditure on economic growth, the neo-classical growth equation adopted in this study is extended through the level of technology (A), which can be construed broadly as embodying productivity and efficiency in all ramifications. This extension is through the identification of possible determinants of productivity growth **($\frac{\Delta A}{A}$)** and specification of the total factor productivity growth **($\frac{\Delta A}{A}$)** function. The determinants of factor productivity growth **($\frac{\Delta A}{A}$)** include the totality of factors or things, except growth in the explicitly identified factors of production (which are only quantities of labour and capital in the above Equation (5) that influence economic growth. In the discussion here, such identified or recognised factors are limited to only the size of budgetary variables (viz: government expenditure) of the combined government as well as three control variables in the form of trade openness, financial development, and inflation rate.

$$\left(\frac{\Delta Y}{Y}\right)_t = (1-\alpha)\frac{\Delta N}{N} + \alpha\frac{\Delta K}{K} + \beta_3 GEXP_t + \beta_4 OPENS_t + \beta_5\ FINDEV_t + \beta_6 INFL_t \text{ ...... } (7)$$

Inserting the stochastic error term (U) and intercept term (β_0) into Equation (7) and also replacing 1- α by β_1 and α by β_2 yields the economic growth baseline Equation 8, thus:

$$\left(\frac{\Delta Y}{Y}\right)_t = \beta_0 + \beta_1\left(\frac{\Delta N}{N}\right)_t + \beta_2\left(\frac{\Delta K}{K}\right)_t + \beta_3 GEXP_t + \beta_4 OPENS_t + \beta_5 FINDEV_t + \beta_6 INFL_t + U_t \text{.... } (8)$$

where: $\frac{\Delta Y}{Y}$, $\frac{\Delta N}{N}$, $\frac{and\ \Delta K}{K}$ are as defined in connection with the growth accounting Equation (5) while notations for other explanatory variables and parameters are as defined in connection with the productivity growth Equation (6); $\beta_0 =$ intercept term and U is the error term.

Equation (8) shows that economic growth is a function of labour force growth ($\frac{\Delta N}{N}$), growth of capital stock ($\frac{\Delta K}{K}$), the relative size of government expenditure (GEXP) and the three control variables viz: (OPENS, FINDEV, and INFL) that determine productivity growth.

The first alternative of testing for the existence of a non-linear relationship between government expenditure $(GEXP)^2$ and economic growth is estimated below:

$$\left(\frac{\Delta Y}{Y}\right)_t = \beta_0 + \beta_1\left(\frac{\Delta N}{N}\right)_t + \beta_2\left(\frac{\Delta K}{K}\right)_t + \beta_3 GEXP_t + \boldsymbol{\delta}\,(GEXP)^2_t + \beta_4 OPENS_t + \beta_5 FINDEV_t + \beta 6 INFL_t + U_t \ldots\ldots (9)$$

Where $(GEXP)^2_t$ is the square of government expenditure and $\boldsymbol{\delta}$ is its coefficient. All other variables and parameters are earlier explained in connection with Equation 8. The coefficient of $(GEXP)^2_t$ is expected to be opposite in sign to that of the coefficient of GEXP

Alternatively, the second method of using Switching Regression Analysis (threshold) can be used to estimate the non-linear relationship between government expenditure and economic growth as specified below:

$$\frac{\Delta Y}{Y\,t},\ q_{t,},\ X_t\ ;\ 1 \le t \le T \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 10$$

where $\frac{\Delta Y}{Y\,t}$ is the dependent variable at time t, q_t is a threshold variable, and X_t is a set of variables hypothesized to affect economic growth. The structural form of the equation for a single threshold can be written as:

$$\frac{\Delta Y}{Yt} = \{\ \beta_0 + \beta_1 GEXP_{t,} + \boldsymbol{\delta} X_t + U_{t,} \qquad if\ \ q_t \le \vartheta \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 11$$

$$\frac{\Delta Y}{Yt} = \{\ \beta_0 + \beta_1 GEXP_{t,} + \boldsymbol{\delta} X_t + U_{t,} \qquad if\ \ q_t > \vartheta$$

where:

The observations are divided into two "regimes" depending on whether the threshold variable $q_{t,}$ is smaller or larger than the threshold ϑ. The regimes are distinguished by differing regression slopes β_1 and $\beta_{2.}$ For identification of β_1 and $\beta_{2,}$ it is required that the elements of X_t are not time-invariant. We also assume that the threshold variable $q_{t,}$ *is* not time invariant. β_0 is the intercept, U_t is the error term which is assumed to be independent and identically distributed (IID), ϑ is a threshold parameter, and $GEXP_t$ is the government expenditure switching regime.

To determine the separate effects of government capital and recurrent categories of expenditure on economic growth, which is the economic categories of Government expenditure, the study disaggregates the total government expenditure into its capital and recurrent expenditure components. The rationale for examining the separate effects of capital and recurrent expenditure is that they may have different effects on productivity growth.

$$\left(\frac{\Delta Y}{Y}\right)_t = \beta_0 + \beta_1\left(\frac{\Delta N}{N}\right)_t + \beta_2\left(\frac{\Delta K}{K}\right)_t + \theta_1 CAPEX_t + \theta_2 RECEX_t + \beta_3 OPENS_t + \beta_4 FINDEV_t + \beta_5 INF_t + U_t \ldots 12.$$

where:

CAPEX refers to capital expenditure, while RECEX is recurrent expenditure.

To determine the separate effects of functional categories of total government expenditure on economic growth, the study disaggregates the total government expenditure into its four functional categories, viz; Administration (ADM), Economic Services (ECS), Social and Community Services (SCS) and Transfers (TRANS) expenditure to see what are their respective effects on economic growth in Nigeria.

$$\left(\frac{\Delta Y}{Y}\right)_t = \beta_0 + \beta_1\left(\frac{\Delta N}{N}\right)_t + \beta_2\left(\frac{\Delta K}{K}\right)_t + \theta_1 ADM_t + \theta_2 ECS_t + \theta_3 SCS_t + \theta_4 TRANS_t + \beta_5 OPENS_t + \beta_6 FINDEV_t + \beta_7 INF_t + U_t \quad \ldots\ldots (13)$$

3.3 Estimation Techniques

Both the descriptive and inferential analyses were carried out for this study. The descriptive analysis entails the use of summary statistics to describe each of the variables. Since most macro-economic variables are often non-stationary, the study first checks for the presence of a unit root in respect of each variable, using the Augmented Dickey-Fuller unit root test procedure to see whether variables are stationary at level, i.e. I(0) series, or at the first difference, i.e. I(1), before estimating the model. Based on the outcome of the unit root test, the study also tests for the existence of a long-run relationship among the variables. The relevant post-estimation tests were conducted to check the validity of the results including tests for heteroskedasticity, multicollinearity, serial correlation and normality in the distribution of the residuals. After the general diagnostic tests and taking of appropriate remedial measures where the outcomes of the tests are not satisfactory, the study proceeds to present the estimates of the model, using, based on the outcomes of the unit root and cointegration tests, the Autoregressive distributed lag (ARDL) estimation method, and then evaluate the performance of each explanatory variable. The choice of ARDL was informed because variables are integrated in different orders.

3.4 Sources of Data and Measurement of Variables

The data employed in the study were gathered from secondary sources covering periods from 1993 to 2022. The definitions of variables employed in the study, their sources and how they are measured are described below:

Economic growth, the dependent variable, is measured as the annual or percentage change in the growth rate of real GDP. Government expenditure (GEXP), capital expenditure (CAPEX), recurrent expenditure (RECEX), administration expenditure, economic services (ECS), social and community services (SCS) and transfer expenditure (TRANS) are all expressed to GDP. The 5 control variables are openness (OPENS) which is measured as the sum of exports and imports of goods and services as a percentage of GDP, inflation (INFL) which is expressed as a percentage growth of GDP deflator, and Financial Development (FINDEV), proxied by the percentage of domestic credits from the banking sector to GDP are obtained from World Bank Indicator (2022), growth of private capital stock $\frac{\Delta K}{K}$ that is expressed as the annual percentage change of capital stock in real term and labour force growth $\frac{\Delta N}{N}$ that is measured as labour force annual percentage change are obtained from International Monetary Fund (IMF), and IMF Investment and Capital Stock Dataset (2022). Data on expenditures, (which is the combination of state government and the administration of the federal capital territory as well as the local governments) are obtained from the CBN Statistical Bulletin (2022).

4.0 Research Findings /Results

4.1 Descriptive Analysis

Table 1 presents the summary statistics. The table consists of the columns for the variables and their description, the total number of observations (obs), mean, standard deviation (std. Dev.), Coefficient of variation (Coef. Of Var), the minimum (Min) and the maximum (Max) values.

Table 1: The Descriptive Statistics

Variables	**Description**	Obs	**Mean**	**Std Dev**	**Coef of var**	**Min**	**Max**
$\frac{\Delta Y}{Y}$	Economic Growth - Annual GDP growth, %	30	4.158	3.847	0.925	-2.035	15.329
GEXP	Government Expenditure – % of GDP	30	14.621	3.543	0.242	9.898	21.693
$GEXP^2$	Square of Government Expenditure – % of GDP	30	225.9	108.642	0.480	97.966	470.597
CAPEX	Capital Expenditure – % of GDP	30	5.464	2.097	0.384	2.261	10.617
RECEX	Recurrent Expenditure – % of GDP	30	9.156	2.199	0.240	4.791	14.355
ADM	Administration Expenditure – in %	30	1.889	.722	0.382	.796	4.129
ECS	Economic Services Expenditure – % of GDP	30	2.04	1.312	0.643	.521	7.491
SCS	Social and Community Service Expenditure – % of GDP	30	1.014	.336	0.331	.356	1.616
TRANS	Transfers Expenditure – % of GDP	30	3.556	1.88	0.529	1.587	8.61
$\frac{\Delta K}{K}$	Growth of Private Capital Stock – Annual % growth	30	5.823	5.994	1.029	-2.997	15.958
$\frac{\Delta N}{N}$	Labour force Growth - Annual % growth	30	2.862	0.627	0.219	1.615	3.912
OPENS	Trade Openness - the sum of imports and exports of goods and services - % of GDP	30	36.24	9.825	0.271	16.352	53.278
FINDEV	Level of Financial Development - % of GDP	30	10.641	3.322	0.312	6.151	19.604
INFL	Annual Inflation – % growth of GDP deflator	30	17.728	16.034	0.904	5.388	72.835

Source: Author's computation 2024. Explanatory Notes: Min = Minimum, Max = Maximum, Obs = Observation, Std. Dev = Standard Deviation, Coef. Of Var = Coefficient of Variation

Table 1 summarizes the descriptive statistics for all variables in the study. For brevity, the self-explanatory nature of the statistics requires no further elaboration, except just to point out that the coefficients of variation in the Table show that Growth of Private Capital Stock ($\frac{\Delta K}{K}$) has the highest variability, followed by economic growth and inflation that recorded the coefficients of variation of 1.02, 0.92 and 0.90 respectively. On the other hand, labour force growth has the lowest degree of variability, followed by recurrent expenditure, and government expenditure, which respectively recorded coefficients of variation of 0.219, 0.240 and 0.242.

Table 2: Augmented Dickey-Fuller Unit Root Test Result

Variables	**Num of Observation**	**ADF Statistics at level (Critical values @ 1% significance are in the parentheses)**	**ADF p-values at level**	**ADF Statistics at 1st diff (Critical values @ 1% significance are in the parentheses)**	**ADF p-values at 1st difference**	**Order of Integration at level form**	**Conclusion as to whether or not stationary in level form**
$\frac{\Delta Y}{Y}$	30	-2.839 (-2.968)	0.065	-7.222 (-2.972)	0.000	I(1)	Unit root
GEXPG	30	-1.743(-3.689)	0.399	-6.772(-3.689)	0.000	I(1)	Unit root
$GEXPG^2$	30	-1.777(-3.689)	0.383	-7.947(-3.689)	0.000	I(1)	Unit root
CAPEX	30	-2.235(-3.679)	0.198	-6.922(-3.689)	0.000	I(1)	Unit root
RECEX	30	-3.486(-3.699)	0.016	-6.246(-3.689)	0.000	I(1)	Unit root
ADMF	30	-4.250(-3.600)	0.001	n.a.	n.a.	I(0)	Stationary
ECSF	30	-1.948(-3.605)	0.307	-10.198(-3.605)	0.000	I(1)	Unit root
SCSF	30	-3.498(-3.600)	0.013	n.a.	n.a.	I(0)	Stationary
TRANSF	30	-1.971(-3.600)	0.297	-7.420(-3.605)	0.000	I(1)	Unit root

Source: Author's Computation (2024).

Explanatory Notes: $\frac{\Delta Y}{Y}$ = *economic growth, GEXP = government expenditure about GDP,* $GEXP^{2,}$ *CAPEX = government capital expenditure, RECEX = general government recurrent expenditure ADMF= federal government administration expenditure, ECSF = federal economic service expenditure, SCSF = federal social and community expenditure, TRANSF = federal government transfers expenditure, , OPENS = trade openness, FNDEV = financial development, INF = inflation,* $\frac{\Delta N}{N}$ *= labour growth and* $\frac{\Delta K}{K}$ *= growth of capital stock. A variable is considered stationary only when the test statistics are statistically significant at 1%. The "n.a" means not applicable, as once a variable is found to be stationary at the level form, it is not applicable (or, rather, superfluous) to conduct a stationarity test for its first difference form.*

The result in Table 2 shows that all the included variables are integrated of order one, that is, they are I(1), except administration and social and community services expenditures, meaning that they are stationary at first difference. This indicates that there is an existence of unit root, so that all the series are non-stationary at levels, thereby necessitating the conduct of a cointegration test.

Table 3: Results of ARDL Bound Cointegration Test

MODELS	F-statistic	Lower Bound at 1%	Upper Bound at 1%	Remarks
MODEL 1 Y= f(GEXP, OPENS, FINDEV,INF, $\frac{\Delta N}{N}$, $\frac{\Delta K}{K}$)	4.956	I_0 = 3.15	I_1 =4.43	Co-integrated
MODEL 2 Y= f(GEXP ^{2}, OPENS, FINDEV,INF, $\frac{\Delta N}{N}$, $\frac{\Delta K}{K}$)	7.717	I_0 = 2.96	I_1 =4.26	Co-integrated
MODEL 3 Y= f(CAPEX, RECEX, OPENS, FINDEV,INF, $\frac{\Delta N}{N}$, $\frac{\Delta K}{K}$)	7.809	I_0 = 2.96	I_1 =4.26	Co-integrated
MODEL 4 Y= f(ADMF, ECSF, SCSF, TRANSF, OPENS, FINDEV,INF, $\frac{\Delta N}{N}$, $\frac{\Delta K}{K}$)	4.866	I_0 = 2.65	I_1 =3.95	Co-integrated

From Table 3, the F-statistic is statistically significant for the 4 models. This is evident from the results of the cointegration tests presented in Table 4.3 which show that the computed F-statistic values of the tests are greater than the upper bound I(1) critical value bound at a 1% level of significance for all the models, implying a rejection of the null hypothesis of no long run relation among the variables of each equation. The conclusion is therefore reached that there exists a long-run relationship among the series featured in every equation. It is thus concluded that the models are all co-integrated. So, it is the ARDL that is chosen as the appropriate estimation technique to adopt for the long-run effects of the explanatory variables on economic growth because is good for variables that are integrated of different orders, I(0) and I(1),

Following the above procedure and the models that are specified in Section 3, the results of the estimates are presented in Table 4, which contains regression results for the four models. Each model estimation result is divided into 3 columns. Column 1 is for the coefficient. Column 2 is for the t-statistic and Column 3 contains the p-values. A coefficient is considered to be statistically significant only if the p-value of its t-statistic is less than or equal to 0.01 critical significance level.

Table 4. Estimates of the Economic Growth $\frac{\Delta Y}{Y}$ Models featuring Total Expenditure and Their Threshold Regression Model Equivalents, Economic & Functional Expenditures

Variables	Models featuring Government Expenditure						Models 2a (low) and Model 2b (up) of the Switching Regression for General Government Total Expenditure Threshold estimate(r)=14.089						Model 3 & 4: Featuring capital Expenditure (CAPEX), Recurrent Expenditure (RECEX), Administration Expenditure (ADMF), Economic Services (ECSF), Social & Community Services (SCS), and Transfers Expenditure (TRANSF)					
	Model 1: Government Expenditure			Model 2: Square of Government Expenditure			Model 2a: Lower Regime			Model 2b: Upper Regime			Model 3: Economic Categories			Model 4: Functional Categories		
	Coef.	t-stat	P-val	Coef.	t-stat	P-val	Coef.	Z-stat	P-val	Coef.	Z-stat	P-val	Coef.	t-stat	P-val	Coef.	t-stat	P-val
GEXP	0.248	3.330	0.015	0.240	5.271	0.013	1.538	3.320	0.005	-1.019	-3.088	0.008	-	-	-	-	-	-
$GEXP^2$	-	-	-	-0.287	5.152	0.014	-	-	-	-	-	-	-	-	-	-	-	-
CAPEX	-	-	-	-	-	-	-	-	-	-	-	-	0.947	2.683	0.044	-	-	-
RECEX	-	-	-	-	-	-	-	-	-	-	-	-	0.546	1.441	0.223	-	-	-
ADM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.379	2.783	0.012
ECS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.510	7.824	0.000
SCS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.222	2.241	0.043
TRANS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-1.891	-5.117	0.000
$\frac{\Delta K}{K}$	0.183	6.596	0.000	0.375	6.148	0.008	0.361	3.59	0.008	0.476	4.43	0.007	0.225	3.410	0.027	0.008	0.229	0.820
$\frac{\Delta N}{N}$	1.679	3.879	0.062	2.572	6.043	0.009	2.653	3.487	0.002	0.121	1.99	0.047	0.470	4.501	0.010	1.340	3.166	0.050
OPENS	0.167	4.952	0.002	0.280	4.998	0.010	-	-	-	-	-	-	0.302	3.243	0.031	1.888	5.611	0.002
FINDEV	0.224	2.763	0.032	2.593	4.980	0.015	-	-	-	-	-	-	1.652	6.981	0.000	1.652	6.981	0.000
INFL	-0.117	-4.941	0.012	-0.069	-2.996	0.057	-	-	-	-	-	-	0.201	5.295	0.006	-0.500	-8.220	0.000
Obs.	30			30			15			15			30			30		
F-Statistics	13.456		0.000	77.095		0.002	-	-	-	-	-	-	13.45		0.000	2.220		0.040
R^2		0.57			0.60		-	-	-	-	-	-		0.68			0.65	
VIF statistics for		0.025			0.0		-	-	-	-	-	-		2.5			1.77	

Multicollin.					03									1				
Breush-Godfery for Autocorr.	2.611		0.067	1.915		0.455	-	-	-	-	-	-	0.732		0.498	1.435		0.259
Breush-Godfery for Heterosced.	1.554		0.285	1.360		0.243	-	-	-	-	-	-	0.990		0.488	0.700		0.680
Jacque-Bera for Normalty test	0.228		0.891	0.989		0.609	-	-	-	-	-	-	2.750		0.252	0.275		0.865

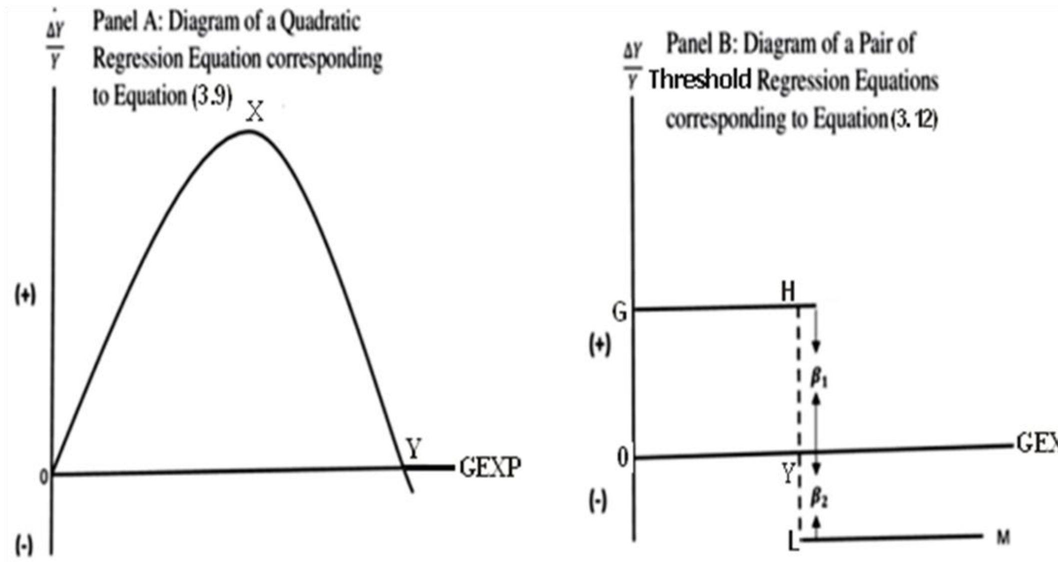
Source: Author's Computation, (2024).

Explanatory notes: *The following are the meanings of the acronyms; Obs = No of Observations, GEXP = government total expenditure, $GEXP^2$ = square of government total expenditure, CAPEX = government capital expenditure, RECEX = recurrent expenditure,* $\frac{\Delta N}{N}$ *= Labour force growth,* $\frac{\Delta K}{K}$ *= Growth of capital stock, ADMF = administration expenditure, ECSF = economic service expenditure, SCSF= social and community service expenditure, TRANSF = transfers expenditure, INFL = inflation rate, FINDEV = Level of financial development, OPENS= Trade Openness.*

As can be seen from Table 4, the R-squared is above 50% in all the models (and slightly higher in the third and fourth models). This means that the four models have very high goodness of fit or explanatory powers.

The study tests for normality in the distribution of the residuals through the Jarque-Bera approach, with the decision rule being to accept the null hypothesis of existence of normality of the residuals if the Jarque-Bera test statistics' p-value is greater than 0.05 and to reject it if otherwise. Judging from the p-values of the Jarque-Bera statistics, which are 0.891, 0.609, 0.252, and 0.865 in Models 1, 2 3, and 4 respectively, the study, concludes that the residuals in the models are normally distributed. Concerning the existence of heteroscedasticity, it is concluded that there is no heteroscedasticity since the test statistics are 1.554, 1.360, 0.732, and 1.435, with corresponding p-values of 0.285, 0.243, and 0.488, in the four models respectively. The result of the serial correlation test shows that the F- statistics are 2.611, 1.915, 0.732, and 1.435 with p-values of 0.067, 0.455, 0.498, and 0.259, thereby leading to the rejection of the null hypothesis of serial correlation. Finally, the study tests for the presence of multicollinearity, using the computed Variance Inflation Factor (VIF) statistic. The result showed that each of the models is free from multicollinearity.

Figure 1: Relationship and Correspondence between the Quadratic and Threshold Regression Equation Estimates



Source: Author's Computation (2024)

5. Discussion of Results/Implication of Findings

Having evaluated the result of the diagnostic tests in the manner discussed above, the study now proceeds to evaluate the performances of the specific explanatory variables as reported in Table 4.

The coefficient of government expenditure (GEXP) in Model 1, is 0.248, with p-values of 0.015, while the coefficient of the square of government expenditure $(GEXP)^2$ is 0.240 with p-values of 0.013. This implies that the coefficients of government expenditure and its square form are positive and statistically significant in the two models. This observed result is in line with studies like Sunny and Olufemi (2023). To determine the threshold of the effect of government expenditure (GEXP), on economic growth, the study adopts the switching regression framework of Seo and Shin (2016), where GEXP is the threshold variable and r is the optimal threshold parameter, the estimated value of which signifies the turning point in the economic growth effect of the threshold variable. The regression is divided into two regimes based on whether the actual observation on GEXP (threshold variable) is above or below the estimated threshold parameter (r). The regimes are distinguished by the slope's parameters of GEXP, that is, β1 and β2. The coefficient of GEXP in the lower regime (β1) gives the marginal effect of government expenditure on economic growth, when GEXP, is below or equal to the threshold parameter while the coefficient of GEXP, as applicable, in the upper regime (β2) shows the marginal effect of the relative size of the government expenditure on economic growth, when GEXP is above the threshold. A positive sign in the coefficient of GEXP in the lower regime followed by a negative sign in the coefficient of GEXP, in the upper regime indicates an inverted U-shaped relationship and a U-shaped relationship if otherwise (i.e., if there exists a negative sign in the lower regime and a positive sign in the upper regime), either of which confirms the presence of a non-linearity relationship between the government expenditure and economic growth.

In panel A of Figure 1, the marginal effect of the size of government expenditure as a percentage of GDP (denoted by GEXP and measured along the horizontal axis) on economic growth or percentage change in real GDP (denoted by $\frac{\Delta Y}{Y}$ and measured along the vertical axis) is initially rising. This rising phase of the incremental effect on growth continues until it attains a maximum at Point X, beyond where it starts to fall monotonically until it becomes zero or ceases to exist at Point Y and finally gets to the negative territory after this point. In Panel B, how the threshold regression analysis is designed to capture the phenomenon in Panel A is depicted. The phase corresponding to where the incremental effect of GEXP on economic growth is positive in Panel A, i.e. the origin or Point O to Point Y or OXY area in Panel A, is averaged and linearised into a sort of average effect (to the tune of β_1 for every percentage point increase in GEXP up to that Point Y) of GEXP on economic growth, not at a particular point, but within that particular range from Point O at the origin to Point Y (which also corresponds to Point Y in Panel A). Thus, in principle, the area under the OXY curve in Panel A should be the same as the area of rectangle OGHY in Panel B.

A distinct feature of a threshold regression analysis is its identification of a kink (and, hence, break in continuity) which, in the case of Panel B, occurs at point H such that any further increase in GEXP would be having a reduced (this time, negative) averaged and linearised effect on economic growth to the tune of β_2 (or the distance YL) per every percentage point increase in GEXP.

As reported in Table 4. the coefficients of the government expenditure (GEXP) are positive and statistically significant, being 1.538, and -1.019, respectively with corresponding p-values of 0.005, and 0.008, when government expenditure is below the threshold values of 1.538. But when the size of GEXP equals or exceeds this 14.089 threshold, their coefficients become negative and statistically significant, being -1.019 for GEXP, with p-values of 0.008. Using the notations in the above paragraph, the estimate of model 2b is 1.538 with a p-value of 0.005 while that of model 2c is -1.019, with a corresponding p-value of 0.008. Of greater importance is the estimate of the threshold value (r), which is 14.089. This means that it is government expenditures that are below 14.089 per cent of GDP that promote or are conducive to economic growth. The government expenditure that equals or surpasses these thresholds is inimical to growth. This is in line with Armey's Curve postulation of what can be termed "too much of a good" thing.

The coefficient of capital expenditure (CAPEX) in Model 3, is 0.947, with p-values of 0.044, while the coefficient of the recurrent expenditure (RECEX) is 0.546, with p-values of 0.223. This implies that the coefficients of capital expenditure are positive and statistically significant while that of recurrent is insignificant. This observed result is in line with studies like Aluthge, Adamu and Musa (2021).

The coefficient of administration expenditure (ADM) in Models 4, is 2.379, with p-values of 0.012. In the case of the economic services expenditure (ECS), the coefficient is 3.510 with p-values of 0.000. As for the social and community services expenditure, the coefficients are 0.222 with p-values of 0.043. Concerning transfer expenditure, the coefficient is -1.891 with p-values of 0.000. This implies that the coefficients of three functional expenditures are positive and statistically significant while that of transfer expenditure is negative and statistically significant in the model. It is therefore concluded that, while the long-run economic growth effect of each ADMF, ECF and SCF is positive, that of TRANF is negative.

6. Conclusions and Recommendations

Following the findings summarised above, it is concluded that government expenditure (GEXP) has positive effects on economic growth.

Based on the findings, it is concluded that there is an inverted U-shaped effect of the size of government expenditure on economic growth, with an increase in the size of the government total expenditure to GDP (i.e., GEXP) having a positive effect on economic growth up till it attains a threshold value of 14.089 per cent of GDP, and started to have a negative economic growth effect after surpassing this threshold.

Following the findings summarised above, it is concluded that the size of the government capital expenditure (CAPEX) has positive effects on economic growth while the government recurrent expenditure (RECEX) has nil effect on economic growth.

Also, it is concluded that three out of the four functional categories of government expenditure, viz: federal government expenditure on administration, economic services as well as social and community services, have positive effects on economic growth, with the economic growth effect of expenditure on economic services being the greatest and distantly followed by that of the administration expenditure, while the social and community services maintain a distant third position. On the other hand, the fourth category, which is the federal government expenditure on transfers, has a negative effect on economic growth.

The findings have been noted above that the size of government expenditure that does not exceed thresholds of 14.089 per cent of GDP is one of the positive drivers of economic growth while the size of government expenditure beyond these thresholds is inimical to economic growth in Nigeria. Accordingly, it is recommended that policymakers pursue pro-government expenditure policies aimed at increasing the size of the government expenditure up to the thresholds to promote economic growth, but such policies should not make government expenditure surpass these thresholds, as doing so will retard growth. Also, given the observation that capital expenditure has a positive effect on economic growth while recurrent expenditure has nil economic growth effect, policymakers should intensify capital expenditure in preference to recurrent expenditure to promote economic growth.

References

Aluthge, C., Adamu, J, & Musa, A. (2021). Impact of Government Expenditure on Economic Growth in Nigeria, 1970-2019. *CBN Journal of Applied Statistics* Vol. 12 No. 1

Akpan, N. (2005). Government Expenditure and Economic Growth in Nigeria Government expenditure and economic growth in Nigeria: a disaggregated approach.

Asimakopoulos, S. & Karavias, Y. (2015). The Impact of Government Size on Economic Growth: A Threshold Analysis. Granger Centre, University of Nottingham, Discussion Paper No.15/02.

Armey, R. (1995). The Freedom Revolution, Regnery Publishing, Washington.

Armey, R. K. (1995) & Armey, R. (1995). The Freedom Revolution: The new Republican house majority leader tells why big government failed, why freedom works, and how we will rebuild America. Regnery Publishing, Washington, D.C.

Asteriou, D. & Hall, S. G. (2011). "The Breusch-Godfrey LM test for serial correlation". *Applied Econometrics* (Second ed.). New York: Palgrave Macmillan. pp. 159–61

Barlas, A. W. (2020). The impact of government expenditure on economic growth in

Afghanistan. *Journal of Economics and Business*, *3*(2), 1-6.

Barro, R. J. (1990). Government Spending in a Simple Model of Endogenous Growth. The *Journal of Political Economy, 98 (5), 103-125.*

Barro, R. J., & X. Sala-i-Martin. 1992. "Economic Growth." Brookings Papers on Economic Activity 1, 107-58. 1__. 1992b. "Convergence," *Journal of Political Economy* 100, April, 223-5I.

Barro, R.J. (1998). Notes on growth accounting. *Journal of Economic Growth, 4* (2), 119-137.

Central Bank of Nigeria (CBN) (2021). Central Bank of Nigeria Statistical Bulletin. Abuja:

Centre for Economic Policy Research, London (United Kingdom). NBER Working Challenges. Turkey: KSP Book Publishers. 170

Danladi, J. D., Akomolafe, K. J. Olarinde, O. S. &. Anyadiegwu, N. L. (2015). Government Expenditure and Its Implication for Economic Growth: Evidence from Nigeria. *Journal of Economics and Sustainable Development.* www.iiste.org ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online) Vol.6, No.18, 2015

Darko, C. K. (2015). Determinants of Economic Growth in Ghana. https://hdl.handle.net/10419/123098

Dornbusch, R., Fischer, S., & Richard, S. (2011). *Macroeconomics* (Elevent,). New York: McGraw Hill.

Elsevier. (2021). Are there links between institutional quality, government expenditure, and tax in emerging economies: does the BARS curve exist? *International Journal of Social Economics*, Vol. 49 No. 3, pp. 356-371.

Estevez (2021). Classical Growth Theory. UDK: 330.34/35-022.316 JEL classification: B10, B15, Q01 DOI: 10.17818/DIEM/2022/1.10

Fernando, J., (2023). Public Spending. https://www.investopedia.com/contributors/53746/ *Finance, 5(4), 146-154.*

Gupta, R. (2018). The impact of government expenditure on economic growth in Nepal.

Halkos, M. & Paizanos, O. (2015). Fiscal policy and economic performance: A review of the theoretical and empirical literature. https://mpra.ub.uni-muenchen.de/67737/1/MPRA_paper_67737.

Haque, M.E., & Osborn, D.R. (2007). Public expenditure and economic growth: A disaggregated analysis for developing countries. Manchester School, 75(5) 533-556

IMF, (2012). Definition of Capital Expenditure. https://www.imf.org/external/pubs/ft/wp/2012/wp12129.pdf

IMF (2023). Gross Domestic Product: An Economy's All. https://www.imf.org/gdp

Kuznets S, (1973) Modern Economic Growth: Findings and Reflections. The American Economic Review, Vol. 63, No. 3 (Jun. 1973), pp. 247-258. http://www.jstor.org/stable/1914358

Merriam-Webster (2020). Economic Growth. https://en.wikipedia.org/wiki/Economic_growth

Meyer, D. Manete, T. & Muzinduts, P. (2017). The Impact of Government Expenditure and Sectoral Investment on Economic Growth in South Africa**:** https://EconPapers.repec.org/RePEc:srs:jarle0:v:8:y:2017:i:6:p:1842-1853

Nuru, N. Y. & Gereziher, H.Y. (2022), "The effect of fiscal policy on economic growth in Nigeria

Onifade, S.T., Cevik, S., Erdogan, S., Asongu, S. & Bekun, F.V. (2020): An Empirical Retrospect of the Impact of Government Expenditure on Economic Growth: New Evidence from the Nigerian Economy. Journal of Economic Structures, 9, 1-13.

https://doi.org/10.1186/s40008-020-0186-7

Patricia, C., & Izuchukwu, C. (2013). Impact of Government Expenditure on Economic Growth in Nigeria. *International Journal of Business and Management Review, 1(4), 64-71.*

Ricardo (1817). Ricardian equivalence proposition. http://en. Wikipedia. org/

Seo, M. H., & Y. Shin. (2016). Dynamic panels with threshold effect and endogeneity. Journal of Econometrics 195: 169–186.

Springer, Cham. https://doi.org/10.1007/978-3-319-48454-9 5.

Sunny, A. I. & Olufemi, G.O. (2023). Government Expenditure and Economic Growth in Nigeria. *International Journal of Research Publication and Reviews,* Vol 4, No. 1, pp 41-48. DOI: https://doi.org/10.32479/ijefi.10614

Wahyudi, W. (2020). The relationship between government spending and economic growth revisited. *International Journal of Economics and Financial Issues*, *10*(6), 84.

World Bank Group (2020). World Development Indicators. World Bank, Washington, DC; ISBN 978-1-4648-0440-3

Zungu, L.T., Greyling, L. & Sekome, M.S. (2020), Government expenditure and economic growth: testing for nonlinear effect among SADC countries, 1994–2017, *African Journal of Business and Economic Research*, Vol. 15 No. 3, pp. 37-69.

Zungu L.T., & Greyling, L. (2021). Government size and economic growth in African emerging economies: does the BARS curve exist? *Emerald Insight* at: https://www.emerald.com/insight/0306-8293.htm