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AN ANALYSIS OF THE DETERMINANTS OF PUBLIC EXPENDITURE GROWTH IN NIGERIA: EVIDENCE FROM TIME SERIES DATA

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Abstract *This study investigates the determinants of the growth of public expenditure in Nigeria using time series data and an econometric modeling framework. Exploring the reasons why public expenditure growth over time has been the key concern of public sector economists. The persistent increase in government spending has raised concerns about fiscal sustainability and economic efficiency. Using annual time series data, the study investigates the impact of key macroeconomic and demographic variables such as gross domestic product (GDP), oil revenue, population growth, inflation, and public debt on public expenditure in Nigeria. An Autoregressive Distributed Lag (ARDL) Model is employed to analyse the long run relationship between growth in public spending and its determinants factors. The findings reveal that economic growth, oil revenue, and population growth are significant drivers of public expenditure in Nigeria. The study concludes with policy recommendations aimed at improving fiscal discipline and promoting sustainable public spending.*

Keywords Determinants, Public Expenditure, Growth, Nigeria, Time Series

1.0 Introduction

Public expenditure plays a crucial role in economic development, particularly in developing economies where the government is a major provider of infrastructure and social services. In Nigeria, public expenditure has expanded rapidly over the years due to rising population, economic growth, political pressures, and dependence on oil revenue. While increased public spending can stimulate growth and improve welfare, uncontrolled expenditure growth may lead to fiscal deficits, inflation, and rising public debt.

In most of the developing countries, government is viewed as an instrument of change and, hence, the size of government expenditure reveals the magnitude of government involvement in the economy. The shift in the role of government from traditional functions such as provision of

security, administration and law and order to direct intervention in income generating activities like capital investment and distributive role like subsidies and transfers have significantly expanded the scope of governments in many countries across the globe. (Jibir, A. & Aluthge, C, 2019).

The major objective of government is therefore to promote societal welfare by means of appropriate economic, political, social and legal programmes. These programmes, however, have led to expansion in public expenditure size particularly in the developing economies like Nigeria with a weak and uncompetitive private sector. Wagner (1883) was assumed to be the first economist who linked economic progress and population growth as the major factors responsible for the growth of government expenditure using the experience of industrialized welfare states.

The continued debate on the determinants of government size becomes necessary because those determining factors are needed not only for managing fiscal imbalances but also to encourage stability in the economy (Aladejare, 2019; Uchenna & Evans, 2014).

Despite extensive public finance reforms, Nigeria continues to experience rising government expenditure. This study seeks to empirically examine the determinants of public expenditure growth in Nigeria using time series data spanning from 1981 to 2024 using ARDL to determine the long run relationship between growth in the size of government and its determinants using an econometric model. By adopting a quantitative approach, the study contributes to the literature by providing empirical evidence on the key macroeconomic variables influencing public spending dynamics in Nigeria.

2.0 Literature Review and Theoretical Framework

2.1.1 Adolph Wagner Law

The study is anchored on Wagner's Law of Increasing State Activity, which postulates a positive relationship between economic growth and public expenditure. As an economy develops, government functions expand due to increased demand for administrative services, social welfare, and infrastructure. The work by Wagner is now popularly referred as the Wagner law of increasing State activity. A pioneer work before which there was no explanation as to the nature of relation between growth of the economy and size of government activity. The work scientifically attempts to explain the share of GNP taken up by the public sector in some European countries.

The law states: *"an increase in the relative size of the public sector would arise because of rising per capita income, which would induce greater spending on cultural and welfare programmes; greater complexity of legal relationship and communication resulting from an ever more elaborate division of labor; increased problems associated with urbanization; and increased state of intervention in the*

economy because of increases in the optimal size of industrial facilities".

2.1.2 Musgrave (1969) and Rostow (1971)

According to Musgrave (1969) and Rostow (1971) analysis of public expenditure growth over time should be based on the examination of histories of developing economies or nations.

They opined that: "in the early stages of growth and development, public sector investment as a proportion of the total investment of the economy was found to be high. Since by the nature of market system allocation for the social and economic infrastructures such as roads, schools, hospitals, sanitation, etc, would be inefficient, the intervention of the public sector in this regards becomes inevitable, thus enlarging government expenditures".

Musgrave opined that as the ratio of investment to GNP rises in the economy that of the public sector would declines, because government attention would then shift to promotion of education, health, welfare, etc, as the economy matures according to Rostow. Their argument is often described as the "Development Models"

2.1.3 Keynesian Theory

Additionally, the Keynesian theory of public expenditure suggests that government spending responds to macroeconomic conditions, particularly during economic downturns, as a stabilization tool. In resource-dependent economies like Nigeria, fiscal illusion theory also explains how revenue windfalls from natural resources lead to rapid expenditure growth without corresponding improvements in fiscal discipline.

Empirical Review

Ahmed Z., (2018) studied the determinants of public expenditure in Algeria using an ARDL co integration approach. The finding of this study showed that in attendance of structural break of the 1990s, the results provide strong evidence that financial repression factor determines the public expenditure level in short-term and long-term, notably the economic growth factor, public debt, urban population, trade openness and structural break.

Muhia, J. G. (2019) examined modelling the determinants of government expenditure in Kenya. The findings revealed that GDP, population, trade openness, taxation, and inflation are essential determinants of the size of Kenya's government expenditure.

Hambeleleni & Yambo, (2019) examined the assessment of the relationship between public debt, government expenditure and revenue in Namibia the findings revealed that an increase in public debt will stimulate government expenditure and that the tax-spend hypothesis does hold for Namibia.

Adamu J. & Chandana A. (2019) carried out a study on Modelling the determinants of government expenditure in Nigeria. The study employed time series data and an ARDL model, the results of the study

revealed that oil revenue, GDP, population, trade openness, oil price, taxation and inflation are important determinants of the size of Nigeria's government expenditure.

Nyasha S., & Odhiambo N., M. (2019) conducted empirical studies on the relationship between public expenditures and economic growth. The study reviewed previous research assessing the impact of government spending on economic growth. The findings of this review indicate that the effect of public spending on economic growth is not clearly defined. Some studies revealed a positive impact, others a negative impact, and some find no significant effect. This lack of consensus is attributed to factors such as differences in study samples, study periods, methodologies employed, and types of public expenditures analyzed. Despite this heterogeneity, most studies tend to support a positive impact of public expenditures on economic growth. The authors emphasize the importance of the composition of public expenditures, suggesting that different categories of spending may have varying effects on growth. They recommend further analysis to determine which types of expenditures are most beneficial for stimulating economic growth.

Gábor K., and Ádám M. (2020) examined the long-term impact of public expenditures on GDP growth, using data from the Classification of the Functions of Government (COFOG) for 25 European Union countries over the period 1996–2017. The employed three econometric methods (GMM, panel fixed effects, and OLS), they found that expenditures on social protection and general public services have a significantly negative effect on GDP growth, suggesting that inefficient allocation of public resources can hinder economic development. In contrast, expenditures on education and health have a positive long-term impact on growth, indicating that strategic investment in these sectors can stimulate the economy. These results highlight the importance of the structure of public expenditures in supporting economic growth.

Ilugbusi et al. (2021) examined the determinants of government expenditure in Southwest Nigeria by using Panel data estimation techniques and indicated that internal revenue, statutory allocation, and domestic debt are the determinant factors of public expenditure in the Southwest region of Nigeria.

Wandeda et al. (2021) analyzed the efficiency of public spending among Sub-Saharan African countries using panel data for 23 Sub-Saharan African countries covering the period 2006-2018. They concluded that institutional quality and domestic saving significantly influence the efficiency of public spending.

Mohsen S., A. (2022) investigated the determinants of government expenditure in Cote d'Ivoire for the period 1980-2020. The study examined the effect of external debt, national income, inflation, and population on government expenditure, by using the ADF unit root test, Johansen cointegration test, Granger causality test, and CUSUM test. Results from the Johansen cointegration test indicated that there are long-run relationships among the variables. Government expenditure is positively related to external debt, national income, and population, but it is negatively

related to inflation. The population has the biggest effect on government expenditure. The Granger causality test shows that there is a unidirectional short-run causality relationship running from external debt to government expenditure, but there is no evidence of any short-run causality relationship between national income, inflation, population, and government expenditure.

Radica Dishlieska-Gramatikova (2023) explored the impact of public expenditures on inflation and economic growth. The study explains that public spending influences inflation by increasing the overall demand for goods and services, which can lead to demand-pull inflation. To curve inflation, governments often adopt restrictive fiscal policies, such as reducing public expenditures, increasing taxes, and decreasing transfers, to limit overall demand. Regarding economic growth, the article suggests that public spending can stimulate the economy by increasing overall demand, but this effect depends on the nature and efficiency of expenditures. The study suggested that well-targeted public investments can foster economic growth, while inefficient spending can have negative effects. It concluded by stressing the importance of determining the impact of public expenditures on inflation and economic growth, as these macroeconomic variables are essential for formulating effective economic policies.

Guillermo P. (2023) investigated the influence of interest rates on public expenditure growth, reversing the traditional perspective that typically analyzes the impact of public spending on interest rates. The study analyzed employed dataset covering 216 countries from 1972 to 2021, using generalized method of moments (GMM) models to test the robustness of results. The study's major findings show that lower interest rates are associated with, and in some cases lead to, a decrease in the growth of per capita public expenditures.

Hammadouche F., Z. (2024) examined the effect of public spending on inflation in Algeria over the period 1973–2022. The data was obtained from the World Bank and the Algerian Ministry of Finance. Applying the Autoregressive Distributed Lag (ARDL) model, the study found a cointegration relationship between public spending and inflation, indicating a long-term link between these variables. The results suggested that public expenditures significantly impact inflation in Algeria, emphasizing the importance of prudent fiscal management to control inflationary pressures.

Abdelmalek H. et al (2025) analyzed the determinants of public spending in Algeria over the period 1980– –2023, using a Vector Error Correction Model (VECM) to assess the short- and long-term relationships between public spending, gross domestic product (GDP), inflation rate, exchange rate, unemployment rate, external debt, and oil-related taxation. The long-term results reveal a significant positive relationship between public spending and GDP as well as the unemployment rate while inflation, the exchange rate, and oil taxation have a negative impact on public spending.

Some studies show a positive impact, others a negative impact, and some find no

significant effect. This lack of consensus is attributed to factors such as differences in study samples, study periods, methodologies employed, and types of public expenditures analyzed.

Empirical studies on Nigeria suggest mixed results. Some studies find strong support for Wagner's Law, indicating that GDP growth significantly drives public expenditure. Others emphasize the role of oil revenue, population growth, inflation, and public debt. Econometric analyses using time series data have shown that Nigeria's public expenditure is highly sensitive to oil price fluctuations, reflecting the country's heavy reliance on oil revenue.

However, many existing studies differ in methodology, data periods, and variable selection. This study builds on prior research by incorporating multiple determinants into a single econometric framework using time series techniques. This study applies Autoregressive Distributed Lag (ARDL) approach to cointegration, which is more appropriate for a small sample size, to empirically capture the relationship between public expenditures growth and determinants using the variables suggested by economic theories, some empirical studies within and across nations as well as their peculiarities with the Nigerian economy and data availability to find out if this study will corroborate any of the previous studies or otherwise.

3.0 Methodology

3.1 Sources and Types of Data

The study uses annual time series data covering a selected period (1981–2024). Data are obtained from secondary sources such as the Central Bank of Nigeria (CBN) Statistical Bulletin, National Bureau of Statistics (NBS), and World Bank Development Indicators.

3.2 Model Specification

To examine the determinants of public expenditure growth in Nigeria, the model that would be estimated in the course of this study is stated below:

PEX = f (EXTD, INF, PRV, POG) …… (1)
Thus, the model is further specified in econometric form as:

$$LOGPEX_t = \beta_o + \beta_1 LOGPUDT_t + \beta_2 LOGRGDP_t + \beta_3 LOGORV_t + \beta_4 LOGPOG + \beta_5 INF + \varepsilon_t \quad \ldots\ldots (2)$$

Where:

LOG = Natural logarithm
PEX = Public Expenditure
PUDT = Public Debt
RGDP = Economic Growth proxy by Real Gross Domestic Product
ORV = Oil Revenue
POG = Population Growth
INF = Inflation
β_o = Model Intercept
β_1 = Coefficient of Pubic Debt
β_2 = Coefficient of Economic Growth
β_3 = Coefficient of Oil Revenue
β_4 = Coefficient of Population Growth
β_5 = Coefficient of Inflation
ε_t = Error term

3.3 Estimation Technique

3.3.1The Autoregressive Distributed Lag (ARDL) Model Approach to Cointegration Test

The ARDL models for examining the determinants of public expenditure growth in Nigeria are presented as follows;

$$\Delta LPEX_t = \beta_o + \sum_{t=i}^{m} \beta_1 \Delta LPEX_{t-1} + \beta_o + \sum_{t=i}^{m} \beta_2 \Delta PUDT_{t-1} + \beta_o + \sum_{t=i}^{m} \beta_3 \Delta RGDP_{t-1} + \beta_o + \sum_{t=i}^{m} \beta_4 \Delta ORV_{t-1} + \beta_o + \sum_{t=i}^{m} \beta_4 \Delta LPOG_{t-1}$$

$$+ \beta_o + \sum_{t=i}^{m} \beta_4 \Delta INF_{t-1} + \mu_t \text{.....(3)}$$

)

We embark on the estimation by (ARDL) test for the null hypothesis of the non-existence of long-run relationship (lack of co integration). The calculated F-statistics is compared with the Critical Value as tabulated by Pesaran (2001). If F-statistics exceeds or supersedes the upper critical value, then the decision rule will be to reject the null hypothesis of no long-run relationship (no co integration) irrespective of whether the underlying order of integration of the variables is zero or one i.e. I(0) or I(1), whereas if F-statistics falls below a lower critical value, then the null hypothesis cannot be rejected (Pesaran et al, 2001).

3.3.2 Error Correction Model

If variables are co integrated, we should estimate causality relationship under the Vector Error Correction term, in order to absorb both the short run and the long run information.

The ARDL Error Correction Model (ECM) specification is given as:

$$LPEX_t = \alpha + \sum_{t=i}^{m} \beta_0 LPEX_{t-1} + \beta_o + \sum_{t=i}^{m} \beta_1 LPUDT_{t-1} + \beta_o + \sum_{t=i}^{m} \beta_3 RGDP_{t-1} + \beta_o + \sum_{t=i}^{m} \beta_4 LORV_{t-1} + \beta_o + \sum_{t=i}^{m} \beta_4 LPOG_{t-1}$$

$$+ \beta_o + \sum_{t=i}^{m} \beta_4 INF_{t-1} + \beta_5 ECM_{t-1} + \mu_t \text{.....(4)}$$

The model helps to avoid the short run loss of information. The Short run deviations towards the long run equilibrium, is adjusted instantly to the long run equilibrium, therefore, the Error Correction term helps to correct the proportion of disequilibrium in the next period.

3.3.3 Unit Root Test

It is fundamental to test for the statistical properties of variables when dealing with time series data. The other necessary condition for testing unit root test when we apply ARDL model is to check whether the variables enter in the regression are not order two i.e. I(2), which is a type of stochastic process that has received a great deal of attention and scrutiny by time series analysts is the so-called stationary stochastic process.

To ensure reliable result of test for stationarity, the study employs both Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) tests. The testing procedure for the ADF and PP unit root test is specified as follows:

[ADF-test]: $\Delta y_t = \alpha_0 + \alpha_{1t} + \delta_1 y_{t-1} + \sum_{i=0}^{m} \Delta y_{t-1} + \varepsilon_t$ ..... (5)

[PP-test]: $y_t = \beta_0 + \beta_{1t} + \delta_2 y_{t-1} + \epsilon_t$ ..... (6)

4.0 Results and Discussion

4.1 Unit Root Tests and Results

In order to ascertain the degree of integration of the variables used in the study, unit root tests were conducted using standard Augmented Dickey-Fuller (ADF) and Phillips-Perron tests.

Table 4.1: **Unit Root Results for ADF and PP tests at Level and First Difference**

	ADF Tests				PP Tests			
	At Level		At First Difference		At Level		At First Difference	
Variables	T-Statistics	P Values	T-Statistics	P Values	T-Statistics	P Values	T-Statistics	P Values
LPEX	0.0492	0.9520	-4.4167	0.0013*	-0.2454	0.9233	-4.6421	0.0037*
LPUDT	-1.7256	0.4089	-6.9764	0.0000*	-1.2076	0.6601	-6.8981	0.0001*
LRGDP	0.1104	0.9621	-5.4068	0.0001*	0.1960	0.9685	-6.6727	0.0000*
LORV	-1.8880	0.3339	-8.3449	0.0002*	-1.7840	0.3819	-8.3953	0.0003*
LPOG	-1.7129	0.4662	-4.5655	0.0008*	-2.9932	0.0451**	-4.458542	0.0059*
INF	-2.9340	0.0513***			-3.0076	0.0436**		

Source: Researcher's computation using E-Views Version 10.

Notes: *, ** and *** indicate significance and the rejection of null hypothesis at 1%, 5% and 10% for ADF and PP.

Table 4.1 shows the ADF and PP tests conducted for LPEX, LPUDT, LRGDP, LORV, LPOG and INF. The tests were conducted at level and first difference with

intercept. At level ADF and PP tests show INF is stationary at 10% and 5% level of significance respectively. At first difference, both ADF and PP tests show LPEX, LPUDT, LRGDP, LORV, LPOG are stationary at 1% level of significance. Unit root tests confirm that the variables are integrated of mixed order, justifying the use of the ARDL framework. None is of the series is integrated of order I(2).

4.2 ARDL Bounds Tests for Co-Integration

From the unit root tests carried out, we have series integrated of I(0) and I(1), the appropriate model to use is ARDL bound test. The test also confirmed that none of the series is integrated of I(2). To examine the long run relationship among the variables of the study, Pesaran et al (2001) bound procedure was employed.

The calculated F statistic is compared with two critical bound values provided by Pesaran (2001). If the calculated F statistic is greater than the upper bound critical value, the null hypothesis of no long run relationship is rejected, if otherwise the null hypothesis cannot be rejected. Table 4.2 shows the calculated F statistic is greater than both the Pesaran et al (2001) and Narayan (2004) upper bound critical values at 1% and 5% level of significance respectively. This indicates that the null hypothesis of no long run relationship is rejected and concluded that there is coingration relationship among the variables in the long run.

Table 4.2: **Bound Test Results**

Dependent Variable	Explanatory Variables	F-Statistic Value	Co-integration Status
PEX	PUDT,RGDP,ORV,POG,INF	**5.243**	Co-integarted
Null Hypothesis: No long run relationship exists.			
Critical Bound Values	Pesaran et al (2001)		
	Lower Bound	Upper Bound	
1 %	3.41	4.68	
5 %	2.62	3.79	
10%	2.26	3.79	

Source: Researcher's computation using Eview version 10.

4.3 Long Run ARDL Model Estimations

Having confirmed the existence of long run relationship among economic growth and its determinants, the next step is to estimate appropriate ADRL model to find out the long run coefficients as reported in table 4.3.

Table 4.3: **Results of Long Run Estimates**

Dependent Variable is LPEX				
Regressors	Coefficients	Standard Errors	t- statistic	P. Values
LPUBT	0.3520	0.2743	1.2831	0.2203
LRGDP	0.3606**	0.1587	2.2713	0.0394
LORV	0.1490**	0.0764	2.2745	0.0313
LPOG	0.3213**	0.1363	2.2828	0.0386

INF	0.0044	0.0027	1.5886	0.1345

Source: Researcher's computation using Eviews version 10.
Notes: ** indicates significance at 5%.

The long-run estimates show that real GDP exerts a positive and statistically significant effect on public expenditure, validating Wagner's Law in the Nigerian context. This explains that a 1% increase in economic growth will increase public spending by 35%. Oil revenue is also found to be a significant driver of public expenditure growth, reflecting the pro-cyclical nature of fiscal policy in Nigeria. Population growth positively influences public expenditure, indicating increasing demand for public goods and social services. A 1% increase in oil revenue and population growth will spur government expenditure to rise by 14% and 32% respectively. Inflation exhibits a positive but statistically weak or insignificant effect, suggesting that price instability increases the nominal cost of government activities. The coefficient of public debt is positive but statistically insignificant, implying that deficit financing has been used to sustain government spending.

4.5 Diagnostic and Model Stability Tests

To check the standard property of the estimated long run model, some diagnostic tests are conducted. These include the serial correlation test (Breusch and Godfrey LM test) Breusch-Pagan-Godfrey hetroskedasticity test, Normality test and Ramsey Reset test (functional form). In addition the stability of the long run estimates is tested by applying the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) tests. Such tests are recommended by Pesaran et al (2001). In order to reject or accept the null hypothesis, we look into the p values associated with the test statistics. The null hypothesis is rejected if the p-values are smaller than the standard significance level (i.e 5%), if otherwise the null hypothesis cannot be rejected.

Table 4.4: **Results for Post-Estimation Diagnostic Tests**

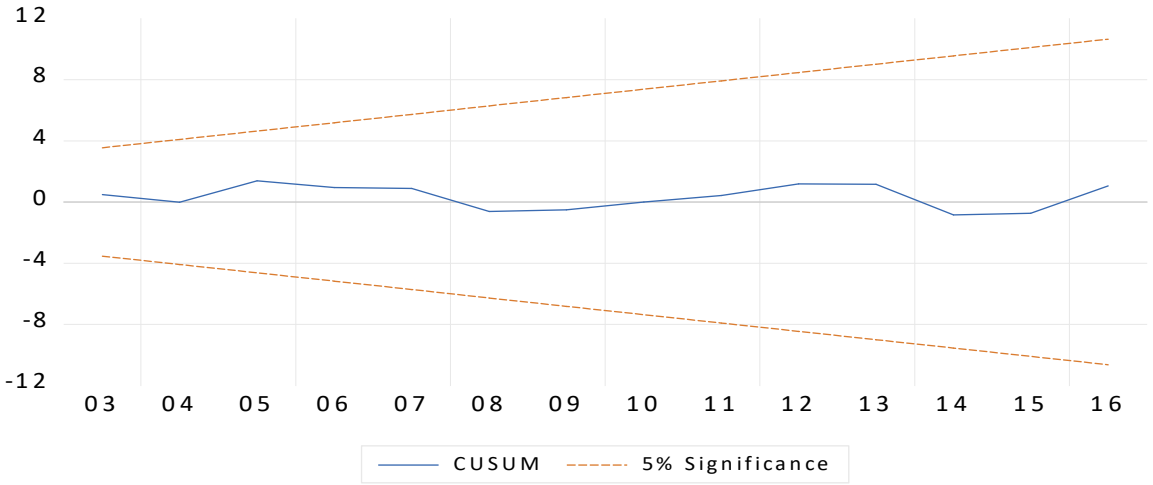
Test Statistic	**P Values**
Breusch-Godfrey Serial Correlation LM Test: Null hypothesis No Serial Correlation	0.868
Breusch-Pagan-Godfrey Heteroskedasticity Test: Null hypotheis Homoskedasticity	0.567
Normality Test	0.443
Ramsey Reset Test: Functional Form	0.275

Source: Researcher's Computation using Eviews version 10.

Table 4.4 shows that the ARDL Model estimated for this study passed all the diagnostic tests conducted. The null hypothesis of no serial correlation cannot be rejected because the F statistic P- value of 0.868 is greater than 0.05, we can, therefore, conclude that the variables used in the estimation of the model are serially uncorrelated. For heteroskedasticity test,

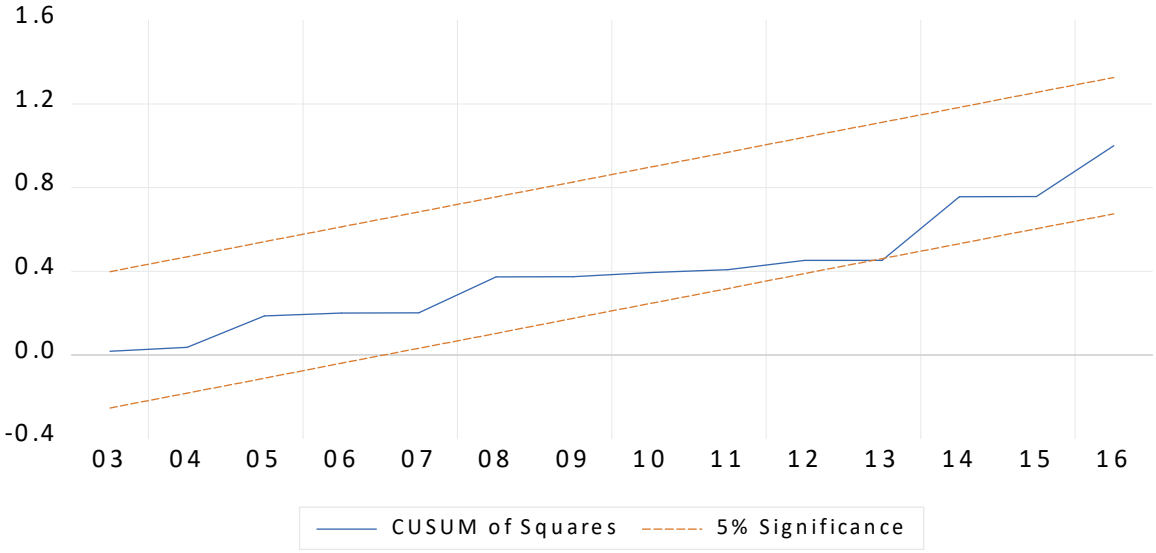
the null hypothesis is that the residuals are homoskedastic, the F statistic p value of 0.567 indicates that we cannot reject the null hypothesis. We therefore conclude the residuals are homoskedastic. The result of normality test shows that the p value associated with Jaque-Berra statistic is greater than p value at 5% level of significance (i. e 0.443> 0.05) The same applies to Ramsey reset test, which test whether the model suffers from omitted variable bias or not. The test result indicates that we cannot reject the Ramsey's test, as the p value of 0.275 is greater than 0.05. This implies the selected ARDL model for Nigeria is correctly specified and the parameter estimates are not biased and can be used for policy recommendation.

Testing of parameter stability using CUSUM and CUSUMSQ



The straight lines represent critical bounds at 5% significance level

Figure 1: Plot of Cumulative Recursive Residuals (A)



The straight lines represent critical bounds at 5% significance level

Figure 2: Plot of Cumulative Sum of Squares of Recursive Residuals (B)

The plot of both CUSUM and CUSUMSQ lies within the 5% range of

significance level, hence the long run and short run estimates are dynamically stable and the results of the estimated model are reliable and efficient.

5.0 Conclusion and Recommendations

This study empirically investigated the determinants of public expenditure growth in Nigeria using time series data by employing an econometric model. The results reveal that GDP growth, oil revenue, and population growth are the major drivers of public expenditure in Nigeria. While increased public spending can promote development, its growth must be carefully managed to ensure fiscal sustainability.

Based on the findings, the study recommends the following;

i. Strengthening public financial management, enhancing transparency, and diversifying revenue sources to achieve sustainable public expenditure growth in Nigeria.
ii. Nigeria's public expenditure growth is largely driven by economic expansion, oil revenue, and demographic pressures. This has important policy implications. Economic growth should be accompanied by improved fiscal discipline to prevent excessive spending.
iii. Revenue diversification is essential to reduce overreliance on oil income. It is crucial to prioritize transparent fiscal policies, this will help reduce corruption, and diversify revenue sources. Nigeria can better manage public expenditure growth and use public funds more efficiently to promote long-term economic and social development
iv. Considering the strong positive relations between population and government spending, it is suggested that government should encourage less family size through awareness, population reduction policies and legislations. Effective population management and long-term planning are necessary to control rising expenditure pressures.
v. There is also need for proper management and use of debt in financing-efficient and productive projects in the economy. Furthermore, borrowing should be channeled toward productive investments that generate economic returns rather than recurrent expenditure.

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