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MODERATING IMPACT OF GOVERNMENT EXPENDITURE AND OIL PRICE CHANGES ON INFLATION IN NIGERIA: AN ARDL APPROACH

MODERAÇÃO DO IMPACTO DAS DESPESAS PÚBLICAS E DAS VARIAÇÕES DO PREÇO DO PETRÓLEO NA INFLAÇÃO NA NIGÉRIA: UMA ABORDAGEM ARDL

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Abstract
This study explores the moderating effect of government spending and oil price changes on inflation in Nigeria from 1986 to 2024, using annual data. Inflation is measured by the Consumer Price Index, while the main explanatory variables include the official exchange rate, broad money supply, oil price, real interest rate, and an interaction term between government expenditure and oil price. An ARDL estimation technique was used and the ADF Unit root tests confirm that all variables are non-stationary at levels but stationary at first difference, suggesting they are integrated of order one. The bounds test reveals a long-run relationship among the variables. In the long run, the interaction term has a positive and significant effect on inflation (coefficient = 0.7906), indicating that rising oil prices and government spending together increase inflation. Oil price alone reduces inflation in the long run (-0.5096),

Resumo
Este estudo analisa o efeito moderador dos gastos públicos e das variações dos preços do petróleo sobre a inflação na Nigéria no período de 1986 a 2024, utilizando dados anuais. A inflação é medida pelo Índice de Preços ao Consumidor, enquanto as principais variáveis explicativas incluem a taxa de câmbio oficial, a oferta monetária ampla, o preço do petróleo, a taxa de juro real e um termo de interação entre os gastos do governo e o preço do petróleo.
Foi utilizada a técnica de estimação ARDL, e os testes de raiz unitária ADF confirmam que todas as variáveis são não estacionárias em nível, mas estacionárias na primeira diferença, sugerindo que são integradas de ordem um. O teste de limites (bounds test) revela a existência de uma relação de longo prazo entre as variáveis. No longo prazo, o termo de interação apresenta um efeito positivo e significativo sobre a inflação (coeficiente = 0,7906), indicando que o aumento

while the exchange rate is positively related to inflation (0.3437), and the real interest rate negatively impacts inflation (-0.0325). In the short run, oil price increases reduce inflation, but higher government spending during oil booms reverses this effect. The error correction term suggests that 33% of deviations from equilibrium are corrected annually.

Keywords: Inflation. Government Expenditure. Oil Price. Exchange Rate. ARDL. Nigeria.

conjunto dos preços do petróleo e dos gastos públicos eleva a inflação. O preço do petróleo, isoladamente, reduz a inflação no longo prazo (-0,5096), enquanto a taxa de câmbio está positivamente relacionada com a inflação (0,3437), e a taxa de juro real impacta negativamente a inflação (-0,0325). No curto prazo, aumentos no preço do petróleo reduzem a inflação, mas maiores gastos públicos durante períodos de alta do petróleo revertem esse efeito. O termo de correção de erros sugere que 33% dos desvios em relação ao equilíbrio são corrigidos anualmente.

Palavras-chave: *Inflação, gastos públicos, preço do petróleo, taxa de câmbio, ARDL, Nigéria.*

1 INTRODUCTION

Inflation remains a persistent challenge for countries across the globe, impacting both developed and developing economies. However, developing countries often face more severe inflation problems. High inflation erodes the purchasing power of households and harms economic stability by making goods and services more expensive. It also dampens trade competitiveness as countries with higher inflation see their goods priced out of international markets. This can lead to reduced job creation, slow economic growth, and diminished government revenues. For these reasons, economic managers strive to keep inflation at manageable levels to ensure sustainable economic development (Asekunowo, 2016). In Nigeria, inflation has remained a significant issue for decades, with both internal and external factors influencing its persistent rise.

Throughout its recent history, Nigeria has been faced with relatively high inflation. Since the 1970's, inflation in Nigeria has mostly been double digits, even reaching 80% in 1994 (Asogu, 1991; Rapu *et al*. 2016). Even core inflation, which eliminates the most volatile food and energy prices, has remained high in Nigeria, most notably with spikes such as 2003's 35% and 34.8% in November 2024 (Oyadeyi *et al*. 2025). These statistics illustrates that Nigeria is, regardless of the numerous changes to its monetary policies funnel, is still battling with inflation. Currently, the high inflation in

the country is undermining its economic stability, and thus more aggressive monetary policies are called for.

It is incontrovertible that the factors responsible for the inflationary trend in Nigeria are divers, with both external and internal factors at play. The external factors are global fluctuations in the price of oil and exchange rate of Naira to other currencies including the US Dollar. As an oil dependent economy, Nigeria is oil dependent and its economy far more in relation to the changes in the global oil prices. A rise or drop in oil prices creates a gap which ultimately translates to Nigeria's oil revenue, which percolates to inflation. Moreover, a depreciation in the Naira raises the cost of imports which consequently increases the inflation rate of the entire economy at a greater fraction (Musa & Maijama'a, 2021). Internally, government expenditure is a major contributory factor as far as inflation is concerned. The uncontrolled government expenditure increases inflation through the rise in money supply due to deficit spending, debt financing, and new money creation (Akpan & Aniefiok, 2023; Valogo *et al,* 2023).

In Nigeria, government expenditure has been shown to interact with inflation differently. The government aims to promote growth along with improved public services like healthcare, education, and infrastructure, and this is achieved through public spending (Ahuja & Pandit, 2020). Public spending, however, is financed with either borrowed money, printed money, or (in most scenarios) money with no defined value, all of which can lead to inflation unless there is a gain in productivity. In this case, the recent removal of fuel subsidies has Correlatively increased spending by the government. Also, there are concerns over the inflationary effects of the government spending, which in the cited case is spending about N53 trillion by the year 2025. The budget in 2015 was estimated to be about N12.1 trillion, which in turn has led to increased inflation in Nigeria (Nnachi *et al*. 2023; Koreshkova 2006).

Inflation in Nigeria is sensitive to oil prices. Nigeria is a top oil exporter and funds government expenditures using oil revenues. A rise in Nigeria's global oil price leads to an increase in revenue as well as domestic demand which fuels inflation. A fall in oil prices, on the other hand, would lead to deficits and economic instability, both of which worsen inflation. Other authors have identified oil price shifts as a major driver of inflation in oil-exporting countries (Kathuria & Sabat, 2020; Kudabayeva *et al*., 2024). Nigeria exemplifies the paradoxical nature of the oil price and inflation relationship;

increasing oil prices tend to push up inflation as a result of higher production costs, also known as cost-push inflation.

The literature also has a recurrent issue concerning the importance of government expenditure and oil prices in determining the inflation rate. Some case studies tend to suggest that there is no direct relationship between government expenditure and inflation (Dikeogu, 2018; Imoisi *et al*, 2023), while others argue the converse but only in the case of extremely high oil prices and severe fiscal deficits (Kinda, 2012; Zhang, 2022). The literature on oil prices and inflation has also produced mixed results, with some studies arguing that the effects are significant, while others argue the effects are weak, or almost non-existent (Augustine & Umoh, 2023). Such discrepancies in the literature only serve to frustrate policymakers as they attempt to craft fiscal and monetary policy that controls inflation.

The problems caused by inflation in Nigeria have real social and economic implications. Inflation diminishes the purchasing power of constituencies, lowers living standards, and adds to disruptions to business activity. Even more, the current climate of inflation likely dissuades not only foreign, but domestic, investments critical to fostering sustaining growth. Udoh and Kokoette (2023) contend that the current inflation in the region is the worst since the 1980s. Failure to manage the economic situation effectively will further increase the chances of inflation what will become a more substantive menace. This research seeks to address the lack of a cross-analysis of government expenditures and oil price movements in relation to inflation, thereby suggesting alternative approaches to fiscal oil management to capture the policies appropriate for the region.

The main contribution of this study is the analysis of the interaction between government expenditure and oil prices as costs of inflation in Nigeria. Few previous studies have considered the effects of these factors separately, l*et al*one their combined effect on inflation. This investigation aspires to enhance knowledge of the interaction between government spending, oil prices and inflation to aid policymakers in averting undue inflation in Nigeria. This study will shed light on the impact of government expenditure as an inflationary counter-balance to the increase in oil prices, thereby improving the empirical analysis of the inflationary impact of public spending on the economy of Nigeria.

2 LITERATURE REVIEW

2.1 Government spending and inflation: relationship and transmission channel

The effect of inflation on economic development has received considerable attention both in theory as well as in practice. Most economists agree that high inflation diminishes economic growth, yet the reason of inflation is still widely discussed. Nguyen (2016) suggests that the underlying causes of inflation are numerous and multifaceted, involving very different ideologies. Fischer *et al* (2002) undertook an extensive cross-country study of 94 countries from 1960 to 1995 and concluded that episodes of hyperinflation, and particularly those that exceed an annual rate of 100%, have a considerable negative impact on economic development. Their study highlights the consequences of out-of-control inflation on development which emphasizes the necessity of appropriate policies to control inflation.

Inflation dynamics can be understood through three principal frameworks: the monetary approach, the fiscal approach, and the public finance approach. Friedman claimed that inflation was a monetary issue, and that there was a money supply inflation, Friedman's conclusions were supported by Sargents examination of fiscal and monetary dominance and the indirect deficits inflationary process through money creation. Evaluative literature continues to build affirmation and consensus, attributing positive effects to fiscal and monetary policies in curbing inflation. The fiscal approach inflation, taxes, and expenditures, and ne of public finance inflation Sphinx due to public policy attempts to maximize public revenue through inflation tax or seigniorage.

According to public finance theory, the government, when constrained in the capacity to borrow, may print money to finance expenditures which value results in inflation of the respondent's economy. This process is termed as seigniorage. With seigniorage, the government can now create neo money and spend it which in turn generates government revenue without taxation. Specifically, the CBN's "Ways and Means" provision is an example of how the government is able to generate inflationary revenue in Nigeria. This is especially true when there is a revenue shortage and there is increased expenditure. Money created in this manner enables the government to fulfill its budgetary expenditures without applying the orthodox tax regime and adds to inflationary

Koreshkova (2006, p. __). From the Koreshkova (2006) work it is reasonable to suggest that the government is able to finance real public expenditure by creating currency in circulation and this is then used to explain inflationary gaps in an economy as seigniorage and deficit finance public expenditure. Phelps (1973) and Koreshkova (2006) have underlined the same conclusions.

The lack of significant developmental progress in Nigeria despite the continued increase in government spending over the years has baffled scholars (Olaide & Ranmilowo, 2023). Economically meaningful spending has been allocated towards self-serving political enterprises over the years, and spending towards economically meaningful development has been sidelined. Insufficient investments in infrastructural and capacity-building projects in Nigeria leads to inefficiencies in the transport, energy, and market regulation cross-sectors. the result is a set of atypically high prices for the offered goods and services stemming from structural inflation, which is a byproduct of monetary and fiscal policy inflation, and poor Akinkuotu (2025). This also illustrates the interaction of fiscal policy and structural policies inflating the country's inflation.

The budgetary appropriation cycle of Nigeria has shifted its focus to include larger projects since 1985. According to Akobi *et al*. (2021), in 1984 5 billion Naira was allocated to the Nigerian budget. By 2024, the national budget is expected to grow to 30 trillion Naira. There has been considerable 15-fold increase in the annual budget. This is spending of the Governments of Nigeria continues to rise more each day. Akobi *et al*. even tried to put the Gov Annual spending in 2021 to more than 41 trillion Naira (2021) and its expenditure multiplier to 4.85. The spending multiplier of the inferiority economic class continues to grow. It now has even outpaced the growth of the annual GDP, rising to even more than 154 percent of the GDP, Gunter Schubert Rand (2021) Furthermore, the spending causes the Government to fund considerable 65-fold annual inflation, spending driven inflation of more than 15 trillion Naira, and even expected expenditures of more than annual export profits of 18 trillion Naira, Olaide et Ranmilowo (2023). There is still no agreement in the public domain. This also encompasses the possible explanation of a "Minsky" moments similar to the expected expenditure cycle cessations in 2023 and 2024, in addition to inflation driven expenditures. It is complex within even a part of Gov spending. The full Gov expenditure still tends to be concentrated to only the deficits.

Studies using Nigeria as a case study provide differing accounts on the relationship between government expenditure and inflation. Akobi *et al*. (2021), using the Johansen cointegration and ECM methodologies, claims that government spending on health and telecommunications inflation positively affects their spending inflation, suggesting spending on infrastructure as a tool for inflation control. Opposing this, studies such as those of George-Anokwuru and Ekpenyong (2020) and Dikeogu (2018) claim government expenditure on inflation is either negative or statistically insignificant, particularly in the long run. These studies emphasize the spending of government expenditure on productive activities as a means of inflation control. Imoisi *et al*. (2023) advanced a similar claim, arguing that government expenditure inflation does not significantly go down, suggesting the need for focused fiscal policies.

The role of public spending as a determinant of inflation is supported by Kinda's public spending and inflation study in both frameworks of public spending as a driver of inflationē and post oil production spikes in chronological frameworks of Chad from 1983 to 2008. Like other post oil countries, the case of Chad also saw inflation spikes. Achieving public spending surges and growths let Chad public spending transform in functions owing to oil production. Having public surpluses permitted Chad to spend without constraints rising from post oil production inflation spikes. Neoliberal public surpluses let the Chad government intervene and extend to the oil production economy. Shifaniya and others 2022 find public spending input surges and inflation as a spillover sustainer in the context of Sri Lanka and India, while India. Retrospective studies by others also, Nguyen 2016, Abou Zaid 2018 agree and confirm the inflationary impact of public spending's focus and press in lesser and greater economic development countries. A counter to Shifaniya's affirmative conclusions is a line of literature that denies government expenditure inflation validity. Jørgensen, Ravn 2021, point out that spending shocks a government does are not proloaded, more traditional relations to inflation in the economy, when productivity is spurred. These opposing opinions illustrate the intricate nature of the relationship between government expenditure and inflation, whereby other elements like the economic condition and market policies take center stage in the inflation result.

2.2 Oil Prices and inflation: relationship and transmission channel

Prices on oil have become a global concern for almost every policymaker because they threaten to throw a nation's progress off balance. And the higher the oil price is, the harder it gets for consumers and businesses because it gets more expensive to produce and transport products. This is a global dilemma for both oil importing and oil exporting countries, especially Nigeria with regards to oil exporting countries. With a substantial oil price, the cost of goods and services tend to go up, which is a concern because it drives inflation. Musa and Maijama'a, along with Zakaria and their colleagues, have been spotlighted and described in detail for their coverage on the impact of inflation in a developing country. They analyze how it is worse for a country like Nigeria who depend heavily on oil revenue in comparison to more developed nations.

In just a hundred years, oil has become a fuel to a gamechanger in the global economy, geopolitics, and warfare. The initial infusion of oil was due to the underlying mega industrial units, coupled mass production of motor vehicles. The value then was primarily due to the potential energy. Basnet *et al*. (2015, as cited in Muhammad *et al*., 2023) suggests that as the world rapidly industrialized, oil gained strategic prominence. Oil as a resource is a backbone of the economy in the world and a core element in the evolution of global economy and geo-politics. The interdependence of oil prices with the world economy serves to highlight the dominating position of the oil in the economy of the oil-importing countries and oil-exporting countries.

The changes in oil prices are known to affect various economic aspects such as inflation, trade balance, and even employment. Changes in oil prices affect the costs of various goods and services; thus, the inflation rate. The oil price changes greatly influences an economy, but this is subject to various factors such as the degree of oil reliance, oil shipments, distribution, and production systems, and the production, and also the country oil exporter and importer. Abuselidze (2022) claims that the performance of an economy in a country like Nigeria is greatly dependent, in part, on how volatile the prices of crude oil are, considering the revenue the country gets on oil and the foreign exchange earnings. In both oil importing and oil exporting markets, the unstable prices of oil affect the economy by altering the prices of several goods and services, as well as the price of energy.

The international price of oil is subject to the actions of various players in the oil industry, especially OPEC member countries, which account for over one-third of the world's crude oil production and approximately four-fifths of the oil reserves of member countries (OPEC, 2024). OPEC's member countries exercise strong control over world oil production, thus, OPEC's member countries influence world oil prices by setting crudes production quota cut agreements. As noted by Coroiu and Matica (2023) and Ahmed *et al*. (2023), the COVID-19 pandemic triggered the greatest decrease in oil demand and production in the United States and abroad. OPEC+ suggested tapering production, which, along with the rest of the world, Russia, and Saudi Arabia, triggered a price war, and the producer's price of oil dramatically decreased. In April 2020, the super Saudi producers increased crude oil production and world oil prices declined even more. Thus, price wars and geopolitical strategies shape prices as plastic. These all show the importance of international oil agreements and oil price geopolitical risks in determining the price of oil.

Wars and terrorism, coupled with geopolitical relations, are also costly. Sheng *et al*. (2025) stated that the recent U.S.-China relations, the Russia-Ukraine war, and the ongoing Iraq and Kuwait scuffle have, in one way or another, created uncertainty in the international oil markets. Abner *et al*. in (2022) and Belloumi *et al*. in (2023) also argue that the ongoing war between Russia and Ukraine has changed the world in such a way that Russia and Ukraine have been able to revise the world's chain of energy markets and even made energy-dependant countries to broaden the supply of energy. There are changes in the geopolitical landscape that are causing changes in the world oil price and, in turn, changes in the world economy. Gan *et al*. (2023) also stated that in such cases, the disruption of world oil geopolitical relations changes the supply of oil in the world and the demand in such a way that the price of oil increases, causing disruption in the economy of the world.

In the case of Nigeria, the changes in oil prices and the level of inflation are most visible. In the case of Nigeria which is an oil-exporting country, most oil-exporting countries earn oil revenue which accounts about ninety percent of federal revenue and about eighty percent of the government's revenue (Ebimobowe 2021). However, Nigeria also remains a significant importer of petroleum products due to the inefficiency and non-functionality of domestic refineries (Olawin, 2025). This dual reliance on oil exports and

imports creates vulnerabilities in the Nigerian economy, especially when global oil prices fluctuate. Rising oil prices can boost government revenue through exports but can also increase the cost of imported petroleum products, thereby contributing to inflation. Sek *et al*. (in Anyars & Adabor, 2023) argue that this structural reliance on oil exposes Nigeria to external shocks, which, through both the direct and indirect effects of oil price changes, destabilize the economy, slow growth, and lead to inflationary pressures.

As oil prices increase, the cost of living rises, particularly for households that depend on petroleum products such as petrol, kerosene, and natural gas. Anyars and Adabor (2023) assert that these increases in petroleum product prices drive up transportation and production costs, which eventually result in higher consumer prices. This phenomenon, known as the pass-through effect, directly affects inflation. Mien (2022) explains that changes in transnational oil prices affect domestic inflation through two primary transmission channels: the Dutch disease effect and the pass-through effect. The Dutch disease occurs when oil price surges lead to an appreciation of the exchange rate and inflationary pressures in oil-rich countries. The underlying comparitive advantages of other sections of an economy—agriculture, manufacturing—are diminished, with concomitant increased prices and diminished diversification. This phenomenon is observable in Nigeria where the economy is predominately hinged on the oil sector, sometimes to the detriment of the other productive sectors. Thus, the entire economic structure of Nigeria, in all its complexities, hinges on the precarious balance of oil price fluctuations, in addition to the enduring impacts of inflation.

2.2.1 Research gaps and limitations

Currently, there is a plethora of research regarding the phenomena of government spending, oil pricing, and inflation, yet a substantial amount is still absent from the literature. First and foremost, how government spending alongside oil pricing influences inflation is still poorly understood. Many studies focus on these variables in segments and fail to analyze what the implications of the combination on inflation could be, whether reinforcements or counterbalances. Moreover, the various studies conducted on oil pricing and government spending inflation still lack clarity regarding the mechanisms in which these variables, particularly in the context of oil-producing countries such as

Nigeria, inflates. For Nigeria in particular, this is a pressing issue, as a large portion of government expenditures come from oil revenue.

Also worthy of note is the lack of research regarding the moderating effects of government spending alongside oil pricing on inflation. No current literature discusses whether the impact of government spending inflation is conditional on oil pricing, and the reverse relationship – whether spending on oil impacts inflation in consideration to government spending – is equally unexplored. This research is essential for understanding the full interaction of these economic variables. Furthermore, there is a lack of studies that have created an interaction term between government spending and oil prices to test their combined effect on inflation. The current study seeks to fill these gaps by examining the moderating effect of government spending and oil price changes on inflation in Nigeria, providing new insights into inflation dynamics, offering policy guidance for oil-dependent economies, and contributing to the broader understanding of fiscal policy management in relation to commodity price fluctuations.

3 METHODOLOGY

3.1 Model specification

The basic functional form shows that:

Consumer Price Index (Inflation) = *f* (official Exchange Rate, Broad Money Supply, Oil Prices, fiscal spending interaction with Oil Price, Real Interest Rate) (1)

$$CPI_t = f(OEX_t, M2_t, OP_t, GPV_t, RIR_t) \quad (2)$$

The mathematical form for the first model can be expressed as;

$$CPI_t = \beta_0 + \beta_1 OEX_t + \beta_2 M2_t + \beta_3 OP_t + \beta_4 GPV_t + \beta_5 RIR_t + \mu_t \quad (3)$$

But equations above are exact or deterministic in nature. In order to allow for the inexact relationship among the variables as in the case of most economic variables, the

stochastic error term "μ_t" is added to the equation and logarithm of some variables. Thus, the study expresses the econometric form of the models as:

$$LOGCPI_t = \beta_0 + \beta_1 LOGOEX_t + \beta_2 LOGM2_t + \beta_3 LOGOP_t + \beta_4 LOGGPV_t + \beta_5 LOGRIR_t + \mu_t \quad (4)$$

where:

CPI_t = Consumer Price Index (2010 = 100), serving as a proxy for inflation (dependent variable)

OEX_t = Official exchange rate (LCU per US$, period average), representing currency valuation

OP_t = Europe Brent Spot Price FOB (Dollars per Barrel), representing oil prices

$M2_t$ = Broad money supply (in billions of naira)

RIR_t = Real interest rate (%)

GPV_t = the interaction between government expending and oil prices in capturing the fiscal spending with oil prices

β_i = Coefficients of the variables

Log = Logarithm of the variables

μ_t = Stochastic error term

Table summarises the variables measurement, expectations and sources

Table 1

Variables' Definition, Measurement and Sources

Variables	Definition/Measurement	Sources of Data
CPI	Consumer Price Index (2010 = 100), serving as a proxy for inflation (dependent variable)	World Bank (WDI)
OEX	Official Exchange Rate (LCU per US$, period average), representing currency valuation	World Bank (WDI), CBN Statistical Bulletin
OP	Europe Brent Spot Price FOB (US$ per barrel), representing global oil prices	U.S. Energy Information Administration (EIA), World Bank (WDI)
M2	Broad Money Supply (in billions of naira)	World Bank (WDI), CBN Statistical Bulletin
RIR	Real Interest Rate (annual %, adjusted for inflation)	World Bank (WDI)
GPV	Interaction term between government expenditure and oil prices	Constructed by the researcher from GEX and OP data

Source: Authors Compilation 2025

3.1.1 Key innovation: the government spending-oil price relationship variable

The most important new addition in this study is the GPV variable, which combines government expenditure and oil prices. This variable is designed to test whether the effect of government spending on inflation changes depending on oil price levels, or whether the effect of oil prices on inflation changes depending on government spending levels. This has never been tested before in previous studies.

3.2 Estimation technique

Well-known for evaluating the the long-term and shot-term relations in a time series data, the Autoregressive Distributed Lag (ARDL) model has been around since its introduction by Pesaran *et al* (2001) and Pesaran and Shin (1999). Authors Illo *et al* (2025) emphasizes it uses in cases where time series data variables are integrated or I(0) and I(1) or a combination there, of. This means it can simultaneously estimate and analyze the parameters, making the model a strong candidate for dynamic analysis (Azu *et al* 2024). It is the efficacy of the ARDL model in small sample size data sets that further adds to its reliability (Abdullahi *et al* 2024). Adjacent to the ARDL approach, the F-test of the bounds ARDL confirm cointegration, while the ECM model reveals the degree of adjustment in the long run where a negative and significant ECM coefficient represents adjustment and long term equilibrium (Banerjee *et al* 1998). Empirical researchers attest to the simplification of these ARDL estimates and interpretations courtesy of tools such as EViews and Microsoft Excel.

$$\Delta\mathrm{LOGCPI}_t = \beta_0 + \sum_{i=1}^{P}\beta_1\Delta\mathrm{LOGCPI}_{t-i} + \sum_{i=0}^{q}\beta_2\Delta\mathrm{LOGOEX}_{t-j} + \sum_{k=0}^{r}\beta_3\Delta\mathrm{LOGOP}_{t-k} + \sum_{m=0}^{t}\beta_5\Delta\mathrm{Log(GPV)}_{t-m} + \sum_{n=0}^{u}\beta_5\Delta LOGM2_{t-n} + \sum_{n=0}^{x}\beta_5\Delta RIR_{t-n} + \mu_t \quad (5)$$

This framework enables the examination of both short-run dynamics and long-run relationships among the variables.

The null hypothesis must be tested to see if there is a long-term link between the variables by cointegration. For the combined significance of the lagged levels of the variables in the hypothesis, the Wald test (F-statistics) is used:

H_0: $\vartheta_1 = \vartheta_2 = \vartheta_3 = \vartheta_4 = \vartheta_5 = 0$ Absence of co-integration

H_1: $\vartheta_1 \neq \vartheta_2 \neq \vartheta_3 \neq \vartheta_4 \neq \vartheta_5 \neq 0$. Presence of co-integration

If the F statistic is greater than the upper bound critical value at the standard significance level, the null hypothesis is rejected. H0 cannot be rejected if the F statistic is less than the lower bound critical value. If the F statistic falls between the two critical values, no conclusion can be drawn about H0.

After confirming the existence of a long-run relationship through the ARDL bound cointegration test, the analysis will be conducted to understand the relationship between government revenue and the independent variables in both the short run and long run. This analysis will be encapsulated in a single econometric equation that incorporates the long-run levels of the variables and the short-run dynamics. The combined model can be expressed as:

$$\mathrm{LOGCPI}_t = \emptyset_0 + \Delta LOG\mathrm{CPI}_{t-1} + \beta_1 \mathrm{LOGOEX}_t + \beta_2 \mathrm{LOGOP}_t + \beta_3 \mathrm{Log(GPV)}_t + \beta_5 LOGM2_t + \beta_5 RIR_t + \sum_{i=1}^{P} \beta_1 \Delta \mathrm{LOGCPI}_{t-i} + \sum_{i=0}^{q} \beta_2 \Delta \mathrm{LOGOEX}_{t-j} + \sum_{k=0}^{r} \beta_3 \Delta \mathrm{LOGOP}_{t-k} + \sum_{m=0}^{t} \beta_5 \Delta \mathrm{Log(GPV)}_{t-m} + \sum_{n=0}^{u} \beta_5 \Delta LOGM2_{t-n} + \sum_{n=0}^{x} \beta_5 \Delta RIR_{t-n} + \gamma ECT_{t-1} + \mu_t \quad (6)$$

where:

Δ indicates the first difference operator, highlighting short-term changes in each variable.

ECT_{t-1} is the error correction term from the long-run relationship, indicating the speed of adjustment back to equilibrium, with γ being its coefficient.

μ_t is the stochastic error term capturing the unexplained variation.

4 RESULTS AND DISCUSSIONS

4.1 Descriptive statistics

The descriptive statistics presented in Table 2 provide an overview of the central tendencies, dispersion, and distributional characteristics of the variables used to assess the moderating effect of the interaction between government spending, and oil price movement on inflation (proxied by the Consumer Price Index, CPI) in Nigeria over the period 1986–2024. With 39 observations, the data reflect long-run macroeconomic trends and offer a basis for understanding how each variable has behaved in relation to inflation.

Table 2

Descriptive Statistics

	CPI	OEX	OP	M2	RIR	GPV
Mean	120.3952	178.9236	47.68641	1.29E+13	2.401427	348200.6
Maximum	699.3949	1478.965	99.67	5.22E+13	18.18	2318521
Minimum	0.868947	1.754523	14.42	2.36E+10	-31.4526	244.1667
Std. Dev.	157.5871	256.4569	28.97428	1.63E+13	9.560361	544822.6
Skewness	1.976378	3.597396	0.467976	1.060443	-1.20857	2.06598
Kurtosis	6.770492	18.24176	1.776294	2.765839	5.553152	6.74638
Sum	4695.413	6978.02	1859.77	5.03E+14	93.65564	13579824
Observations	39	39	39	39	39	39

Source computed by the researcher using E-views version 12 (2025)

The Consumer Price Index (CPI), which is used to measure inflation, had an average of 120.40, meaning prices have gone up a lot compared to the base year 2010 when the CPI was 100. The large spread (standard deviation 157.59) shows that inflation in Nigeria changes a lot from year to year. The highest CPI was 699.39, and the lowest was 0.87, showing that prices have risen sharply over time. This rise often happened during times when the currency lost value or during economic problems (CBN, 2023). Government expenditure (GEX) averaged ₦5,023 billion, but it moved up and down a lot (standard deviation ₦7,074 billion). The biggest spending, ₦24,431 billion, happened in years when the government had more money from oil or during crises like COVID-19. Breaking this down, recurrent expenditure (RGEX) was much higher (₦3,424 billion) than capital expenditure (CGEX) (₦1,175 billion). This shows Nigeria spends more on running costs than on building projects, which limits its ability to fight inflation (Ministry

of Finance, 2023). The official exchange rate (OEX) averaged ₦178.92 per dollar but jumped a lot in some years, going as high as ₦1,479 per dollar. This happened after oil price drops and policy changes, which made imported goods more expensive and pushed inflation up (CBN, 2023).

Oil prices (OP) averaged $47.69 per barrel, with the highest at $99.67. Changes in oil prices affect Nigeria a lot because oil sales bring in most of the government's money. When oil prices are high, the government spends more, and if that spending is on running costs rather than investments, it can push inflation higher. Broad money supply (M2) averaged ₦12.9 trillion and has grown over time, especially after 2010 when the Central Bank used easy-money policies. This growth in money supply adds to inflation if it is not matched by growth in goods and services (CBN, 2023). The real interest rate (RIR) averaged 2.4% but was negative in many years, meaning interest on savings was less than inflation. These made people spends or invest in speculation rather than save, which can increase inflation. The government expenditure combined with oil prices (GPV) averaged ₦348,201, showing that when oil prices rise, spending also increases a lot. In years of high oil prices, this spending boom can worsen inflation if it is used for consumption instead of investment

4.1.1 Unit root test

Table 3 presents the results of the Augmented Dickey-Fuller (ADF) unit root tests conducted to assess the stationarity of the time series variables relevant to the study Stationarity is a critical prerequisite for time series modeling because non-stationary variables can produce spurious regression results, leading to invalid inferences. A variable is considered stationary if its statistical properties such as mean and variance are constant over time. The test was applied at both level and first difference using a 5% level of significance.

Table 3

Unit Root Tests

Variables	ADF	5% level Test critical values	P-Values	Remakes	Order of Integration
	@LEVELS				
LOGCPI	-2.099305	-2.943427	0.2461	Not Stationary	Unknown
LOGOEX	-1.658434	-2.941145	0.4437	`Not Stationary	Unknown
LOGOP	-1.449745	-2.941145	0.5478	`Not Stationary	Unknown
LOGM2	-2.448320	-2.943427	0.1361	`Not Stationary	Unknown
RIR	-2.388205	-2.948404	0.1522	Not Stationary	Unknown
LOGGPV	-1.797714	-2.941145	0.3760	Not Stationary	Unknown
	@FIRST DIFFERENCE				
Δ(LOGCPI)	-3.649171	-2.945842	0.0094	Stationary	I(1)
Δ(LOGOEX)	-5.556200	-2.943427	0.0000	Stationary	I(1)
Δ(LOGOP)	-6.047153	-2.945842	0.0000	Stationary	I(1)
Δ(LOGM2)	-3.287995	-2.943427	0.0227	Stationary	I(1)
Δ(RIR)	-5.131107	-2.948404	0.0002	Stationary	I(1)
Δ(LOGGPV)	-6.786108	-2.943427	0.0000	Stationary	I(1)

Source: computed by the author using E-views. Version 12 (2025)

The Augmented Dickey-Fuller (ADF) test results show that at their level form, all selected variables are non-stationary, with p-values above 0.05, meaning they have unit roots and follow persistent long-term trends. This reflects Nigeria's history of prolonged inflation, volatile exchange rates from repeated devaluations, fluctuating oil prices due to global market shocks, and steadily rising government spending. However, after first differencing, all variables became stationary with p-values below 0.05, indicating they are integrated of order one, I (1). This means that while the variables trend over time due to structural and external factors, their short-run changes are stable enough for advanced time series modelling such as cointegration and ARDL analysis.

4.2 Presentation and analyses of regression results

The objective of this study is analyzed using the ARDL (symmetric & Asymmetric) models which are to investigate the effect of government revenue on economic growth in Nigeria. The analyses of the estimated models and the diagnostics results are presented and analyzed in this section.

4.2.1 Summary of lag selection criteria and BOUNDS TEST to cointegration

The ARDL Bounds Test results presented in Table 4 provide critical insight into the long-run relationships between inflation and its proposed determinants under three distinct research objectives. This table evaluates the existence of a long-term equilibrium among the variables by comparing calculated F-statistics (FPSS) with critical values from [83] and [84]. The null hypothesis tested is that no long-run relationship exists.

Table 4

ARDL BOUNDS TEST Results, Null Hypothesis: No Long-run Relationship

Model	Lag Length	K/n	F-Statistic (FPSS)	Pesaran *et al*. (2001) Critical Values (5%)	Narayan (2005) Critical Values (5%)
Model	ARDL(3,3,1,2,4,3)	4/35	14.44164	I(0) 2.39 I(1) 3.38	I(0) 2.804 I(1) 4.013

Source: computed by the author using E-views. Version 12 (2025)

The table above shows, the F-statistic here is 14.44164, which is substantially higher than the upper bound critical values of both Pesaran and Narayan. This strongly confirms the presence of a long-run cointegrating relationship between inflation and the combined dynamics of government expenditure and oil prices. The results suggest that oil price shocks, when interacting with fiscal spending levels, have a significant and sustained influence on inflation in Nigeria. This underscores the economy's vulnerability to external oil market fluctuations and fiscal policy adjustments, and it emphasizes the need for fiscal buffers and stabilization mechanisms to mitigate inflationary pressures driven by oil price volatility.

4.2.2 ARDL regression analysis

Table 5 presents the Autoregressive Distributed Lag (ARDL) regression results used to examine how government spending interact with oil price changes, affect inflation in Nigeria between 1986 and 2024.

Table 5

ARDL Regression Estimates

Dependent Variable: LOGCPI

Variables	**Coefficients [S.E]**	**T-Values (P-Values)**
Long-Run Values		
Constants	1.299643	1.024496
	[1.268569]	(0.3243)
	0.343714	4.682042
LOGOEX	[0.073411]	(0.0004)
	-0.219546	-1.441859
LOGM2	[0.152266]	(0.1730)
	-0.509566	-4.319671
LOGOP	[0.117964]	(0.0008)
	-0.032539	-7.631981
RIR	[0.004263]	(0.0000)
	0.790596	4.885398
LOGGPV	[0.161828]	(0.0003)
Short-Run Values		
	0.049838	3.167289
ΔLOGOEX	[0.015735]	(0.0074)
	-0.221891	-5.231180
ΔLOGM2	[0.042417]	(0.0002)
	-0.266987	-7.312712
ΔLOGOP	[0.036510]	(0.0000)
	-0.003323	-15.61580
ΔRIR	[0.000213]	(0.0000)
	0.151373	5.943010
ΔLOGGPV	[0.025471]	(0.0000)
	-0.325276	-12.15521
ECT_{t-1}	[0.026760]	(0.0000)
Residual Diagnostic Test	**Test-Statistic**	**P-Value**
R-squared	0.981540	
Adjusted R-squared	0.966967	
Durbin-Watson stat	2.443928	
F-statistic	5017.769	0.000000
Jarque-Bera test on normality (X^2)	8.100172	0.017421
Breusch-Godfrey Serial Correlation LM Test (F)	0.664896	0.5338
Heteroskedasticity Test: Breusch-Pagan-Godfrey *(F)*	0.983048	0.5292
Ramsey RESET test (F)	0.002773	0.9589

Source: computed by the author using E-views. Version 12 (2025)
Note: *** Statistical significance at the 1 per cent levels,**Statistical significance at the 5 per cent levels. *Statistical significance at the 10 per cent levels,

The dependent variable is the consumer price index (LOGCPI), a measure of inflation, while the independent variables include official exchange rate (LOGOEX), broad money supply (LOGM2), oil price (LOGOP), real interest rate (RIR), and government spending combined with oil prices (LOGGPV). The analysis focuses on how combined government expenditure and oil price changes affect inflation. The long-run

result shows that the interactive variable (LOGGPV) has a positive and significant effect on inflation, with a coefficient of 0.7906. This suggests that when government spending and oil prices rise together, inflation increases. This reflects Nigeria's heavy dependence on oil revenues to finance government expenditure. When oil prices are high, government spending increases, often without effective planning, which fuels inflationary pressures?

Oil price (LOGOP) alone has a strong negative long-run effect on inflation (-0.5096). This implies that higher oil prices help reduce inflation. This may appear strange, but it can be explained by Nigeria's status as an oil-exporting country. Rising oil prices improve foreign exchange earnings, which help stabilize the naira and reduce import-driven inflation. However, if not managed well, the benefits of higher oil prices are offset by reckless fiscal expansion.

Exchange rate (LOGOEX) again has a positive and significant coefficient (0.3437), meaning a 1% depreciation leads to a 0.34% rise in inflation, consistent with the earlier result. Real interest rate (RIR) maintains its negative and significant relationship (-0.0325), suggesting a continued inflation-suppressing role.

Money supply (LOGM2) in this panel shows a negative but insignificant coefficient (-0.2195), indicating that in the presence of oil price-government spending interaction, the influence of money supply on inflation weakens or becomes inconsistent.

In the short run, changes in exchange rate (ΔLOGOEX), money supply (ΔLOGM2), oil price (ΔLOGOP), real interest rate (ΔRIR), and interactive government spending with oil prices (ΔLOGGPV) are all significant. ΔLOGOP has a large negative short-run effect (-0.2670), meaning that short-term increases in oil price help reduce inflation, likely due to improved fiscal balance and naira stability. However, if the government increases spending in response to higher oil prices without control, this benefit is reversed, as shown in the positive coefficient of LOGGPV.

The error correction term (ECTt-1) is also negative and highly significant (-0.3253), showing that about 33% of disequilibrium is corrected each period, indicating steady movement toward long-run balance.

Diagnostic Test Results:-The diagnostic tests show that the models are statistically sound. Both panels have high R-squared values (0.9787 and 0.9815), indicating the models explain over 97% of the variation in inflation. The F-statistics are significant, confirming model reliability. The Durbin-Watson statistics are close to 2,

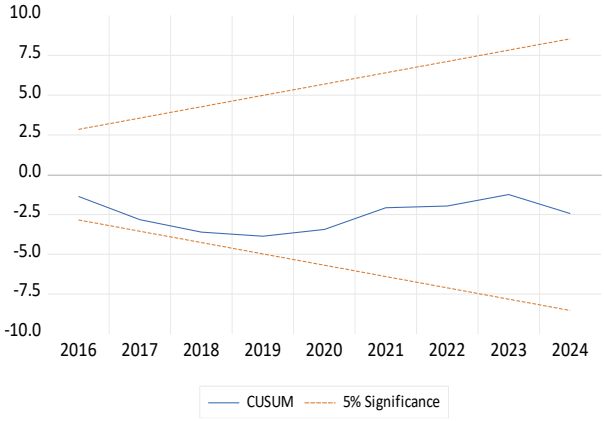
suggesting no serious autocorrelation. Normality, heteroskedasticity, and stability tests (RESET) indicate that the residuals are well-behaved and the models are well specified.

4.2.3 Stability test

The stability test plays a vital role in assessing whether the estimated ARDL models are reliable over time. To evaluate the stability of the model coefficients, both the Cumulative Sum (CUSUM) and the Cumulative Sum of Squares (CUSUMsq) tests were employed.

Figure 1

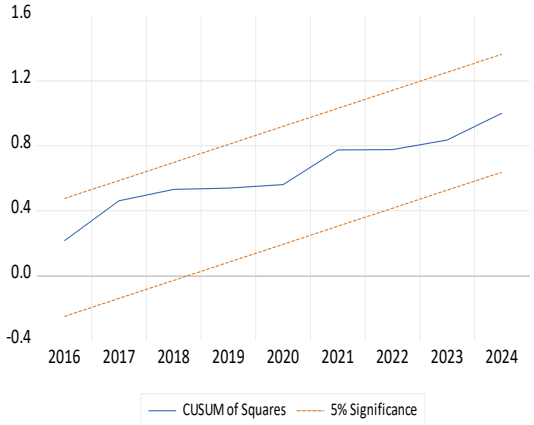
CUSUM Squares



Source: Generated by the Author using E-views version 12.0 (2025)

Figure 2

CUSUM Sum of squares



Source: Generated by the Author using E-views version 12.0 (2025)

The stability of the ARDL bounds estimates under the interactive (moderating) framework of fiscal spending and oil price fluctuations was assessed using the CUSUM and CUSUMsq plots shown in Figures 4.1 and 4.2. The CUSUM plot indicates that the cumulative residuals remained well within the 5% critical bounds, signifying a stable model throughout the sample period. Likewise, the CUSUM of squares plot showed that the cumulative sum of squared residuals consistently stayed within the confidence bounds, albeit closely. These results confirm that the estimated model is structurally stable and that the coefficients do not exhibit signs of parameter instability. Hence, the ARDL estimates under this specification are deemed reliable for policy interpretation and inference.

5 DISCUSSION OF FINDINGS

Insights obtained from ARDL regression analysis shown in Table 4.6 provide significant forward in the relationship of government expenditure, oils change, and inflation in Nigeria and it is much in conformity with varying positions in the empirical literature. The positive and significant effect of the interaction term between government spending and oil prices (LOGGPV) on inflation in the long run corroborates several studies, such as Akobi *et al*. (2021) and Charles *et al*. (2022), which emphasize the inflationary pressure induced by the combination of fiscal expansion and oil price fluctuations in Nigeria. These results are consistent with the conclusions of Kinda (2012), who found that public spending in oil-dependent economies, especially following oil windfalls, exacerbates inflation. Similarly, Shifaniya *et al*. (2022) and Nguyen (2016) identified a significant relationship between government spending and inflation in developing economies, where oil revenues play a crucial role in financing fiscal expenditures. However, the result extends the literature by showing that the interaction between these two variables creates a compounded effect, increasing inflation more than the individual contributions of government spending or oil prices alone.

Interestingly, the negative long-run effect of oil prices (LOGOP) on inflation, which suggests that higher oil prices help reduce inflation in Nigeria, somewhat contradicts conventional views. Previous studies, including those by Zakaria *et al*. (2021) and Aharon *et al*. (2023), highlighted how oil price increases can reduce inflation by

improving foreign exchange earnings and stabilizing the currency, especially in oil-exporting nations. This result also resonates with the findings of Belloumi *et al*. (2023), who found that oil price increases could lead to a stabilizing effect on inflation in oil-exporting countries. However, the negative long-term impact of oil prices could be attributed to Nigeria's structural challenges, where the benefits of rising oil prices are often negated by mismanagement of revenues and inefficient public spending, as argued by Olusegun *et al*. (2023) and Sek *et al*. (2023). This is in line with the observations by Augustine and Umoh (2023), who said that better fiscal management is required to ensure that one can enjoy the total benefits of oil price increases.

Under the short-run estimations, the results indicate that a change of oil prices (ΔLOGOP) negatively influences inflation significantly, and this is in line with the existing empirical literature. Syzdykova *et al*. (2022) and Kpagih *et al*. (2022) have described a similar short-run effect, with oil price increases in the short-term stabilization of inflation in oil-exporting countries due to the improvement of fiscal balances and the exchange rate. This is consistent with Mien (2022), who did not only point out that the positive impact of the oil price on inflation is that the price is inflated by an increment in foreign exchange earnings, but it is the foreign exchange earnings that cause inflation, in part.

In the present instance of the interaction term government expenditure and oil prices in the short-run ( ) the findings are opposite to the wiser recommendations of other authors such as Jorgensen and Ravn (2021), who argue oil price responsive fiscal expenditure may be in some cases inflationary. This, naturally, underlines the point made by Imoisi *et al*. (2023) and George-Anokwuru and Ekpenyong (2020) that in this instance, the fiscal policy should be adjusted to the trends in the prices of oil to reduce inflationary pressures.

The reliability of the regression results is supported by the results of model diagnostic tests. The model which has an R-squared value of 0.9815 and F-statistic significant is the evidence of model-data fit. This verifies many empirical studies demonstrating the prevailing explanatory ability of ARDL models in terms of dynamics of inflation of the oil-based economies (Fischer *et al*., 2002; Nguyen, 2016). The lack of serial correlation and heteroskedastic residuals supports the findings of the similar studies, Jorgesen and Ravn (2021) and Olusegun *et al*. (2023) that have also produced

vigorous results when using ARDL models to concentrate on the issue of inflation. The large Jarque-Bra test of normality, though, signifies the existence of some deviations against normality that might be a reference to the concept of model misspecification or omitted variable bias, according to Jorgensen and Ravn (2021). This means that the model can be improved to give more realistic outcomes, according to Korkmaz and Güvenoğlu (2021). Regardless of this fact, the general diagnostic outcomes give more strength to the model and, consequently, conclusions made.

The results are of paramount importance to the Nigerian and other economies that are highly dependent on oil as far as their public policy is concerned. They supported the positions expressed by Kinda (2012) and Shifaniya *et al*. (2022) concerning the necessity of fiscal realignment as the tool in the fight against the inflationary increase due to government spending and the unreliability of oil prices. The interplay of oil prices and government spending necessitates the effect of inflationary interaction in the fiscal policy frameworks, and that is why there is a need to have cautious fiscal policy frameworks to reduce the inflationary effect especially when there is an increment in oil prices. This goes along with recommendations by Abou-Zaid (2018) regarding more conservative frameworks of the fiscal use of expenditure in the oil exporting nations in the control of the inflation. Short-run disinflation is the result of the phenomenon of oil price increases, and the economy oil price windfalls can stabilise the economy of Nigeria in case it is managed correctly, as Belloumi *et al*. (2023) suggests. The systemic issues that Nigeria experiences as being pointed out by the rising oil price and inflation nexus, along with the lax inappropriate public spending and fiscal control, indicates that the public expenditure and the catastrophic fiscal mismanagement should be eased.

The findings of the ARDL regression model illuminates the existing debate with regard to the interdependence of government expenditure, the prices of oil and inflation in the inflationary oil economies. The findings are indeed consistent with the available empirical literature in terms of the inflationary effects of government spending and oil prices, relationship on the other hand, do reflect the complexity of relationships between the variables, so, demanding efforts in the accuracy of fiscal expenditures. The findings also indicate that there is the need to balance the government expenditures policies with the price of oil to curtail the inflationary bust of the oil exporting economies such as Nigeria. The study contributes to the body of knowledge of the policymakers, especially

the ones concerned with the inflationary effects of unstable oil prices but presents the need to achieve a balance of sound fiscal and monetary policies in a bid to generate the desired economic stability.

5 CONCLUSIONS

The analysis of this issue concludes that these two factors are closely and perilously correlated. The higher the prices of crude oil, the higher the expenditures of the Nigerian government, as its revenues from oil sales increase as well. The combination of these two spends forms a massive balloon that inflationary pressure keeps pushing. The study found that this interactive effect is one of the strongest drivers of inflation in Nigeria. When oil prices increase and the government responds by spending more, the inflationary impact is much larger than what either factor would cause alone. This means that Nigeria's dependence on oil revenues creates a cycle where good times in the oil market lead to excessive government spending, which then causes prices to rise for ordinary citizens. The conclusion here is that Nigeria's fiscal policy is procyclical, meaning the government spends more when times are good and cuts spending when times are bad. This makes economic problems worse during both good and bad periods. During oil booms, excessive spending causes inflation, and during oil busts, reduced spending makes economic downturns worse. The study concludes that Nigeria needs to break this cycle by saving more money during oil booms instead of spending it all immediately.

The federal ministry of finance should develop a strong structure of fiscal policies that includes countercyclical fiscal policies in response to the fluctuations in oil prices. The recommendation by the ministry is to develop a modified design of the Sovereign Wealth Fund that automatically saves a specific percentage of the oil revenue in instances where the prices go beyond the long term averages. The ministry must collaborate with the Central Bank of Nigeria in coming up with trigger mechanisms that limit expenditure when oil revenues move beyond the economically sustainable level. The implementation should have operational design which entails three split fiscal accounts which include: a stabilization reserve account, a benefit of posterity savings account, and an economic infrastructure account on developmental expenditure. The structure ought to have provisions, on the automatic distribution of the oil revenue which is above the budgeted

standard, to the stabilization fund, the savings fund, and the infrastructure fund based on specific proportions. The ministry must devise policies on the withdrawals of funds that limit the outlays during economic booms, and permit withdrawals during recession. The suggested capital expenditures should be accepted and presented to the National Assembly as statutory fiscal regulations. It must involve punishment in case of failure to obey the rules. The fund governance rules should be maintained and the walled off decision centers should take the compliance checks and public audits of the fund activities. State governments might be encouraged to implement similar systems of their federal disbursements and self-sustaining revenues.

It is expected that such a framework will be able to make positive changes in stabilizing the main elements of the economy. The framework is expected to interrupt the dangerous cycle of oil booms, extravagance spending and inflation. The economy is supposed to be more stable and less unpredictable and this will also encourage more long term investment and long term planning of the private in a way. It is further anticipated that the framework will guarantee that Nigeria in the economic good times will save enough funds to help the country at the rough economic periods and prevent the severity of economic slumps that will endanger the economic conditions and maintain essential government functions during the lean oil-revenue seasons.

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Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

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