CBN Journal of Applied Statistics Vol. 14 No. 1 (June 2023) 47-91

Modelling the Impact of Government Expenditure on Economic Growth in Nigeria: The Moderating Effects of Oil and Non-oil Revenue

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This study examines the relationship between government expenditure and economic growth and assesses the moderating effects of oil revenue and non-oil revenue in Nigeria from 1981 to 2021. The study uncovered short-term asymmetry in the government expenditure-economic growth nexus while the long-term relationship was symmetric. The study found that government expenditure is a significant determinant of economic growth in Nigeria and that oil and non-oil revenue influences the nexus between government expenditure and economic growth in Nigeria positively. The study recommends efficient management of oil revenue, directing investments during high revenue periods and ensuring fiscal sustainability. Government should also establish transparency, long-term fiscal planning, ensuring budget compliance measures, and an independent fiscal oversight body for consistency in fiscal expansion strategies, strengthening revenue collection, capacity building, and political commitment, restructuring budget allocation to prioritize capital expenditure over recurrent expenditure while ensuring accountability and transparency in project implementation, channeling resources into viable ventures, and improving fiscal management to reduce corruption and ensure efficient capital project execution.

Keywords: Capital expenditure, household consumption expenditure, economic growth, government expenditure, non-oil revenue, oil revenue, recurrent expenditure, and trade balance.

JEL Classification: F41, F43, H27, H50, O47

DOI: 10.33429/Cjas.14123.3/5

1. Introduction

Government expenditure is seen as a fiscal policy tool for driving the wheels of growth in developing economies. It forms one of the macroeconomic policy tools used to avoid shortfalls in production, income, employment, and long-term steady

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growth (Yusuf & Mohd, 2021). It is either expansionary or contractionary depending on the resources at the disposal of the government and the macroeconomic targets. It is expansionary when the government increases its spending and contractionary when the government reduces its spending due to economic and financial constraints or deliberate policy targets. The connection between government revenue and expenditure can be linked to the relationship between income and government spending, as elucidated by Wagner's theory of expanding state activities (Wagner, 1890), while Keynes postulates that an increase in government expenditure increases the level of economic growth through its multiplier effect (Sule, 2019; Keynes, 1936).

Theoretically, while increasing government expenditure accelerates economic growth, and vice versa, there are instances where increasing government expenditure produces no feasible changes in economic growth. In support of the former, Keynes (1936) developed a macroeconomic framework that emphasises the stabilisation of the economy and proposed that government expenditure is beneficial, especially during recessions, and that the magnitude of government expenditure enhances aggregate demand (Ijirshar, *et al*., 2021; Sammut, 2014). However, before Keynesian theory, Classical economists felt that the economy was always at full employment until the Great Depression of 1930s (Ijirshar, *et al*., 2021; Attamah, *et al*., 2015). Consequently, the role of government expenditure has received much empirical attention, yet contestable among scholars. More importantly, in recent times, the nature of the relationship between government expenditure and economic growth, especially in developing countries has remained a debate among scholars. Moreover, the intervening role of revenue sources in the relationship between government expenditure and economic growth has received limited attention from researchers, especially in resource-exporting countries with Dutch disease.

The over-reliance on resource windfalls often lead to budgetary imbalances and fiscal mismanagement in countries characterised by weak institutions and fiscal indiscipline. Thus, resource earnings leading to sudden increase in government revenue could cause inefficient government expenditure and impact the economy negatively. Also, the weak tax systems in some resource-rich developing economies make them vulnerable to dismal economic performance (Eddassi, 2020). The overreliance on

resource revenue due to weak tax system hampers economic diversification, limits investment in non-resource sectors, and constrains government spending on critical areas like education and infrastructure. Thus, to understand the relationship between government expenditure and economic growth, it is imperative to consider the structure of government revenue.

While some scholars have assessed the role of aggregate government expenditure on economic growth (Odubuasi, *et al*., 2020), others have decomposed government expenditure into capital and recurrent expenditure (Aluthge, *et al*., 2021; Nwaeze, *et al*. 2019; Ogar, *et al*., 2019) using a linear approach, while others have subdivided it into different components, including social and community services, economic services, capital expenditures on administration, capital expenditures on transfers, government expenditures on health, and government expenditure on agriculture (Sunny & Olufemi, 2023; Gasasira, 2023; Samuel & Oruta, 2021; Obi, 2020; Duruibe, *et al*., 2020; Olulu, *et al*., 2014; Darma, 2014; Amassoma & Nwosu, 2011; Nurudeen & Usman, 2010). Yusuf and Mohd (2021) further decomposed the effects of capital expenditure and recurrent expenditure on economic growth in Nigeria, while Sumandeep *et al*. (2023) examined the relationship between public revenue, government expenditure, and economic growth in India. Few studies have attempted to determine the asymmetric effects of government expenditure on economic growth in Nigeria using the aggregate government expenditure component (Olaoye, *et al*., 2020; Ijirshar, *et al*., 2021).

This study considers the influence of government expenditure on the growth of the Nigerian economy by decomposing government expenditure into capital and recurrent using linear and nonlinear approaches. This is due to the fact that the reaction of national income to changes in government expenditure, whether it is an increase or decrease, may not necessarily align with the assumptions made by linear models in terms of proportionality. The contribution of this study stems from the application of both the autoregressive distributed lagged (ARDL) and non-linear autoregressive distributed lagged (NARDL) approaches in testing for the presence of short-run and long-run nonlinearities that may exist among the variables and estimating the nonlinear effects of government expenditure as instrumental to achieving economic growth

in Nigeria while considering the moderating effects of the revenue sources. The importance of the moderating effects of revenue sources stems from the fact that oil revenues are characterised as being exhaustible, unstable, unpredictable, and predominantly prone to global shocks, thereby complicating the management of fiscal planning, especially in the presence of global oil price shocks. Baunsgaard (2003) states that over 75% of the government revenue in Nigeria comes from oil earnings that are highly characterised by volatility which impacts both revenue and expenditure. This has constrained fiscal policies and places several uncertainties. On the other hand, non-oil revenue sources appear to be more reliable and stable if properly harnessed.

The study investigates the moderating effects of oil and non-oil revenue on the government expenditure-economic growth nexus in the country, as government spending is influenced by the resources at its disposal. In view of the above, the study assesses the impact of aggregate government expenditure on economic growth in Nigeria and the impact of capital and recurrent expenditure on economic growth using symmetric and asymmetric approaches. This research can guide policies for diversifying income streams, optimizing government expenditure, and fostering sustainable growth. The findings hold relevance for similar resource-rich nations and offer insights into managing revenue, enhancing economic resilience, and achieving long-term development goals.

The rest of this article is organised as follows: Section 2 addresses the literature review, and section 3 describes the methodology. The fourth section discusses and interprets the empirical findings. Section 5 concludes with policy recommendations.

2. Literature Review

2.1 Review of Theoretical Literature

The study hinges on the Keynesian theory of government intervention and Wagner's theory of increasing state activities. The Keynesian theory came due to the Great Depression of the 1930s. According to Keynes' theory, increased government spending accelerates aggregate demand and increases national revenue (Pham, 2023; Michaelides & Papadakis, 2023; Mariati, *et al*. 2022). Keynes urged higher government spending and reduced taxes to raise consumer demand and boost overall eco-

nomic activity. The main idea proposed by Keynes is that government expenditure is a major driver of aggregate demand, implying that raising government spending may boost demand. An increase in aggregate demand may cause firms to expand capital investments and employ more people, boosting employment and reinstating economic growth.

The theory holds the view that an increase in government expenditure increases aggregate output and generates greater revenue. It opposes the concept of excessive savings since it is harmful to the economy, but it upholds the role of consumption as a fundamental tool of growth or national income. The drivers of economic growth as highlighted by Keynes include consumption, investment, government expenditure, and net trade (Michaelides & Papadakis, 2023). This forms the theoretical framework for this study. Keynes theory recommends budget deficit during recession, and this has been criticised because borrowing leads to higher interest rates and financial crowding out.

Adolph Wagner proposed the idea of accelerating state activity. He argued that as income rises, so does government spending (Wagner, 1890). Peacock and Wiseman supported Wagner's law that the expansion of government expenditure is influenced by the collection of revenue, but questioned Wagner's law for emphasising a long-term trend of public economic activity while overlooking the significant 'temporal pattern' or process of public expenditure increase (Peacock & Scott, 2000). They further claim that the theory fails to account for the impact of disasters on government spending. They argued that during times of war, the government raises tax rates and expands the tax structure to obtain more revenues to meet the increase in defence expenditure. As individuals become familiar with the new tax rates and systems, they will remain unchanged after the conflict. As a result, the rise in revenue results in a rise in government spending. However, revenue sources are prone to shocks, and they are characterised by high level of volatility, especially oil revenue. This study is hinged on a concatenated set of theories that help explain the relationship between government expenditure and economic growth while assessing the moderating effects of oil and non-oil revenues. The link between government expenditure and economic growth hinges on the theoretical foundations of Keynes, while the role of

revenue in the nexus between government expenditure and economic growth is explained by Wagner's law of expanding state activities.

2.2 Empirical Review

The relationship between government spending and economic growth has received a great deal of empirical research. Some studies argue that government spending stimulates economic growth, while others argue that it slows it. These disputed findings have been submitted to additional research by disaggregating the growth effects of government expenditure into government capital expenditure and government recurrent expenditure. Several studies have shown either negative or positive growth effects of government capital and government recurrent spending. The variations in the findings might be attributed to the method of government expenditure components, the sensitivity of the findings to changes in a set of control variables, the time period, and the approaches used in terms of linearity and nonlinearity of the relationship. Some of these studies are also cross-sectional, with results that cannot be inferred directly to the Nigerian situation. This paper contains cross-sectional studies on the relationship between government expenditure and economic growth, studies that disaggregated government spending into capital and recurrent expenditure, and studies that tried an asymmetric analysis of the relationship.

Several panel studies have been conducted on the relationship between government expenditure and economic growth. Anjande *et al*. (2020), for example, used the pooled mean group (PMG) approach to assess the influence of government spending on economic growth in 40 African countries from 1970 to 2017. According to the study, more government spending has a strong positive impact on economic growth. Using asymmetric approach, Olaoye *et al.* (2020) assessed the effects of government expenditure on economic growth in ECOWAS. Utilizing the System Generalised Method of Moments on 15 ECOWAS countries from 2005 to 2017, the study found that positive changes in government expenditure exert positive changes in economic growth, while negative changes in government expenditure exert negative changes on economic growth in Nigeria. This also explains the positive relationship between government expenditure and economic growth in ECOWAS. Kimaro *et al*. (2017), Dudzeviit *et al*. (2017), Carter *et al*. (2013), and Wahab (2011) discovered a posi-

tive relationship between government spending and economic growth, meaning that increases in government spending boost growth. Some studies have also revealed a negative influence of government expenditure on economic growth using panel data. They demonstrated that increasing government expenditure reduces economic growth (Odubuasi *et al* 2020; Nurudeen Usman, 2010). Some empirical studies have assessed the impact of government expenditure on economic growth in Nigeria using the aggregate expenditure component of the government in the data analysis. For instance, Okpabi *et al.* (2021), using the Johansen cointegration and error correction model on annual time series data from 1984 to 2015, revealed a positive impact of government expenditure on the growth of the Nigerian economy in the long run and an insignificant negative effect in the short run. Danladi *et al.* (2015) found that government expenditure significantly influences economic growth in Nigeria using the autoregressive distributed lag (ARDL) approach. Other studies that have revealed the positive influence of government expenditure on economic growth in Nigeria include Sunny and Olufemi (2023), Ifarajimi and Oluwole (2017); Okoro (2013); Iheanacho (2016); and Taiwo and Abayomi (2011). In contrast, Odubuasi *et al.* (2020) and Nurudeen and Usman (2010) utilised the autoregressive distributed lagged (ARDL) method on annual data covering 2004 to 2018 and found a negative influence of government expenditure on economic growth in Nigeria. Empirical studies from other countries such as Kapunda and Topera (2013) in Tanzania and Bojanic (2013) in Bolivia found that government expenditure spurs economic growth.

Some previous studies have also disaggregated the effects of government expenditure on economic growth in Nigeria into government recurrent expenditure and government capital expenditure. For example, Ogar *et al.* (2019) employed the VAR approach and found that government recurrent expenditure has a nonsignificant positive influence on economic growth in Nigeria. Similarly, Obasikene (2017) found an insignificant positive influence of government recurrent expenditure on economic growth in Nigeria. Aluthge *et al.* (2021), using the autoregressive distributed lag (ARDL) approach on annual data from 1970 to 2019, found no influence of recurrent expenditure on economic growth in Nigeria. Obasikene (2017) has a similar finding.

Conversely, Oluwatobi and Ogunrinola (2011) found that government recurrent ex-

penditure accelerates the level of national output. Ebipre and Eniekezimene (2020) assessed the impact of government expenditure on economic growth in Nigeria from 1981 to 2016. While using OLS, they found that government recurrent expenditure spurs economic growth.

However, some studies have found a weak positive influence of government capital investment on economic growth in Nigeria. For example, Ogar *et al*. (2019) found that government capital expenditure has a positive but weak effect on economic growth in Nigeria. Similarly, Samuel and Oruta (2021) used annual data from 1981 and 2020 and showed a weak positive influence of government capital expenditure on economic growth in Nigeria. In addition, Aluthge et al (2021) showed a significant positive influence of government capital expenditure on economic growth in Nigeria. On the other hand, applying Nigerian data from 1981 to 2017 and utilising Engel-Granger two-step error correction technique, Saidu and Ibrahim (2019) revealed that government capital expenditure has a detrimental impact on economic growth in Nigeria. In a similar finding, Ebipre and Eniekezimene (2020) also utilised the OLS method on Nigerian annual data from 1981 to 2016. They revealed that increasing government capital expenditure has a negative impact on economic growth. Oluwatobi and Ogunrinola (2011) also revealed that capital expenditure has a detrimental impact on Nigerian economic growth.

In a different approach, Samuel and Oruta (2021) decomposed government expenditure into several components, such as recurrent expenditures on health, agriculture, education, debt servicing, and capital expenditure on social and economic services. While utilising data on Nigeria from 1981 to 2020, the study found that recurrent expenditures on health, agriculture, and education have a negative but weak influence on economic growth, while government recurrent expenditure on debt servicing and road construction exert a positive influence on economic growth in Nigeria. The study also revealed positive growth effects but a weak influence of capital expenditure on economic services and social services in Nigeria. Duruibe *et al*. (2020), using a fully modified ordinary least squares (FMOLS) on data ranging from 1986 to 2018, found that government spending on education, transportation, and communication services has positive and significant effects on economic growth in Nigeria, while

expenditure on defence has negative effect. Duruibe *et al.* (2020) used a vector error correction model approach using data from 1986 to 2016 to disaggregate government spending using a similar method. The study also revealed that government expenditures on administration, economic services, and social and community services exert a strong positive influence on economic growth, unlike government transfers, which have a negative influence on growth. Another study by Okere *et al.* (2019) also considered annual data from 1981 to 2016 and found that government expenditure on administration and economic services are capable of accelerating economic growth in Nigeria. They used the error correction model approach and pairwise Granger causality test for the data analysis. Darma (2014) studied the effect capital expenditure on economic growth in Nigeria from 1980 to 2010 using an OLS approach. The study found that total capital expenditure, capital expenditure on administration, and social and community services, have positive impact on economic growth in Nigeria.

Utilising the ordinary least squares (OLS) method on annual data from 1999 to 2016, Nwaeze *et al.* (2019) found that government recurrent expenditure on social and community services, economic services and transfers have strong positive influence on economic growth, while government expenditure on administration has weak positive influence on economic growth in Nigeria. Olulu *et al.* (2014) also decomposed government expenditure into government expenditures on health and education. They found that the former retards economic growth, whereas the latter has positive but insignificant influence on economic growth. Another study by Amassoma and Nwosu (2011) using annual data from 1986 to 2010 utilised the components of government expenditure (government expenditure on agriculture, education, health, and transport, and communication). They employed a parsimonious error correction regression method and found that expenditure on agriculture has a significant influence on growth, unlike the influence of government expenditure on education, health, transport, and communication, which are statistically insignificant. Samuel and Oruta (2021) studied Nigeria from 1981 to 2020 and disaggregated government expenditure into government recurrent expenditures on agriculture, health and education and found a weak influence on growth in Nigeria. Obi (2020) also assessed the effects of government recurrent expenditure on economic growth using a vector error correction model approach. The study revealed that economic services and so-

cial community services are not drivers of economic growth in Nigeria.

Ijirshar *et al.* (2021) analysed data from 1986 to 2017 to test the asymmetric effects of government spending on economic growth in Nigeria and showed that increase and decrease in government expenditure increases and decreases growth in Nigeria, respectively. This helps to explain the positive link between government spending and economic growth in the country. Yusuf and Mohd (2021) used the nonlinear ARDL technique to examine the impact of government spending on economic growth in Nigeria from 1980 to 2018. The results showed that growth responds asymmetrically to changes in recurrent expenditure. The study, however, neglected the role of oil and non-oil revenue in the nexus between government expenditure and economic growth in Nigeria. This form a gap in the literature that is filled by this study.

This study relaxes the typical assumption of linearity or symmetry as approached by different scholars in prior studies and analyses the asymmetric effects of government spending on economic growth in Nigeria using both linear and nonlinear ARDL methods. The study also analyses the moderating effects of oil and non-oil revenue on the nexus between government expenditure and economic growth in Nigeria, which has not been addressed in earlier empirical studies reviewed. Examining the moderating effects of oil and non-oil revenue on the government expenditure-economic growth link in Nigeria has filled the gap in the literature. This is because Nigeria's heavy reliance on oil revenue makes its economy vulnerable to global oil price fluctuations. Understanding how these revenue sources influence government spending and economic growth is essential for insightful fiscal policy decisions and policy recommendations.

3. Methodology

3.1 Data Description

The study made use of annual time series data from 1981 to 2021 obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin and World Bank. Data were collected on the following variables: real gross domestic product, gross fixed capital formation, household consumption expenditure, foreign direct investment inflows, government expenditure, capital expenditure and recurrent expenditure, trade balance, oil revenue and non-oil revenue. The description of the variables is presented

in Table 1.

Table 1: Data Description and Sources

Variable Name	Definition	Measurement	Source
RGDP	Real Gross Domestic Product	Billions	Central Bank of Nigeria Statistical Bulletin
CONS	Household final consumption expenditure	Billions	Central Bank of Nigeria Statistical Bulletin
GEXP	Government expenditure	Billions	Central Bank of Nigeria Statistical Bulletin
GFCF	Gross fixed capital formation	Billions	Central Bank of Nigeria Statistical Bulletin
FDI	Foreign direct investment, net inflows	Billions	World Development Indicators
CEXP	Government capital expenditure	Billions	Central Bank of Nigeria Statistical Bulletin
REXP	Government rcurrent expenditure	Billions	Central Bank of Nigeria Statistical Bulletin
TBAL	Trade balance	Billions	Central Bank of Nigeria Statistical Bulletin
OILR	Oil revenue	Billions	Central Bank of Nigeria Statistical Bulletin
NOILR	Non-oil revenue	Billions	Central Bank of Nigeria Statistical Bulletin

3.2 Empirical Model

The study is hinged on the theoretical framework of government intervention proposed by Keynes, as well as the examination of aggregate demand across the four sectors. Keynes stated four determinants of national output: consumption, investment expenditure, government expenditure, and net trade. Equation 1 can be stated as follows:

$$Y = C + I + G + (X - M) \tag{1}$$

where Y = aggregate output, C = household consumption expenditure, I = investment expenditure, G = government expenditure, and$(X - M)$ = net trade balance. The study used GDP at constant basic prices for economic growth, investment expenditure decomposed into gross fixed capital formation and foreign direct investment inflows, government expenditure (the aggregate government expenditure in equation

(2), government capital expenditure in equation (3) and government recurrent expenditure in equation (4), the two components of government expenditure in equation (5), the moderating effects of government expenditure and revenue sources (oil and non-oil revenue) with government expenditure variable (GEXP) in equation (6), and the moderating effects of government expenditure and revenue sources (oil and non-oil revenue) without government expenditure variable (GEXP) in equation (7), and the net balance of trade. The study incorporates the constitutive terms which are revenue sources and government expenditure in equation (6). This is in line with the suggestions by Brambor, et al. (2006), who also argued that including the constitutive terms could generate multicollinearity issues. The research employed the centering technique to address the problem (Echambadi & Hess, 2007). However, given the existence of the high multicollinearity in the interactive model, the study estimated the interactive model with the GEXP variable (equation 6) and without the GEXP variable (equation 7) to ensure the robustness of the results. Besides, the constitutive terms in multiplicative interaction models are less problematic and often exaggerated (Brambor, *et al.,* 2006). The study adopted this approach to examine the main effect of government expenditure on economic growth, averaged across all levels of the moderator, while the interactive terms capture how the relationship changes across different levels or conditions of government revenue sources. The models can be written in their functional forms as follows:

$$RGDP_t = f(CONS_t, GFCF_t, FDI_t, GEXP_t, TBAL_t) \tag{2}$$

$$RGDP_t = f(CONS_t, GFCF_t, FDI_t, CEXP_t, TBAL_t) \tag{3}$$

$$RGDP_t = f(CONS_t, GFCF_t, FDI_t, REXP_t, TBAL_t) \tag{4}$$

$$RGDP_t = f(CONS_t, GFCF_t, FDI_t, CEXP_t, REXP_t, TBAL_t) \tag{5}$$

$$\begin{aligned} RGDP_t = f(&CONS_t, GFCF_t, FDI_t, GEXP_t, \\ &GEXP*OILR_t, GEXP*NOILR_t, TBAL_t) \end{aligned} \tag{6}$$

$$\begin{aligned} RGDP_t = f(&CONS_t, GFCF_t, FDI_t, GEXP*OILR_t \\ &, GEXP*NOILR_t, TBAL_t) \end{aligned} \tag{7}$$

where GDP is real gross domestic product (economic growth), CONS is household

final consumption expenditure, GFCF is gross fixed capital formation, FDI is foreign direct investment, GEXP is aggregate government expenditure, CEXP is government capital expenditure, REXP is government recurrent expenditure, TBAL i trade balance, GEXP*OILR is interactive effect of government expenditure and oil revenue, and GEXP*NOILR is the interactive effect of government expenditure and non-oil revenue. Equation (2) examines the impact of aggregate government expenditure on economic growth in Nigeria, equation (3) assesses the effect of government capital expenditure on economic growth in Nigeria, equation (4) assesses the effect of government recurrent expenditure on economic growth in Nigeria, equation (5) assesses the effects of decomposed or disaggregated government expenditure (capital expenditure and recurrent expenditure) on economic growth in Nigeria, equation (6) examines the moderating effects of revenue sources on the government expenditure-economic growth nexus in Nigeria with government expenditure (GEXP), and equation (7) examines the moderating effects of revenue sources on the government expenditure-economic growth nexus in Nigeria without government expenditure (GEXP). The stochastic forms of equations (2), (3), (4), (5), (6), and (7) can be written as:

$$RGDP_t = \alpha_0 + \alpha_1 CONS_t + \alpha_2 GFCF_t + \alpha_3 FDI_t + \alpha_4 GEXP_t + \alpha_5 TBAL_t + u_t \quad (8)$$

$$RGDP_t = \beta_0 + \beta_1 CONS_t + \beta_2 GFCF_t + \beta_3 FDI_t + \beta_4 CEXP_t + \beta_5 TBAL_t + u_t \quad (9)$$

$$RGDP_t = \delta_0 + \delta_1 CONS_t + \delta_2 GFCF_t + \delta_3 FDI_t + \delta_4 REXP_t + \delta_5 TBAL_t + u_t \quad (10)$$

$$RGDP_t = \varphi_0 + \varphi_1 CONS_t + \varphi_2 GFCF_t + \varphi_3 FDI_t + \varphi_4 CEXP_t + \varphi_5 REXP_t + \varphi_6 TBAL_t + u_t \quad (11)$$

$$RGDP_t = \phi_0 + \phi_1 CONS_t + \phi_2 GFCF_t + \phi_3 FDI_t + \phi_4 GEXP_t + \phi_5 GEXP * OILR_t + \phi_6 GEXP * NOILR_t + \phi_7 TBAL_t + u_t \quad (12)$$

$$RGDP_t = \lambda_0 + \lambda_1 CONS_t + \lambda_2 GFCF_t + \lambda_3 FDI_t + \lambda_4 GEXP * OILR_t + \lambda_5 GEXP * NOILR_t + \lambda_6 TBAL_t + u_t \quad (13)$$

where α_0, β_0, δ_0, φ_0, ϕ_0 and λ_0 are intercepts, $\alpha_1 - \alpha_5$, $\beta_1 - \beta_5$, $\delta_1 - \delta_5$, $\varphi_1 - \varphi_6$, $\phi_1 - \phi_7$ and $\lambda_1 - \lambda_6$ are parameter coefficients to be estimated and u_t=stochastic error term. The parameter estimates are theoretically expected to be positive for all the variables. In this study, the marginal effects of government expenditure and oil revenue is $(\phi_4 + \phi_5 OILR_t)$ and the marginal effects of government expenditure and non-oil revenue is $(\phi_4 + \phi_6 NOILR_t)$ in the equation (12). The study used marginal

effects in the interpretations of the constitutive elements instead of the unconditional marginal effects (ϕ_5 and ϕ_6). The hypothesis is that the effect on government expenditure on economic growth in Nigeria depends either on oil or non-oil revenue or both. Therefore, the coefficients estimated in this study are not interpreted in terms of average effect of the change in government expenditure on economic growth in Nigeria. Therefore, the increase in government expenditure is associated with an increase in economic growth when either of the revenue sources (oil or non-oil revenue) is present.

Based on the result of the test of linearity in Table 9, the non-linear models are also considered for this study. Following Schodert (2003), Apanisile & Oloba (2020), and Shin, *et al*. (2014), the NARDL approach can be specified by building new variables that explain instances of government expansionary fiscal policy (increasing government expenditure) and government contractionary fiscal policy (decreasing government expenditure) for aggregate government expenditure, decomposed components of government expenditure and the interactive effects of government expenditure with revenue sources. This involves disintegrating the time series into two, namely, ($GEXP\_POS_t$ and $GEXP\_NEG_t$) for the aggregate GEXP, ($CEXP\_POS_t$,$CEXP\_NEG_t$,$REXP\_POS_t$, and $REXP\_NEG_t$) for the decomposed GEXP, as follows:

$$GEXP\_POS_t = \sum_{j=1}^{t} \Delta GEXP\_POS_t = \sum_{j=1}^{t} \max(\Delta GEXP_t, 0)$$
$$GEXP\_NEG_t = \sum_{j=1}^{t} \Delta GEXP\_NEG_t = \sum_{j=1}^{t} \min(\Delta GEXP_t, 0)$$
$$CEXP\_POS_t = \sum_{j=1}^{t} \Delta CEXP\_POS_t = \sum_{j=1}^{t} \max(\Delta CEXP_t, 0)$$
$$CEXP\_NEG_t = \sum_{j=1}^{t} \Delta \quad CEXP\_NEG_t = \sum_{j=1}^{t} \min(\Delta CEXP_t, 0)$$
$$REXP\_POS_t = \sum_{j=1}^{t} \Delta REXP\_POS_t = \sum_{j=1}^{t} \max(\Delta REXP_t, 0)$$
$$REXP\_NEG_t = \sum_{j=1}^{t} \Delta REXP\_NEG_t = \sum_{j=1}^{t} \min(\Delta REXP_t, 0)$$

where $\Delta GEXP_POS_t$and $\Delta GEXP\_NEG_t$ represent fractional sums of increasing and decreasing government expenditure, respectively; $\Delta CEXP_POS_t$and $\Delta CEXP\_NEG_t$ represent fractional sums of increasing and decreasing government capital expenditure, respectively; $\Delta REXP_POS_t$and $\Delta REXP\_NEG_t$ represent fractional sums of increasing and decreasing government recurrent expenditure, respectively; $\Delta GEXP*$

$OILR_POS_t$and $\Delta GEXP * OILR\_NEG_t$ represent fractional sums of increasing government expenditure as a result of increasing oil revenue and decreasing government expenditure as a result of decreasing oil revenue, respectively; and $\Delta GEXP * NOILR_POS_t$and $\Delta GEXP * NOILR\_NEG_t$ represent fractional sums of increasing government expenditure as a result of increasing non-oil revenue and decreasing government expenditure as a result of decreasing non-oil revenue, respectively.

The average effect of government expenditure in equation (12) is $\frac{\partial GDP}{\partial GEXP} = \phi_4$, while the marginal effect of government expenditure on economic growth when there is oil revenue in the multiplicative interaction equation (12) is $\frac{\partial GDP}{\partial GEXP} = \phi_4 + \phi_5 OILR$ (the assumption is that government expenditure will significantly increase economic growth if and only if the oil revenue increase, and vice versa), and the marginal effect of government expenditure on economic growth when there is non-oil revenue in the multiplicative interaction equation (12) is $\frac{\partial GDP}{\partial GEXP} = \phi_4 + \phi_6 NOILR$ (the assumption is that government expenditure will significantly increase economic growth if and only if the non-oil revenue increase, and vice versa). However, there is significant reductive effect when there is no oil revenue nor non-oil revenue. The reductive effect declines as either oil revenue or non-oil revenue increase in computing for the marginal effects. The asymmetric ARDL (NARDL) model of equations can be specified as:

$$RGDP_t = \alpha_0 + \alpha_1 CONS_t + \alpha_2 GFCF_t + \alpha_3 FDI_t + \alpha_4 GEXP\_POS_t + \alpha_5 GEXP\_NEG_t + \alpha_6 TBAL_t + \sum_{i=1}^{p} \gamma_{1,i} \Delta RGDP_{t-i} + \sum_{i=0}^{q} \gamma_{2,i} \Delta CONS_{t-j} + \sum_{i=0}^{q} \gamma_{3,i} \Delta GFCF_{t-i} + \sum_{i=0}^{q} \gamma_{4,i} \Delta FDI_{t-i} + \sum_{i=0}^{q} \gamma_{5,i} \Delta GEXP\_POS_{t-i} + \sum_{i=0}^{q} \gamma_{6,i} \Delta GEXP\_NEG_{t-i} + \sum_{i=0}^{q} \gamma_{7,i} \Delta TBAL_{t-i} + \varepsilon_t \quad (14)$$

$$RGDP_t = \beta_0 + \beta_1 CONS_t + \beta_2 GFCF_t + \beta_3 FDI_t + \beta_4 CEXP\_POS_t + \beta_5 CEXP\_NEG_t + +\beta_6 TBAL_t + \sum_{i=1}^{p} \gamma_{1,i} \Delta RGDP_{t-i} + \sum_{i=0}^{q} \gamma_{2,i} \Delta CONS_{t-i} + \sum_{i=0}^{q} \gamma_{3,i} \Delta GFCF_{t-i} + \sum_{i=0}^{q} \gamma_{4,i} \Delta FDI_{t-i} + \sum_{i=0}^{q} \gamma_{5,i} \Delta CEXP\_POS_{t-i} + \sum_{i=0}^{q} \gamma_{6,i} \Delta CEXP\_NEG_{t-i} + \sum_{j=0}^{q} \gamma_{7,j} \Delta TBAL_{t-j} + \varepsilon_t \quad (15)$$

$$RGDP_t = \delta_0 + \delta_1 CONS_t + \delta_2 GFCF_t + \delta_3 FDI_t + \delta_4 REXP\_POS_t + \delta_5 REXP\_NEG_t + \delta_6 TBAL_t + \sum_{i=1}^{p} \gamma_{1,i} \Delta RGDP_{t-i} + \sum_{i=0}^{q} \gamma_{2,i} \Delta CONS_{t-i} + \sum_{i=0}^{q} \gamma_{3,i} \Delta GFCF_{t-i} + \sum_{i=0}^{q} \gamma_{4,i} \Delta FDI_{t-i} + \sum_{i=0}^{q} \gamma_{5,i} \Delta REXP\_POS_{t-i} + \sum_{i=0}^{q} \gamma_{6,i} \Delta REXP\_NEG_{t-i} + \sum_{j=0}^{q} \gamma_{7,j} \Delta TBAL_{t-j} + \varepsilon_t \quad (16)$$

$$RGDP_t = \varphi_0 + \varphi_1 CONS_t + \varphi_2 GFCF_t + \varphi_3 FDI_t + \varphi_4 CEXP\_POS_t + \varphi_5 CEXP\_NEG_t + + \varphi_6 REXP\_POS_t + \varphi_7 REXP\_NEG_t + \varphi_8 TBAL_t + \sum_{i=1}^{p} \gamma_{1,i} \Delta RGDP_{t-i} + \sum_{i=0}^{q} \gamma_{2,i} \Delta CONS_{t-i} + \sum_{i=0}^{q} \gamma_{3,i} \Delta GFCF_{t-i} + \sum_{i=0}^{q} \gamma_{4,i} \Delta FDI_{t-i} + \sum_{i=0}^{q} \gamma_{5,i} \Delta CEXP\_POS_{t-i} + \sum_{i=0}^{q} \gamma_{6,i} \Delta CEXP\_NEG_{t-i} + + \sum_{j=0}^{q} \gamma_{7,j} \Delta REXP\_POS_{t-j} + \sum_{j=0}^{q} \gamma_{8,j} \Delta REXP\_POS_{t-j} + \sum_{j=0}^{q} \gamma_{9,j} \Delta TBAL_{t-j} + \varepsilon_t \quad (17)$$

Equations (14), (15), (16) and (17) allow the possibility that the process being modelled can exhibit asymmetric effects of government expenditure in the short run or in the long run.

3.2 Estimation Techniques

The study used both descriptive statistics and econometric tools. The descriptive tools provide insight into the historical background of the behaviour of the data. The econometric tools employed are unit root tests (Ng and Perron, augmented Dickey Fuller (ADF) and Philip Perron (PP)) to test for stationarity of the series. The study utilised ARDL, NARDL, and Fully Modified OLS (FMOLS) methods. The ARDL method is applied to linear time series models. The application of NARDL is because it permits the incorporation of the possibility of asymmetric effects of government expenditure or otherwise on economic growth in Nigeria. The nonlinear approach also provided graphs of cumulative dynamic multipliers used to trace out the adjustment pattern of economic growth following the positive and negative changes in government expenditure. The justification for considering the nonlinear approach is because most of the changes in economic variables have asymmetric effects. However, a linear approach was also used in situations where there are no asymmetries in the relationship. These two approaches are employed irrespective of whether the series are stationary at the level or at first difference (i.e., I(0) or I(1)). This approach can provide consistent estimates of the long-run parameters even in the presence

of weak endogeneity. More importantly, the NARDL models employ partial sum decompositions of the explanatory variables to accommodate asymmetry and non-linearity. The NARDL also provides cumulative dynamic multipliers and guarantees easy interpretation and visualisation of the traverse to an equilibrium position due to a shock (Cho, *et al*., 2021; Shin, *et al*., 2014).

The study used restricted intercept and no trend at the trend specifications for the estimates. This study used the model that restricts the constant to enter the cointegrating relationship (that is, the restricted constant and no trend case). The trend specification gave satisfactory residual diagnostic tests (Jarque Bera normality test, Breusch-Godfrey serial correlation LM test, heteroskedasticity Breusch–Pagan-Godfrey test, Ramsey test). This is because all the postestimation tests were examined on the residuals to determine the distribution pattern, normality, serial independence and whether the residuals were constant.

The study also estimated long-run coefficients of the ARDL model using the fully modified OLS estimator to overcome the asymptotic bias in the OLS estimator, which asymptotically follows a mixed normal distribution. Phillips and Hansen (1990) introduced an estimation method that incorporates a semi-parametric correction to address issues arising from the long-term correlation between the cointegrating equation and innovations in stochastic regressors. This approach, known as the FMOLS estimator, is designed to be asymptotically unbiased and exhibits fully efficient mixture normal asymptotics. As a result, it enables the use of standard Wald tests for asymptotic Chi-square statistical inference. The problem of the null limit distribution of Wald statistic testing restrictions on long-run estimates that do not follow the chi-squared distribution is resolved in this study using FMOLS in estimating the long-run parameters. This could also help in resolving the singularity problem (Cho, *et al*., 2021).

4. Results and Discussions

The descriptive statistics, stationarity test, optimal lag, cointegration test, and vector error correction test were all analysed in this paper. The impulse response and variance decomposition statistics were also examined.

4.1 Descriptive Statistics

Table 2: Descriptive Statistics

	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
RGDP	37,710.48	72,393.67	16,048.31	20,309.83	0.58	1.71
CONS	24,022.91	52,453.03	8,326.31	13,636.39	0.40	1.65
GFCF	8,637.71	15,789.67	5,668.87	1,979.14	1.27	5.60
GEXP	2,494.31	12,164.15	9.64	3,189.90	1.41	4.21
FDI	378.55	1,360.31	0.15	432.89	0.71	2.06
CEXP	551.78	2,522.47	4.10	629.59	1.43	4.70
REXP	1,792.98	9,145.15	4.75	2,401.74	1.51	4.54
TBAL	1,069.12	5,822.59	-7,905.60	2,599.82	-0.53	4.98
OILR	2,533.52	8,878.97	7.25	2,694.56	0.67	2.17
NOILR	1,246.58	6,397.14	2.98	1,650.07	1.34	3.93

Note: RGDP is real GDP, CONS is household consumption expenditure, GFCF is gross capital formation, FDI is foreign direct investment, GEXP is government expenditure, CEXP is government current expenditure, REXP is government recurrent expenditure, TBAL is trade balance, OILR is oil revenue and NOILR is non oil revenue.

From Table 2, RGDP had a mean value of N37,710.48 billion with a standard deviation of 20,309.83. The real gross domestic product recorded the maximum value of N72,393.67 billion in 2021 and the minimum value of N16,048.31 billion in 1984. Both government expenditure and recurrent expenditure recorded the lowest values of N9.64 billion and N4.75 billion, respectively in 1983, while capital expenditure recorded the minimum value of N4.1 billion in 1984. The statistics have shown that government expenditure, capital expenditure, recurrent expenditure, real gross domestic product, household consumption expenditure, and non-oil revenue recorded their maximum values of N12,164.15 billion, N2,522.47 billion, N9,145.15 billion, N72,393.67 billion, N52,453.03 billion, and N6,397.14 billion, respectively in 2021, as it is the most recent year in the study. This implies an upwards trend in the data sets. The result further indicates that the average government recurrent expenditure in Nigeria during the study period is more than three times the average government capital expenditure in the country.

Oil revenue peaked in 2011 due to the increase in the global oil price. The government recurrent expenditure, oil revenue, and household consumption expenditure recorded their minimum values in 1983, while non-oil revenue, capital expenditure, real gross domestic product, and foreign direct investment recorded their lowest val-

ues in 1984. The trade balance has been very unfavourable in recent years, with the highest deficits recorded in 2021. This may also be attributed to the supply chain disruptions, fall in oil price, high cost of production and consequently uncompetitive nature of the Nigerian exports, and the scarcity of forex required to import critical inputs for production. The reason why a fall in oil prices affects trade flows is because Nigerian export trade is dominated by crude oil.

Apart from trade balance, which is negatively skewed, all other data series in the study exhibited positively skewed distributions, with government recurrent expenditure having the highest value. This implies that the data distribution for the variables are tilted towards large values except for trade balance, which is contrary. This explains the high standard deviations observed in the series, with most of them having over 100% dispersion of the data around the mean. The peakedness of the gross fixed capital formation, government expenditure, capital expenditure recurrent expenditure, trade balance, and non-oil revenue are steep, exhibiting a leptokurtic shape. However, the data series for real gross domestic product, household consumption expenditure, foreign direct investment, and oil revenue exhibited a platykurtic shape, implying that the distribution of the variables is widely spread from their mean values with flat slopes.

4.2 Variance Inflation Factors

The study tests multicollinearity among the explanatory variables. The results are presented in Table 3. Explanatory variables do not have multicollinearity problems if the centred variance inflation factor is less than 10; otherwise, there is an incidence of multicollinearity problems in the model.

The results from Table 3 show that there exists no incidence of multicollinearity within the models since the centred variance inflation factors of the explanatory variables are below 10. An exception is made for CONS, CEXP, REXP, GEXP, GEXP_OILand GEXP_NOILR, as their centered variance inflation factors exceed the threshold of 10. Nevertheless, the study excluded the GEXP from the interactive equation for robustness check. Besides, the extent of collinearity is not very severe that could affect the reliability of the estimates especially in multiplicative models (Brambor, *et al.*, 2006). Considering the significant role these regressors (constitutive terms) play in

the models, they were retained and the equation was further estimated without GEXP for robustness check.

Table 3: Variance Inflation Factors

Variable	Coefficient Variance	Uncentered VIF	Centered VIF	Variable	Coefficient Variance	Uncentered VIF	Centered VIF
Equation with Aggregate GEXP				**Equation with Decomposed GEXP**			
CONS	0.020830	46.24469	11.06043	C	9401029.	27.42536	NA
GFCF	0.109323	25.09592	1.222763	CONS	0.018134	48.37609	11.57020
FDI	7.701250	7.350924	4.120968	GFCF	0.091003	25.10235	1.223076
GEXP	0.292550	13.82740	8.500194	FDI	6.395167	7.335019	4.112052
TBAL	0.094078	2.130456	1.815725	CEXP	9.592724	23.31843	13.04690
C	9708615.	28.41557	NA	REXP	1.217795	37.87147	24.10285
				TBAL	0.107682	2.930182	2.497308
Equation with Isolated CEXP				**Equation with Isolated REXP**			
CONS	0.018175	31.24233	7.472286	CONS	0.017173	38.00121	9.088820
GFCF	0.140091	24.90025	1.213229	GFCF	0.109624	25.08255	1.222111
FDI	8.882026	6.564440	3.680061	FDI	7.117712	6.771721	3.796264
CEXP	4.897555	7.671372	4.292209	REXP	0.307248	7.925670	5.044198
C	10584008	23.98580	NA	C	9401029.	27.42536	NA
Equation with Moderating Effects and GEXP				**Equation with Moderating Effects Excluding GEXP**			
CONS	0.014884	63.66511	15.22690	CONS	0.011513	30.82502	7.372478
GFCF	0.056962	25.19347	1.227516	GFCF	0.090906	25.16656	1.226204
FDI	4.698719	8.641143	4.844272	FDI	7.399368	8.517634	4.775032
GEXP	1.270324	115.6819	71.11378	GEXP_NOILR	1.04E-08	11.81502	9.344295
GEXP_O	1.01E-08	24.96216	16.38052	GEXP_OILR	9.99E-09	10.16837	10.16837
GEXP_NO	1.46E-08	26.34790	20.83810	TBAL	0.101341	2.767656	2.358792
TBAL	0.071477	3.118608	2.657898	C	9635888.	34.01218	NA
C	5294451.	29.85595	NA				

Note: RGDP is real GDP, CONS is household consumption expenditure, GFCF is gross capital formation, FDI is foreign direct investment, GEXP is government expenditure, CEXP is government current expenditure, REXP is government recurrent expenditure, TBAL is trade balance, OILR is oil revenue and NOILR is non oil revenue.

4.3 Unit Root Tests

Table 4: Ng and Perron Unit Root Test Results (with Constant)

Variables	MZa	MZt	MSB	MPT	Order
RGDP	-2.396	-0.812	0.338	8.698	
D(RGDP)	-9.303**	-2.091**	0.224**	2.882**	1(1)
CONS	1.450	0.864	0.595	31.255	
D(CONS)	-16.279***	-2.459**	0.151***	2.871**	1(I)
GFCF	-2.396	-1.079	0.450	10.134	
D(GFCF)	-84.667***	-6.480***	0.076***	0.340***	1(I)
FDI	-2.405	-0.867	0.360	8.929	
D(FDI)	-18.071***	-2.988***	0.165***	1.419***	1(1)
GEXP	-1.687	-0.419	0.248	8.432	
D(GEXP)	-19.053***	-3.073***	0.161***	1.336***	I(1)
CEXP	5.163	2.651	0.513	38.347	
D(CEXP)	-16.411***	-2.429***	0.148***	2.988**	1(1)
REXP	-22.947***	-2.989**	0.1302***	2.341**	1(0)
TBAL	-1.040	-0.525	0.504	15.697	
D(TBAL)	-289.69***	-11.99***	0.041***	0.139***	1(1)
OILR	-2.990	-1.138	0.380	8.011	
D(OILR)	-19.435***	-3.112***	0.160***	1.277***	1(1)
NOILR	5.758	3.903	0.677	65.471	
D(NOILR)	-13.986***	-2.735**	0.124***	2.637**	1(1)

Note: *** probabilities<0.01, ** probabilities <0.05, * probabilities <0.1. RGDP is real GDP, CONS is household consumption expenditure, GFCF is gross capital formation, FDI is foreign direct investment, GEXP is government expenditure, CEXP is government current expenditure, REXP is government recurrent expenditure, TBAL is trade balance, OILR is oil revenue and NOILR is non oil revenue.

Before the estimation of the model, all the series were subjected to unit root tests to determine their stationarity levels. The results of the Ng and Perron with constant, Ng and Perron with constant and trend, augmented Dickey Fuller (ADF) and Philip Perron (PP) unit root tests are shown in Table 4, Table 5, Table 6, and Table 7,

respectively. The null hypothesis for all the unit root tests is that an observable time series is nonstationary (that is, has a unit root). The results of the stationary test are presented in Tables 4, 5, 6 and 7.

Table 5: Ng and Perron Unit Root Test Results (with Constant and Trend)

Variables	MZa	MZt	MSB	MPT	Order
RGDP	-3.338	-1.255	0.376	26.566	
D(RGDP)	-17.759***	-2.996**	0.157**	5.202**	1(1)
CONS	-3.998	-1.227	0.307	20.661	
D(CONS)	-18.127**	-2.932**	0.156**	5.074**	1(I)
GFCF	-4.426	-1.440	0.325	20.188	
D(GFCF)	-88.165***	-6.614***	0.075***	1.131***	1(I)
FDI	-9.294	-2.151	0.231	9.820	
D(FDI)	-18.112***	-3.0007**	0.165**	5.082**	1(1)
GEXP	-6.049	-1.563	0.258	14.887	
D(GEXP)	-19.255**	-3.101**	0.161**	4.741**	I(1)
CEXP	-22.11**	-2.987**	0.135**	6.056*	1(0)
REXP	-117846***	-767.61***	0.0006***	0.0001***	1(0)
TBAL	-0.833	-0.386	0.463	48.303	
D(TBAL)	-272.911***	-11.634***	0.042***	0.444***	1(1)
OILR	-9.807	-2.168	0.221	9.4914	
D(OILR)	-19.421**	-3.112**	0.160**	4.717**	1(1)
NOILR	-12.363	-2.071	0.167	9.442	
D(NOILR)	-17.794**	-2.985**	0.134***	4.368**	1(1)

Note: *** probabilities<0.01, ** probabilities <0.05, * probabilities <0.1. RGDP is real GDP, CONS is household consumption expenditure, GFCF is gross capital formation, FDI is foreign direct investment, GEXP is government expenditure, CEXP is government current expenditure, REXP is government recurrent expenditure, TBAL is trade balance, OILR is oil revenue and NOILR is non oil revenue.

The unit root test results from Table 4 to Table 7 show that most of the series were not stationary at levels, as their test statistics are all greater than their corresponding critical values. The null hypothesis was rejected for all series when expressed in first differences, as their test statistics were all less than their corresponding critical values implying that they are integrated of order one I (1). This suggests that all variables have a mean-reverting ability that is initially different.

The residuals test for all the selected models were free of serial correlation, and they exhibited a normal distribution and homoscedasticity. Based on the evidence that the residuals were homoscedastic and there was empirical evidence of no serial

correlation, the ARDL bounds test was estimated for all the equations.

Table 6: ADF Unit Root Test Results

Variable	ADF @ Level	ADF @ First Difference	ADF @ Level	ADF @ First Difference	Order of Integration
	Constant		**Constant and Trend**		
RGDP	0.569521	-3.288313**	-1.975137	-3.538102**	1(1)
CONS	0.803213	-8.030236***	-2.990348	-8.320494***	1(1)
GFCF	-4.30322***		-6.050231***		1(0)
FDI	-1.158176	-7.976297***	-2.519745	-7.892904***	1(1)
GEXP	0.580908	-3.171319**	-0.841432	-8.759145***	1(1)
CEXP	1.454102	-4.251965***	-2.066113	-4.868635***	1(1)
REXP	-0.531267	-11.56919***	-1.909512	-11.63417***	1(1)
TBAL	-1.398696	-11.74382***	-1.067357	-11.67337***	1(1)
OILR	-1.472679	-6.460439***	-2.506086	-6.377323***	1(1)
NOILR	-1.538951	-9.488498***	1.789954	-6.101505***	1(1)

Note: *** probabilities<0.01, ** probabilities <0.05, * probabilities <0.1. RGDP is real GDP, CONS is household consumption expenditure, GFCF is gross capital formation, FDI is foreign direct investment, GEXP is government expenditure, CEXP is government current expenditure, REXP is government recurrent expenditure, TBAL is trade balance, OILR is oil revenue and NOILR is non oil revenue.

Table 7: Phillips-Perron Unit Root Test Results

Variables	Phillips- Perron @ Level	Phillips- Perron @ First Difference	Phillips- Perron @ Level	Phillips- Perron @ First Difference	Order of Integration
	Constant		**Constant and Trend**		
RGDP	1.050947	-3.152798**	-2.258277	-3.455718*	1(1)
CONS	1.549820	-8.174203***	-2.828296	-8.903791***	1(1)
GFCF	-4.186988***		-7.881708***		1(0)
FDI	-0.909061	-8.065419***	-2.518342	-7.977019***	1(1)
GEXP	6.371339	-3.495444***	2.799871	-5.510477***	1(1)
CEXP	2.614997	-8.106674***	-1.166837	-8.768554***	1(1)
REXP	-2.456426	-11.68676***	2.949843	-4.244631**	1(1)
TBAL	-2.018949	-4.870127***	-1.798688	-4.787090***	1(1)
OILR	-1.464497	-6.970350***	-2.582500	-6.859409***	1(1)
NOILR	5.146183	-5.105699***	2.264016	-6.186819***	1(1)

Note: *** probabilities<0.01, ** probabilities <0.05, * probabilities <0.1. RGDP is real GDP, CONS is household consumption expenditure, GFCF is gross capital formation, FDI is foreign direct investment, GEXP is government expenditure, CEXP is government current expenditure, REXP is government recurrent expenditure, TBAL is trade balance, OILR is oil revenue and NOILR is non oil revenue.

4.4 Results of ARDL bounds test

The results of the ARDL bounds tests for all the equations are presented in Table 8.

Table 8: Results of ARDL bounds test

Equation	F-statistic	I(0)	I(1)
Aggregate GEXP Equation (ARDL)	17.803***	2.62	3.79
Aggregate GEXP Equation (NARDL)	19.064***	2.45	3.61
Equation with Isolated CEXP (ARDL)	19.333***	2.62	3.79
Equation with Isolated CEXP (NARDL)	16.599***	2.45	3.61
Equation with Isolated REXP (ARDL)	17.638***	2.62	3.79
Equation with Isolated REXP (NARDL)	15.408***	2.45	3.61
Decomposed GEXP Equation (ARDL)	8.446***	2.45	3.61
Decomposed GEXP Equation (NARDL)	6.665***	2.22	3.39
Moderating Effect Equation with GEXP (ARDL)	26.894***	2.32	3.5
Moderating Effect Equation without GEXP (ARDL)	10.136***	2.45	3.61

Note: *** probabilities<0.01, ** probabilities <0.05, * probabilities <0.1. RGDP is real GDP, CONS is household consumption expenditure, GFCF is gross capital formation, FDI is foreign direct investment, GEXP is government expenditure, CEXP is government current expenditure, REXP is government recurrent expenditure, TBAL is trade balance, OILR is oil revenue and NOILR is non oil revenue.

The results show that all the F-statistics for the linear and nonlinear models that captured aggregated government expenditure (GEXP), decomposed government expenditure (CEXP and REXP), and the moderating effects of the revenue sources-oil revenue on the government expenditure-economic growth nexus [(GEXP_OILR) and non-oil revenues (GEXP_NOILR)] (with and without GEXP) are statistically significant at the 1% level. This implies that there is evidence of a long-run relationship among the variables in all the equations.

4.5 Results from Tests of Asymmetry

The Wald test was used to assess the long-run and short-run asymmetric relationship in the models. Table 9 shows the results. The results show a statistically significant F-statistic of 6.293 (P=0.02<0.05). This implies that there is an asymmetric effect of government expenditure on economic growth in Nigeria in the short run at 5% level of significance (for the aggregate GEXP equation). In contrast, there are asymmetric effects of government expenditure on economic growth in the long run at 10% level of significance.

From the estimates of the equation with decomposed government expenditure, asymmetric effects exist between capital expenditure and economic growth and between recurrent expenditure and economic growth in the short run. However, there is no asymmetric effects between capital expenditure and economic growth, and between recurrent expenditure and economic growth in the long-run given that the F-statistic values are not statistically significant. This implies that asymmetric effects of capital and recurrent expenditure exist on economic growth in Nigeria in the short run, unlike the long run, which is symmetric.

Table 9: Wald test for asymmetry

Test Statistic	Value	Df	Probabili	Test Statistic	Value	Df	Probability
Long-run				**Short-run**			
Aggregate GEXP				**Aggregate GEXP**			
t-statistic	1.792203	22	0.0869	t-statistic	2.508626	22	0.0200
F-statistic	3.211992	(1, 22)	0.0869	F-statistic	6.293202	(1, 22)	0.0200
Chi-square	3.211992	1	0.0731	Chi-square	6.293202	1	0.0121
Equation with Isolated CEXP				**Equation with Isolated CEXP**			
t-statistic	0.921084	26	0.3655	t-statistic	0.921084	26	0.3655
F-statistic	0.848396	(1, 26)	0.3655	F-statistic	0.848396	(1, 26)	0.3655
Chi-square	0.848396	1	0.3570	Chi-square	0.848396	1	0.3570
Equation with Isolated REXP				**Equation with Isolated REXP**			
t-statistic	1.096634	25	0.2833	t-statistic	1.096634	25	0.2833
F-statistic	1.202606	(1, 25)	0.2833	F-statistic	1.202606	(1, 25)	0.2833
Chi-square	1.202606	1	0.2728	Chi-square	1.202606	1	0.2728
Decomposed GEXP (CEXP)				**Decomposed GEXP (CEXP)**			
t-statistic	-0.424103	15	0.6775	t-statistic	2.596905	15	0.0202
F-statistic	0.179863	(1, 15)	0.6775	F-statistic	6.743918	(1, 15)	0.0202
Chi-square	0.179863	1	0.6715	Chi-square	6.743918	1	0.0094
Decomposed GEXP (REXP)				**Decomposed GEXP (REXP)**			
t-statistic	1.561909	15	0.1392	t-statistic	-2.628848	15	0.0190
F-statistic	2.439561	(1, 15)	0.1392	F-statistic	6.910844	(1, 15)	0.0190
Chi-square	2.439561	1	0.1183	Chi-square	6.910844	1	0.0086

Note: *** probabilities<0.01, ** probabilities <0.05, * probabilities <0.1. RGDP is real GDP, CONS is household consumption expenditure, GFCF is gross capital formation, FDI is foreign direct

investment, GEXP is government expenditure, CEXP is government current expenditure, REXP is government recurrent expenditure, TBAL is trade balance, OILR is oil revenue and NOILR is non oil revenue.

4.6 Long-run results

The results of the symmetric long-run impact of government expenditure on economic growth in Nigeria are presented in Table 10, while the results that decomposed GEXP into government capital expenditure (CEXP) and government recurrent expenditure (REXP) are presented in Table 11.

Table 10: Long-Run results with Aggregate GEXP (Dependent Variable=RGDP

Variables	(ARDL) Linear	(FMOLS) Linear
CONS	1.289***	0.999***
	(0.137)	(0.111)
GFCF	-0.856	0.200
	(0.537)	(0.354)
FDI	13.100**	1.548
	(4.387)	(2.122)
GEXP	0.478	1.757***
	(0.5000)	(4.223)
TBAL	-0.584	0.386
	(0.817)	(0.234)

Note: *** probabilities<0.01, ** probabilities <0.05, * probabilities <0.1. RGDP is real GDP, CONS is household consumption expenditure, GFCF is gross capital formation, FDI is foreign direct investment, GEXP is government expenditure, CEXP is government current expenditure, REXP is government recurrent expenditure, TBAL is trade balance, OILR is oil revenue and NOILR is non oil revenue.

The long-run ARDL results from the aggregate GEXP show that household consumption expenditure and foreign direct investment exert positive and statistically significant impact on economic growth in Nigeria, respectively. The result is similar with the ARDL estimates from the equations with government capital expenditure (CEXP) and government recurrent expenditure (REXP) isolated. This implies that increasing household consumption expenditure influences the demand for produced goods, leading to higher income. This conforms to the Keynesian position about the multiplier effect of household consumption expenditure on national income and the findings of Sule (2019).

Foreign direct investment also contributes positively to the growth of the Nigerian economy through location advantage of firms. Government expenditure may exert

a positive but insignificant influence on economic growth in the long run. From the estimates of the Fully Modified OLS, both household consumption expenditure and government expenditure have a strong positive influence on economic growth in Nigeria at the 1% level of significance.

Table 11: Long-Run results with Decomposed GEXP (Dependent Variable=RGDP)

Variable	Decompose GEXP (ARDL)	Decompose GEXP (FMOLS)	Equation with Isolated CEXP (ARDL)	Equation with Isolated CEXP (FMOLS)	Equation with Isolated REXP (ARDL)	Equation with Isolated REXP (FMOLS)
CONS	1.900***	0.927***	1.328***	1.275***	1.299***	0.99***
	(0.356)		(0.128)	(0.105)	(0.143)	(0.118)
GFCF	2.873**	0.244	1.151*	0.195	0.851	0.217
	(1.299)	(0.374)	(0.606)	(0.401)	(0.548)	(0.371)
FDI	-7.100	1.886	10.004***	2.142	13.346***	1.603
	(5.248)	(2.241)	(3.339)	(2.409)	(4.467)	(2.222)
TBAL	2.417***	0.852***	0.233	0.178	0.594	0.479*
	(0.763)	(0.290)	(0.344)	(0.223)	(0.857)	(0.259)
CEXP	23.780*	8.532***	3.164*	2.761		
	(13.320)	(2.741)	(1.657)	(1.771)		
REXP	-3.473	4.792***			0.561	2.388***
	(3.222)	(0.976)			(0.858)	(0.582)

Note: *** probabilities<0.01, ** probabilities <0.05, * probabilities <0.1. RGDP is real GDP, CONS is household consumption expenditure, GFCF is gross capital formation, FDI is foreign direct investment, GEXP is government expenditure, CEXP is government current expenditure, REXP is government recurrent expenditure, TBAL is trade balance, OILR is oil revenue and NOILR is non oil revenue.

The estimates from the linear ARDL model of the decomposed GEXP showed a positive and significant impact of household consumption expenditure, gross fixed capital formation and trade balance on economic growth in Nigeria. Capital expenditure has a weak positive influence on economic growth in Nigeria in the long run based on the results from ARDL. However, from the estimates of the FMOLS, the results show that capital and recurrent expenditure contribute significantly to economic growth in Nigeria in the long run. The significant impact of government recurrent expenditure on economic growth in Nigeria was further confirmed by the estimates of the FMOLS with REXP. The implication is that increasing household expenditure, trade, gross fixed capital formation, foreign direct investment, and government ex-

penditure (both government capital and recurrent expenditure with relatively much of government capital expenditure) accelerate the level of economic activities, thereby increasing national income in the long run.

4.7 Long-run Moderating Effects of Revenue Sources on Government Expenditure-Economic Growth Nexus in Nigeria

The results that explains the moderating effects of oil revenue on government expenditure-economic growth nexus in Nigeria, and the moderating effects of non-oil revenue on government expenditure-economic growth nexus in Nigeria are presented in Table 12.

Table 12: Long-Run Estimates of Linear Models with Moderating Effects of Revenue on Government Expenditure-Economic Growth Nexus (Dependent Variable=RGDP)

Variables	Moderating Effects with GEXP (ARDL)	Moderating Effects with GEXP (FMOLS) Linear	Moderating Effects without GEXP (ARDL)	Moderating Effects without GEXP (FMOLS) Linear
CONS	1.448***	0.845***	1.851***	1.269***
	(0.398)	(0.112)	(0.1997)	(0.105)
GFCF	1.735**	0.0981	1.507**	0.141
	(0.772)	(0.309)	(0.725)	(0.402)
FDI	16.573**	2.973	5.241	3.302
	(8.275)	(1.995)	(3.162)	(2.598)
GEXP	3.063	4.678***		
	(4.491)	(1.048)		
TBAL	1.055	0.304	1.265	0.716**
	(0.804)	(0.245)	(0.754)	(0.303)
GEXP_OILR	0.00128**	0.000233**	0.00107	0.000503***
	(0.000509)	(0.000092)	(0.000395)	(0.0000954)
GEXP_NOILR	0.00175*	0.000635***	0.000521***	0.000304***
	(0.000897)	(0.000112)	(0.000185)	(0.0000973)

Note: *** probabilities<0.01, ** probabilities <0.05, * probabilities <0.1. RGDP is real GDP, CONS is household consumption expenditure, GFCF is gross capital formation, FDI is foreign direct investment, GEXP is government expenditure, CEXP is government current expenditure, REXP is government recurrent expenditure, TBAL is trade balance, OILR is oil revenue and NOILR is non oil revenue.

The findings from the linear models investigating the moderating effects of oil and non-oil revenue on the government expenditure-economic growth nexus in Nigeria,

as presented in Table 12, offer the following findings. The results are compared with the average effects of government expenditure on economic growth in Nigeria in the long-run as presented in Table 10. First, the results reveal that household consumption expenditure, gross fixed capital formation (from the ARDL estimates of the moderating effects with and without GEXP), government expenditure (from the FMOLS estimates of the moderating effects with GEXP variable), trade (from the FMOLS estimates of the moderating effects without GEXP variable), and foreign direct investment (from the ARDL estimates of the moderating effects with GEXP variable) have significant and positive effects on economic growth in Nigeria in the long run. This implies that when the government allocates resources towards consumption expenditure, such as public services and welfare programs, it can stimulate economic growth. Similarly, attracting foreign direct investment contributes positively to the country's economic development by bringing in capital, expertise, and access to new markets. The result also implies that gross fixed capital formation exerts strong influence on economic growth in Nigeria in the long-run.

Second, the study highlights the role of oil revenue in shaping the relationship between government expenditure and economic growth in Nigeria. The average effect of government expenditure on economic growth in Nigeria in the long as presented in Table 10 (ARDL and FMOLS results) is the same with that of Table 12 (ARDL and FMOLS results). However, when oil revenue increases, the marginal effects of government expenditure on economic growth become statistically significant at the 5% level of significance in the long run. This suggests that during periods of higher oil revenue, government spending plays a more pronounced and positive role in driving economic growth and vice versa, *ceteris paribus*. It implies that oil revenue acts as a catalyst, amplifying the impact of government expenditure on economic growth in Nigeria. Conversely, when there is a reduction in oil revenue, the marginal effects of government expenditure on economic growth in Nigeria in the long run decrease significantly at the 5% critical level. This indicates that during periods of declining oil revenue, government expenditure has a less substantial impact on economic growth. In such situations, the country may face challenges in financing public projects and services, which can hinder overall economic development.

Concerning the moderating effects of non-oil revenue on the relationship between government expenditure and economic growth in Nigeria, the study reveals that the marginal effects of government expenditure on economic growth in Nigeria become statistically significant at the 1% critical level (from FMOLS estimatesand ARDL estimateswithout GEXP variable) and 10% level of significance (from ARDL estimateswith GEXP variable) when non-oil revenue increases and vice versa, *ceteris paribus*. This indicates that during periods of higher non-oil revenue, government spending plays a more pronounced and positive role in stimulating economic growth in Nigeria. This finding aligns with the notion that non-oil revenue sources, such as taxes and other domestic income streams, can be stable and reliable sources of government funding. When these revenue streams are robust, the government can allocate more resources to productive expenditures that contribute to economic growth. The study explains the importance of diversifying revenue sources away from heavy reliance on oil income. This implies that a broader revenue base, including robust non-oil revenue streams, can enhance the government's capacity to fund critical economic growth drivers, such as infrastructure, education, and healthcare.

4.8 Short-run results

The study estimated the short-run linear and nonlinear models with aggregate and decomposed government expenditure (GEXP) being captured as explanatory variables, and the results are presented in Table 13.

From the results of all the variants of equations (nonlinear aggregated GEXP model, decomposed and linear equation with isolated CEXP and REXP), consumption spending has a strong positive influence on Nigeria's economic growth. This is consistent with the findings of Sule (2019). In the aggregate GEXP and decomposed GEXP models, FDI has a short-run negative influence on economic growth in Nigeria in the short run. Trade also exert negative impact on economic growth in Nigeria in the short run based on the estimates of the equation with the isolated REXP. A close examination of the short-run estimates of the nonlinear model for aggregate GEXP shows that positive changes in government expenditure exert a positive influence on economic growth in Nigeria, while negative changes exert a negative influence on economic growth.

Table 13: Short-Run Estimates of Aggregate and Decomposed GEXP (Dependent Variable=RGDP)

Variables	**Aggregate GEXP NARDL**	**Decomposed GEXP NARDL**	Equation with Isolated CEXP (ARDL)	Equation with Isolated REXP (ARDL)
Constant	4052.240***	4378.682***	3517.423***	3440.209***
	(260.907)	(440.42)	(222.961)	(**??**)
D(RGDP(-1))		-0.455***		
		(0.124)		
D(CONS)	0.225***	0.188***	0.209***	0.237***
	(0.0287)	(0.0394)	(0.0302)	(0.0313)
D(CONS(-1))		0.255***		
		(0.0488)		
D(GFCF)	0.164*	0.0331	0.0725	0.119
	(0.085)	(0.0832)	(0.0928)	(0.0923)
D(FDI)	-1.222**	-1.666***	-0.813	-0.283
	(0.569)	(0.650)	(0.545)	(0.564)
D(FDI(-1))	-3.072***		-1.826***	-2.127***
	(0.653)		(0.561)	(0.631)
D(TBAL)			-0.0735	-0.2***
			(0.0484)	(0.0515)
D(TBAL(-1))				0.232***
				(0.0561)
D(GEXP_POS)	0.828***			
	(0.268)			
D(GEXP_POS(-1))	2.067***			
	(0.371)			
D(GEXP_NEG)	-2.569**			
	(1.036)			
D(GEXP_ NEG(-1))	-2.428**			
	(0.0213)			
D(CEXP_POS)		-0.241		
		(1.346)		
D(CEXP_POS(-1))		-11.602***		
		(1.830)		
D(CEXP_NEG)		1.468		
		(1.352)		
D(CEXP_ NEG(-1))		9.003***		
		(2.048)		
D(REXP_POS)		0.312		
		(0.677)		

Variables	**Aggregate GEXP NARDL**	**Decomposed GEXP NARDL**	Equation with Isolated CEXP (ARDL)	Equation with Isolated REXP (ARDL)
D(REXP_ POS(-1))		5.777***		
		(0.934)		
D(REXP_ NEG)		-9.494***		
		(2.997)		
D(REXP_ NEG(-1))		-22.137***		
		(3.840)		
CointEq(-1)	-0.300***	-0.0555***	-0.2336***	-0.261***
	(0.023)	(0.00578)	(0.0199)	(0.0232)
R-Squared	0.901	0.936	0.872	0.873
Adjusted R-Squared	0.870	0.897	0.848	0.8447
F-statistic	28.55***	24.085***	36.349***	30.516***
Prob. (F-statistic)	0.0000	0.0000	0.0000	0.0000
Durbin-Watson statistic	2.422	1.758	2.352	2.371
Breusch-Godfrey Serial Correlation LM Test (Prob.)	1.340[0.284]	0.402[0.6767]	1.431[0.2581]	1.661[0.211]
Breusch–Pagan-Godfrey Heteroskedasticity Test (Prob.)	0.244[0.996]	0.220[0.999]	0.3607[0.9606]	0.381[0.9585]
Ramsey RESET Test (Prob.)	0.0128[0.911]	0.768[0.395]	0.0389[0.8452]	0.217[0.6455]

Note: Standard errors are in parentheses (), while the probabilities of residual tests are in squared brackets [ ]. *** probabilities$<$0.01, ** probabilities $<$0.05, * probabilities $<$0.1. RGDP is real GDP, GFCF is gross capital formation, FDI is foreign direct investment, GEXP is government expenditure, CEXP is government current expenditure, REXP is government recurrent expenditure, TBAL is trade balance, OILR is oil revenue and NOILR is non oil revenue.

This implies that there is a strong positive relationship between government expenditure and economic growth in Nigeria in the short run. From the estimates of the decomposed government expenditure, positive changes in capital expenditure exert a negative influence on economic growth in the short run, while negative changes exert positive influence on economic growth, which is contrary to the apriori expectation. This may be attributed to the level of corruption in the government disbursements for investment and capital projects, leaving them incomplete or inefficient, thereby

serving as a leakage in the Nigerian national income stream. Since the expenditures do not yield immediate positive outcomes and are often financed with huge deficits, they hurt the growth of the economy.

The estimates also showed that positive changes in recurrent expenditure positively impact economic growth, while negative changes negatively influence economic growth. The implication is that an increase in recurrent expenditure accelerates economic growth in Nigeria in the short run. The error correction mechanism for the models revealed negative and statistically significant coefficients, implying that there is a tendency of convergence towards long-run equilibrium in the event of initial distortions. The R-squared and adjusted R-squared showed high explanatory power of the explanatory variables in the models.

The study examined the residuals using the Jarque-Bera test for normality of the residuals, the Breusch-Godfrey serial correlation LM test for serial dependence of the residuals, the Breusch–Pagan-Godfrey heteroskedasticity test to determine whether the variances in the residuals are independent of the explanatory variables, and the Ramsey regression equation specification error test (RESET) to check the general specification for the regression models. The presence of serial correlation causes the estimated variances of the regression coefficients to be biased, leading to unreliable hypothesis testing. The results show the absence of autocorrelation among the residuals since the null hypotheses of no autocorrelation are not rejected given that the Breusch-Godfrey serial correlation Lagrange multiplier (LM) test is not significant. The Ramsey RESET also showed that the models are free from misspecification.

4.9 Short-run Moderating results

The study estimated the short-runlinear model capturing the moderating effects of oil and non-oil revenue on the government expenditure-economic growth nexus in Nigeria. The results are presented in Table 14. This study juxtaposes linear findings from the moderating effects of oil and non-oil revenue on government expenditure-economic growth relationship (Table 14) with the average effects of government expenditure on economic growth in the short run (Table 13). This helps identify whether deviations from the average are meaningful. From the short-run estimates, the study found that government expenditure, osehold consumption spending, gross

fixed capital formation, domestic investment, and aggregate government spending, exert significant and positive influences on economic growth in Nigeria in the short-run, while foreign direct investment (FDI) and trade exert significant negative influence on economic growth in Nigeria in the short run.

This means that household consumption expenditure, domestic investment, and aggregate government spending emerge as potent catalysts of short-term economic growth in Nigeria. This conforms to the findings of Sule (2019) who found positive influence of consumption expenditure on economic growth.

The study findings on the moderating effects of non-oil revenue on the relationship between government expenditure and economic growth in Nigeria are statistically significant. When non-oil revenue increases, the marginal effects of government expenditure on short-term economic growth become statistically significant at the 5% critical level. This suggests that during periods of elevated non-oil revenue, government spending exerts a strong and positive impact on stimulating economic growth in Nigeria in the short run. Similar results are obtained for the moderating effects of oil revenue on the government expenditure-economic growth nexus in Nigeria. However, the heavy dependence on oil income has left the economy vulnerable to global oil price fluctuations. By broadening the revenue base through mechanisms like taxation and investments, the government can bolster its capacity to finance crucial drivers of economic growth, including infrastructure, education, and healthcare. The error correction mechanism revealed negative and statistically significant coefficients, implying that there is a tendency of convergence towards long-run equilibrium in the event of initial distortions. The R-squared and adjusted R-squared showed high explanatory power of the explanatory variables in the moderation models.

The residuals were evaluated to determine the validity of the results. The study thus investigated whether the estimates are reliable, stable, and capable of yielding robust statistical inferences. The study examined the Breusch-Godfrey serial correlation LM test for serial dependence, the Breusch–Pagan-Godfrey heteroskedasticity test to determine whether the variances of the residuals are constant over time, and the Ramsey Regression Equation Specification Error Test (RESET) to check for specification errors.

Table 14: Short-run Moderating Effects Estimates of Government Expenditure and Revenue on Economic Growth (Dependent Variable=RGDP)

Variables	**Moderating Effects with GEXP (ARDL) Linear**	**Moderating Effects without GEXP (ARDL) Linear**
Constant	3862.143***	2699.288***
	(189.069)	(273.243
D((RGDP(-1))		-0.326***
		(0.117)
D(CONS)		0.314***
		(0.0344)
D(GFCF)	0.181**	0.132
	(0.0767)	(0.0859)
D((GFCF(-1))		
D(FDI)	-4.4588***	-0.741
	(0.624)	(0.495)
D((FDI(-1))	2.335***	
	(0.456)	
D(GEXP)	1.388***	
	(0.354)	
D((GEXP(-1))	4.488***	
	(0.587)	
D(TBAL)	-0.752***	-0.442***
	(0.0917)	(0.0733)
D(GEXP_OILR)	0.000208***	
	(0.0000219)	
D(GEXP_OILR(-1))	0.0000941***	
	(0.0000176)	
D(GEXP_NOILR)	0.0000753**	0.0000381*
	(0.0000281)	(0.0000197)
D(GEXP_NOILR(-1))	0.0009***	
	(0.000116)	
CointEq(-1)	-0.228***	-0.211***
	(0.0134)	(0.0225)
R-Squared	0.936	0.898
Adjusted R-Squared	0.91	0.875
F-statistic	35.954***	38.856***
Prob. (F-statistic)	0.0000	0.0000

Durbin-Watson statistic	1.706	1.701
Breusch-Godfrey Serial Correlation LM Test (Prob.)	0.241[0.7886]	0.476[0.6273]
Breusch–Pagan-Godfrey Heteroskedasticity Test (Prob.)	0.185[0.9997]	0.385[0.9621]
Ramsey RESET Test (Prob.)	0.243[0.6274]	0.189[0.8513]

Note: Standard errors are in parentheses (), while the probabilities of residual tests are in squared brackets [ ]. *** probabilities<0.01, ** probabilities <0.05, * probabilities <0.1. RGDP is real GDP, GFCF is gross capital formation, FDI is foreign direct investment, GEXP is government expenditure, CEXP is government current expenditure, REXP is government recurrent expenditure, TBAL is trade balance, OILR is oil revenue and NOILR is non oil revenue.

The results show the absence of autocorrelation among the residuals since the null hypotheses of no autocorrelation are not rejected given that the Breusch-Godfrey serial correlation Lagrange multiplier (LM) test possesses probability values that are greater than the 5%. The residuals are also homoscedastic. The Ramsey RESET also showed that the models are free from misspecification.

The study examined the cumulative dynamic multiplier effects. The results are depicted in Figures 1 to 5.

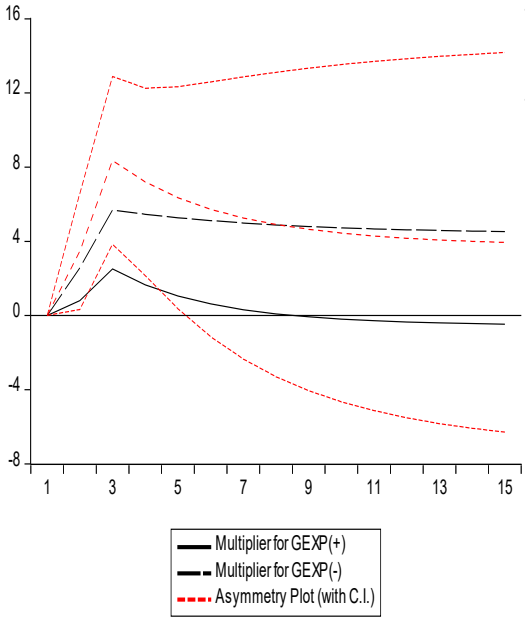

Fig. 1: (GEXP)

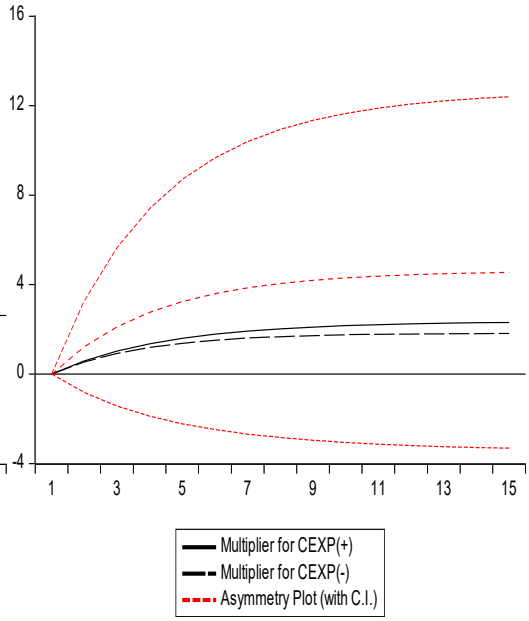

Fig. 2: (Isolated CEXP)

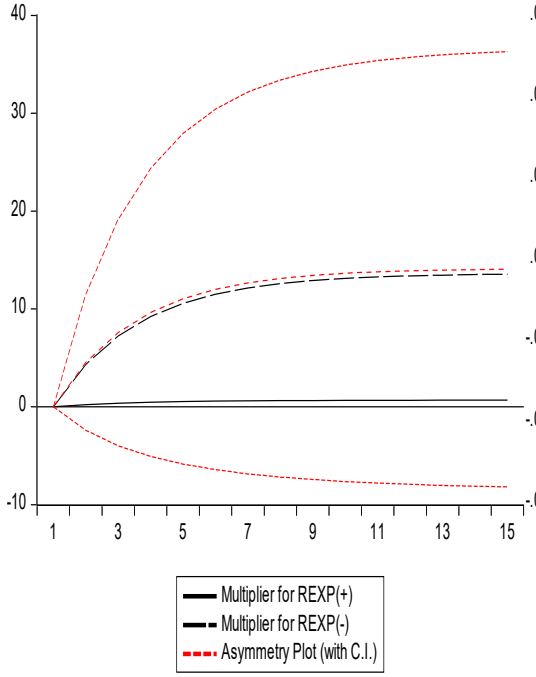

Fig. 3: (Isolated REXP)

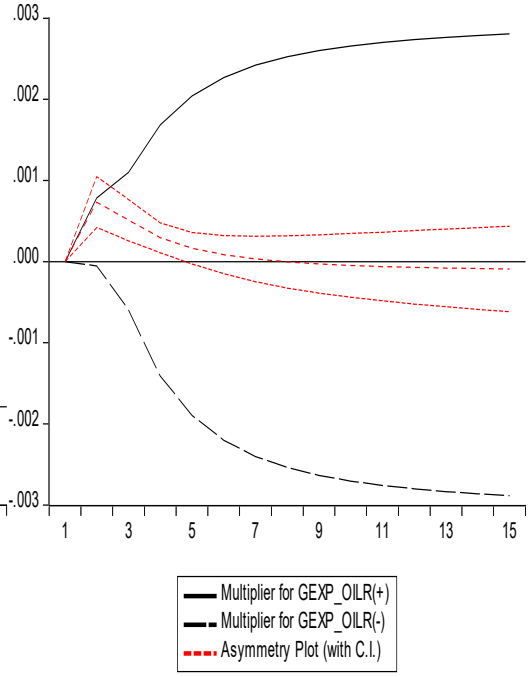

Fig. 4: (GEXP_OILR)

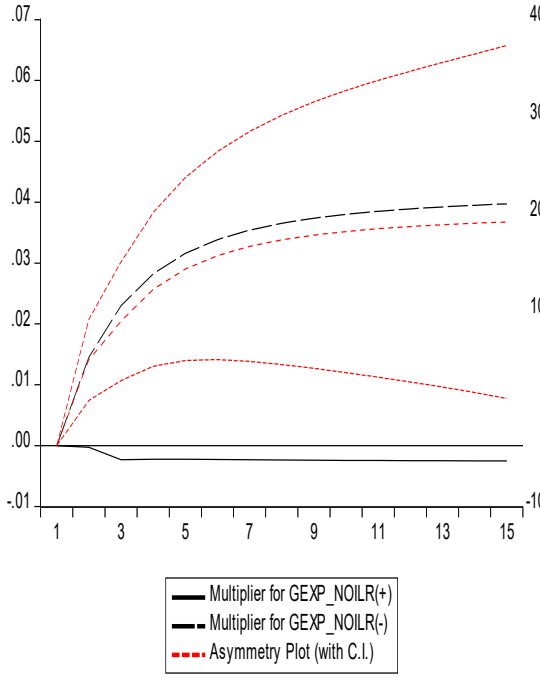

Fig. 5: (GEXP_NOILR)

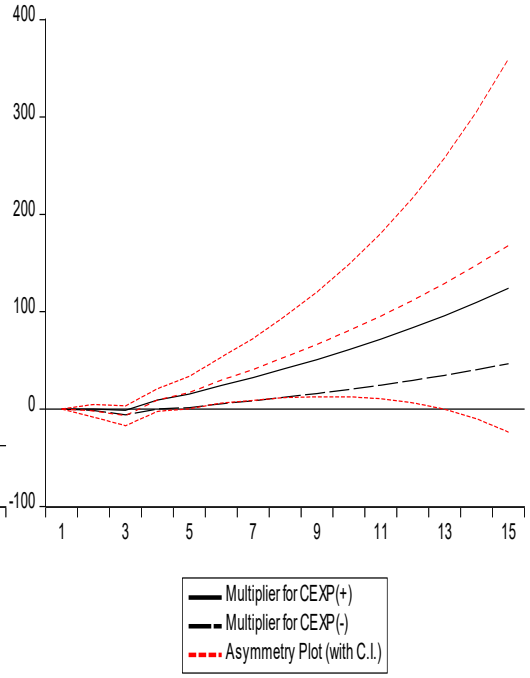

Fig. 6: (CEXP)

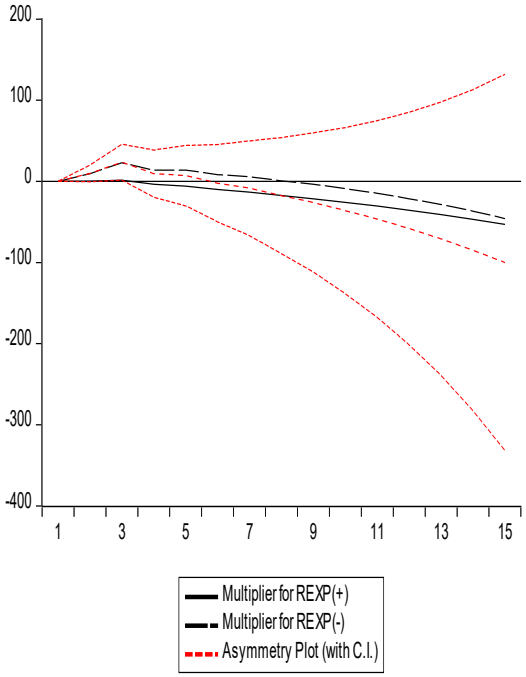

Fig. 7: Dynamic Multipliers for REXP

The figures depict the patterns of economic growth to their new long-run equilibria in response to positive and negative changes in readjusting government expenditure, the decomposed government expenditure and the interaction of government expenditure with oil and non-oil revenue. The asymmetry line (broken red line) represents the difference in the positive and negative effects of multipliers due to government expenditure shocks. From Figure 1, the net response of economic growth to negative and positive changes in government expenditure is positive in the short run, but declines over time. The result is theoretically plausible and corresponds to a priori expectations based on Keynesian economics. Using the isolated CEXP and REXP, the net effect of the changes is positive throughout the periods as presented in Figures 2 and 3.

The results derived from the dynamic multiplier in the moderating effects model reveal that when examining the influence of government expenditure on economic growth concerning oil revenue fluctuations, the study observed that positive shifts in the moderating effects, occurring alongside increased oil revenue, yield positive

results. Conversely, when oil revenue decreases, this relationship turns negative. The net impact of oil revenue changes on the government expenditure-economic growth connection is initially positive in the short term but gradually dwindles, ultimately becoming negative in the long term. This observation reflects the inherent volatility of oil revenue and its impact on the relationship between government expenditure and economic growth in Nigeria. Conversely, there is a statistically significant net positive effect stemming from changes in the moderating influence of non-oil revenue on the government expenditure-economic growth nexus in Nigeria. This explains the importance of diversifying revenue sources away from oil, as it enhances the government's ability to foster economic growth more consistently and sustainably.

According to the dynamic multiplier findings, the study can discern distinct effects on economic growth based on changes in government expenditures. Figure 6 illustrates a positive net effect resulting from changes in government capital expenditure, indicating that increased investments in infrastructure and long-term development have a favourable impact on economic growth in Nigeria. On the other hand, Figure 7 portrays a contrasting scenario where changes in government recurrent expenditure yield a negative net effect on economic growth in Nigeria. This suggests that excessive spending on recurrent items, such as salaries and routine operational costs, might not be conducive to sustained economic growth. On average, the net effect of government aggregate expenditure on economic growth in Nigeria yields a positive effect as presented in Figure 1. These results emphasize the importance of a balanced fiscal approach. While investing in capital projects can stimulate economic growth, careful management of recurrent expenses is necessary to maintain fiscal discipline and ensure long-term economic stability. Achieving this equilibrium is essential for fostering robust and sustainable economic growth in Nigeria especially in the long-run.

5. Conclusion and Policy Recommendations

The study concludes that government expenditure is crucial to the growth trajectory of the Nigerian economy, and that oil and non-oil revenue significantly shape the relationship between government expenditure and economic growth. Higher oil revenue amplifies the impact of government spending, while lower revenue dimin-

ishes it. Diversifying revenue sources away from oil is crucial for economic stability. Other driving factors of economic growth are household consumption expenditure and foreign direct investment (FDI) in the long run and short-run, while underlining the need for government allocation and investment attraction.

The study recommends that the Nigerian government should reduce the heavy reliance on oil revenue by diversifying income sources. They should emphasize tax reforms and efforts to increase non-oil revenue. A broader revenue base will provide more resources for government spending on growth-enhancing projects. More so, the government should maintain a balanced fiscal approach by investing in both capital and recurrent expenditure. While capital expenditure can stimulate economic growth, efficient recurrent expenditure is essential for fiscal discipline and long-term economic stability. In addition, the government should develop a robust mechanism for managing oil revenue changes. When oil revenue is high, the government should prioritize investments in critical sectors. During periods of lower oil revenue, they should implement measures to ensure fiscal sustainability and minimize disruptions to public services and projects.

The study also recommends that it is crucial for the Nigerian government to maintain a consistent approach and guarantee not just the formulation but also the complete execution of fiscal expansion strategies. This can be done by establishing a transparent, long-term fiscal plan aligned with economic goals, enforcing fiscal discipline through budget compliance measures, strengthening revenue collection with tax reforms and anti-corruption measures, and creating an independent fiscal oversight body. Capacity building, stakeholder engagement, and political commitment are also essential. Regular updates to the public debt management strategy and performance-based budgeting help ensure effectiveness. These steps, supported by strong leadership, can foster a culture of fiscal responsibility and enhance the likelihood of successful fiscal expansion strategy implementation, driving sustainable economic growth. These strategies should aim to foster sustainable growth in the non-oil sector by creating favourable conditions that enable domestic businesses to meet international standards. Additionally, to boost the real gross domestic product growth, the drive for self-sustainability should be pursued through entrepreneurial trainings to equip citi-

zens to not only source for their own means of livelihood but also eventually grow such businesses to boost economic growth while meeting external demands. With tax revenue being another major source of revenue in Nigeria, deliberate actions should be taken to improve revenue collection.

To ensure that government expenditure as a tool for economic growth yields better results, the Nigerian government's budget allocation should be restructured such that its spending priority is on capital expenditure rather than on recurrent expenditure. This can be done by prioritizing capital expenditure over recurrent expenditure and implementing a budget restructuring that allocates a higher percentage of the budget to infrastructure development, education, healthcare, and job-creating projects. This shift will foster economic growth, reduce dependency on recurrent spending, and enhance long-term fiscal sustainability. More so, the government expenditure should be carefully managed to avoid inefficiencies. Focus on productive spending in areas like infrastructure, education, and healthcare. Implementing measures to reduce corruption and ensure that capital projects are completed efficiently.

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