EFFECTIVENESS OF NIGERIA'S FISCAL POLICY IN MANAGING OIL PRICE SHOCKS: IMPLICATIONS FOR HEALTH EXPENDITURE AND EXTERNAL DEBT SUSTAINABILITY USING D-i-D TECHNIQUE

NURUDEEN ABIODUN LAWAL
Department of Economics, Tai Solarin University of Education, Ijagun, Ijebu-Ode, Ogun State
Email: *naf_lawal@yahoo.com;* Phone: *08072916024*

GABRIEL OLUSEGUN ODUYEMI*
Department of Economics, Tai Solarin University of Education, Ijagun, Ijebu-Ode, Ogun State
Email: oduyemigo@tasued.edu.ng; Phone: 08057471387

KUNLE BANKOLE OSINUSI
Department of Economics, Tai Solarin University of Education, Ijagun, Ijebu-Ode, Ogun State
Email: osinusikb@tasued.edu.ng; Phone: 08034742233

ABSTRACT
The volatility of oil prices presents significant fiscal challenges for oil-dependent economies like Nigeria, often exacerbating economic instability and undermining social sector investments. This study investigates the effectiveness of Nigeria's fiscal policy in managing oil price shocks, with particular emphasis on their implications for health expenditure and debt sustainability. Motivated by the need to address persistent fiscal imbalances and declining public healthcare funding, the study examines the extent to which fiscal responses mitigate the adverse impacts of oil price fluctuations over a 43-year period. Grounded in Resource curse hypothesis, Wagner's law and fiscal illusion, and Public finance theory, the study highlights the inadequacies of countercyclical fiscal policies in resource-dependent economies. The analysis employs the Difference-in-Differences (D-i-D) technique, and macroeconomic time series data. Key variables include oil price changes, government health expenditure, and debt-to-GDP ratio. Findings from the study reveal that fiscal policy responses during periods of economic contraction often result in reduced healthcare spending and increased borrowing. In contrast, periods of economic recovery from rising oil prices show limited fiscal prudence, with inadequate investments in social infrastructure or debt reduction. These inefficiencies amplify fiscal vulnerabilities and compromise long-term economic stability.The study recommends adopting countercyclical fiscal measures, diversifying revenue sources, and strengthening institutional frameworks to enhance fiscal resilience. Policymakers should prioritize healthcare financing and debt sustainability to mitigate the socio-economic effects of oil price volatility, ensuring equitable access to health services and fiscal stability.

Keywords: Fiscal Policy, Oil Price Shocks, Health Expenditure, Debt Sustainability, Difference-in-Differences
JEL CLASSIFICATION: F34, I18, Q 31

1. INTRODUCTION
The cyclical nature of global oil prices profoundly impacts oil-dependent economies like Nigeria, where oil revenues constitute a substantial portion of government income and foreign exchange earnings (Leo, 2024). Over the past decades, sharp fluctuations in oil prices have triggered episodes of economic expansion, contraction, and recovery, exposing Nigeria's economy to inherent vulnerabilities. Positive oil price changes are associated with economic growth, while

negative changes significantly reduce GDP, reflecting the asymmetric effects of oil revenue on economic performance (Adenuga & Akanbi, 2023). These fiscal shocks, exacerbated by the absence of robust stabilization mechanisms, have led to widening fiscal deficits and unsustainable debt burdens during downturns (Adeyemi et al., 2024). During oil price booms, fiscal indiscipline often results in unsustainable public spending and over-reliance on oil revenues, further entrenching economic volatility.

The consequences of oil price volatility extend beyond the macroeconomic domain, affecting critical sectors such as public health. Fiscal crises triggered by revenue shortfalls often lead to reduced health expenditure, undermining public health systems (Adeyemi et al., 2024). Vulnerable populations face significant disparities in healthcare access and outcomes as fiscal adjustments prioritize economic stabilization over essential health funding. This cyclical neglect of the health sector leaves it underfunded and unable to respond effectively to public health demands, particularly during economic downturns. While measures such as the Excess Crude Account (ECA) and the Sovereign Wealth Fund (SWF) were introduced to mitigate the impact of oil price shocks, their effectiveness in stabilizing revenues and protecting critical expenditures remains questionable (Adeyemi et al., 2024).

These persistent challenges and vulnerabilities of Nigeria's oil-dependent economy to global oil price shocks and the socio-economic consequences they entail, particularly in the wake of recent global disruptions underscore the need for a comprehensive evaluation of Nigeria's fiscal policies to enhance resilience against oil price shocks. For instance, the COVID-19 pandemic and subsequent global economic recovery have underscored the fragility of resource-dependent fiscal systems, highlighting Nigeria's over-reliance on oil revenues, which constitute approximately 85% of government earnings and 90% of foreign exchange inflows (World Bank, 2024). Despite the adoption of stabilization tools like the Sovereign Wealth Fund (SWF) and Excess Crude Account (ECA), mismanagement and inconsistent implementation have rendered these mechanisms ineffective in buffering against fiscal shocks (Adeyemi et al., 2024). Concurrently, the mounting public debt, which has risen to over 40% of GDP by 2024, signals unsustainable borrowing practices often necessitated by oil price downturns (IMF, 2024). Compounding these challenges, fiscal adjustments during crises frequently deprioritize health expenditure, exacerbating inequities in healthcare access and undermining public health resilience, particularly among vulnerable populations (Okeke & Akinola, 2023). Given these realities, the integration of public health considerations into fiscal policy discourse is critical yet underexplored. This study addresses this gap by evaluating Nigeria's fiscal policy effectiveness in mitigating oil price shocks, with a novel focus on health expenditure and debt sustainability, aiming to provide actionable insights for crafting resilient and equitable fiscal frameworks in volatile resource economies.

The novelty of this research lies in its integrated approach, bridging fiscal policy analysis with public health expenditure dynamics. By examining the cyclical patterns of fiscal responses to oil price shocks, the study highlights the interconnectedness of macroeconomic stability, sectoral funding, and debt sustainability. This inclusion of health expenditure as a focal point enriches the discourse, addressing the human development implications of resource-driven fiscal policies often overlooked in traditional analyses. In the same vein, the study's emphasis on external debt sustainability reflects the long-term risks associated with fiscal mismanagement in resource-dependent economies. Additionally, using a Difference-in-Differences (D-i-D) approach, the research adopts a quasi-experimental methodology to assess the causal impacts of fiscal interventions on economic and health-related outcomes. The D-i-D framework allows the study to

estimate counterfactual scenarios, providing a robust tool for evidence-based policy evaluation by capturing the nuanced interplay between fiscal policy decisions, sectoral allocations, and macroeconomic stability.

This research covers an extensive timeframe between 1980 and 2023 to capture the recurring patterns of oil price shocks and the corresponding fiscal responses. This scope allows for the analysis of structural shifts in Nigeria's fiscal architecture and their effects over time. The remainder of the paper is structured as follows: Section 2 reviews the theoretical and empirical literature, Section 3 outlines the methodology, Section 4 presents the results and discussion, and Section 5 concludes with policy recommendations.

2. LITERATURE REVIEW

2.1 Conceptual Review

This review provides a comprehensive exploration of key concepts central to evaluating Nigeria's fiscal policy effectiveness in managing oil price shocks. By integrating these concepts, this review establishes a solid framework for analyzing the interconnected dimensions of fiscal policies, economic shocks, and social outcomes in Nigeria.

Oil price shocks are characterized by sudden and significant fluctuations in crude oil prices, driven by geopolitical crises, supply chain disruptions, and shifts in global energy demand. These shocks are particularly consequential for resource-dependent economies like Nigeria, where they disrupt fiscal stability, weaken currency values, and heighten macroeconomic vulnerabilities. Historically, the 1973 oil crisis underscored the global reliance on oil and the cascading effects of price volatility, demonstrating how oil price booms fuel fiscal expansions while price collapses trigger austerity measures.

Baumeister and Kilian's decomposition categorizes these shocks into aggregate demand shocks, oil supply shocks, oil-specific demand shocks, and oil inventory demand shocks. Aggregate demand shocks arise from global economic activity shifts, while supply shocks stem from production disruptions caused by geopolitical instability or natural disasters. Oil-specific demand shocks reflect expectations of future supply constraints, often magnifying price volatility. Persistent volatility has historically disrupted fiscal planning, heightened economic instability, and exposed governance challenges in Nigeria (Omotosho & Yang, 2024; Bamaiyi, 2024).

Fiscal policy effectiveness measures the capacity of government actions—taxation, spending, and borrowing—to achieve macroeconomic stability, foster growth, and ensure equity. In Nigeria, fiscal policies have often exhibited procyclical tendencies, with government spending expanding during oil booms and contracting during busts. Interventions such as the Excess Crude Account and the Sovereign Wealth Fund were designed to enhance fiscal stability but faced implementation challenges, revealing governance shortcomings (Okorie & Lin, 2024; Samuels, 2024).

Grounded in Keynesian economics, countercyclical fiscal policies are pivotal for mitigating external shocks' adverse effects. Key dimensions of effectiveness include revenue adequacy, efficiency in resource allocation, and fiscal sustainability. However, overreliance on oil revenues, governance failures, and corruption hinder these policies' effectiveness. Moreover, the impacts of fiscal mismanagement extend to critical sectors like health and external debt, exacerbating vulnerabilities during oil price shocks. Understanding fiscal policy effectiveness in Nigeria

highlights its role in addressing fiscal and social pressures, particularly in health expenditure and debt management (Samuels, 2024).

Health expenditure dynamics refer to the trends, allocation, and responsiveness of public spending on healthcare, particularly during economic shocks. In Nigeria, fiscal crises often lead to budget cuts in health spending, undermining commitments such as the Abuja Declaration and exposing weaknesses in healthcare funding. For instance, oil price shocks have historically exacerbated inequalities in healthcare access, particularly among marginalized populations (Ihebuluche, et al. 2023).

Public finance theories link government spending with social welfare outcomes, emphasizing the need for prioritizing healthcare investments during economic contractions. The dimensions of health expenditure include funding sources, allocation priorities, and implications for equity and access. Governance inefficiencies and corruption further compound these challenges, emphasizing the need for sustainable fiscal responses to safeguard public health systems during fiscal crises (Ibironke, 2023).

External debt sustainability evaluates a nation's ability to meet its debt obligations without compromising economic stability or development prospects. In oil-dependent economies like Nigeria, sustainability is influenced by cyclical oil revenues, fiscal deficits, and borrowing patterns. Historically, external debt crises in the 1980s and 2000s highlighted the risks associated with declining oil prices and poor fiscal management (Yussuff, 2024; Georgina, 2023).

Debt overhang theory posits that excessive debt levels discourage investment and economic growth, underscoring the importance of prudent fiscal management. Indicators of sustainability include the debt-to-GDP ratio and debt servicing costs, both of which are directly linked to fiscal policy decisions. Effective strategies such as debt renegotiation and prioritization of capital projects are critical for maintaining sustainability (Odey et al., 2023). However, critics argue that borrowing, when strategically deployed, can fund essential infrastructure that supports long-term growth, provided it does not escalate to unsustainable levels (Matthew & Adetayo, 2022).

The Difference-in-Differences (D-i-D) technique is a robust econometric method for evaluating the causal impacts of policy changes. By comparing treated and untreated groups before and after an intervention, D-i-D isolates policy impacts while controlling for time-invariant unobserved heterogeneity. This technique is highly relevant for assessing the effectiveness of Nigeria's fiscal policy responses to oil price shocks on health expenditure and debt sustainability.

Emerging from econometric methodologies, D-i-D assumes parallel trends between treated and control groups. Its application to fiscal reforms and health programs provides empirical evidence of policy impacts on macroeconomic and social outcomes (Yussuff, 2024). However, critics caution against biases arising from violations of its underlying assumptions or the challenges of defining control groups in complex fiscal environments. Despite these limitations, D-i-D offers methodological rigor, enhancing the study's capacity to evaluate Nigeria's fiscal responses to oil price shocks comprehensively.

2.2 Theoretical Literature

The theoretical underpinnings of this study are rooted in frameworks that illuminate the dynamism between oil price shocks, fiscal policy effectiveness, health expenditure dynamics, and external debt sustainability. Three key theories—Resource Curse Hypothesis, Wagner's Law and Fiscal Illusion, and Public Finance Theory—are particularly relevant to this investigation. These theories provide insights into the economic mechanisms and policy challenges inherent in resource-

dependent economies, such as Nigeria, and establish a foundation for assessing fiscal policy interventions.

2.2.1 The Resource Curse Hypothesis

The Resource Curse Hypothesis posits that resource-rich economies often underperform economically due to fiscal mismanagement, rent-seeking behavior, and weak institutional frameworks. In Nigeria, the over-reliance on oil revenue exacerbates fiscal vulnerabilities, particularly during global oil price fluctuations. This phenomenon aligns with evidence showing that oil wealth has not translated into significant improvements in Human Development Index (HDI) scores, underscoring the mismanagement of resource rents (Lajuwomi, 2024). Additionally, the volatility in oil prices creates fiscal instability, exposing public finances to significant risks (David et al., 2024).

The hypothesis further assumes a paradox of plenty, where economic growth stagnates, and social sectors like health remain underfunded, despite resource wealth. For Nigeria, this paradox underscores structural vulnerabilities that complicate effective fiscal policy responses to oil price shocks. Some scholars, however, argue that with strong institutions and economic diversification, resource wealth can be effectively harnessed for sustainable development, transforming the resource curse into an opportunity (Xiang, 2024; Narh, 2023).

2.2.2 Wagner's Law and the Concept of Fiscal Illusion

Wagner's Law suggests that governments in resource-rich countries tend to expand public spending during periods of revenue booms, often neglecting fiscal sustainability. This pattern is particularly evident in Nigeria, where fiscal policies reflect an over-reliance on oil revenues, leading to cyclical expenditure patterns that exacerbate economic vulnerabilities during revenue downturns (Fagbemi & Fajingbesi, 2024).

Fiscal Illusion complements Wagner's Law by highlighting the tendency of governments to underestimate the true economic costs of their expenditures. This illusion contributes to resource misallocation, particularly in critical sectors like health, where consistent underfunding undermines equitable access and long-term development (Fagbemi & Fajingbesi, 2024). Together, Wagner's Law and Fiscal Illusion provide a framework for understanding Nigeria's fiscal dynamics and the adverse consequences of revenue dependence on health equity and access.

2.2.3 Public Finance Theory

Public Finance Theory serves as the overarching theoretical framework for this study, providing a comprehensive perspective on fiscal policy management. It emphasizes the principles of budgeting, revenue allocation, and expenditure management, particularly in resource-dependent economies like Nigeria. This theory underscores the importance of fiscal discipline and accountability to mitigate the adverse effects of oil price shocks (Xiang, 2024).

The trade-offs between spending, revenue generation, and debt sustainability, as outlined in Public Finance Theory, are central to analyzing Nigeria's fiscal policy responses. Effective fiscal policies require balancing these elements to ensure macroeconomic stability and equitable resource allocation. Recent studies highlight the critical role of fiscal policy in managing resource wealth and its potential to foster sustainable development through sound governance and economic diversification (Xiang, 2024; Narh, 2023).

By integrating these theoretical perspectives, this study bridges the gap between economic theory and practical policy evaluation, offering a nuanced understanding of the fiscal-health nexus in Nigeria.

2.3 Empirical Review

This section critically evaluates recent studies to provide evidence-based insights into the dynamics of oil price shocks, fiscal policy, health financing, governance, and debt sustainability in resource-dependent economies, particularly Nigeria.

Oil price fluctuations significantly influence fiscal policy dynamics in oil-exporting countries. Recent evidence from Sub-Saharan Africa underscores how sharp contractions in fiscal revenues often follow oil price declines (Durand-Lasserve & Karanfil, 2023). In Nigeria, the Sovereign Wealth Fund (SWF), which is designed to cushion the effects of revenue volatility, has been largely underutilized due to inconsistent savings policies (Okunoye & Hammed, 2020). In contrast, successful stabilization mechanisms in countries like Norway and Saudi Arabia highlight the importance of robust budgetary frameworks in mitigating the impact of oil price volatility. These findings point to the fiscal fragility of Nigeria's oil-dependent economy and the critical role of effective stabilization tools in ensuring fiscal sustainability.

Fiscal contractions resulting from oil price shocks disproportionately affect public health financing in resource-dependent economies. For instance, reduced oil revenues in Angola have been linked to a 25% decline in health sector funding, significantly worsening maternal and child health outcomes (António & Rodriguez-Gil, 2020). Similarly, in Nigeria, health expenditures are often deprioritized during fiscal crises, exacerbating inequalities in healthcare access (Vandyck et al., 2018). Evidence suggests that fiscal volatility undermines the quality of health services, particularly in rural areas where access to healthcare is already limited. These findings highlight the need for fiscal resilience and prioritization of health expenditures to safeguard critical social sectors during periods of fiscal stress.

Governance and institutional quality play pivotal roles in shaping fiscal policy outcomes in oil-exporting economies. Weak institutions in Nigeria contribute to fiscal mismanagement, which undermines the effectiveness of stabilization efforts (Koh, 2017). Conversely, countries like Botswana have demonstrated how institutional reforms can enhance fiscal discipline and economic resilience. For instance, António and Rodriguez-Gil (2020) show how Botswana's governance framework has effectively mitigated the adverse effects of oil price shocks. This comparison underscores the importance of institutional strength in managing the vulnerabilities associated with resource dependency and fiscal volatility.

The effectiveness of fiscal policy in mitigating oil price shocks presents a complex mix of successes and limitations. In Nigeria, fiscal consolidation efforts post-2016 aimed at stabilizing public finances have shown modest successes but have struggled to achieve long-term economic growth (Ogbonna et al., 2018). Comparative studies indicate that countries with robust institutional frameworks, such as Mexico, have implemented more effective fiscal responses by combining fiscal discipline with countercyclical spending (Sohag et al., 2024). However, challenges remain in accurately assessing fiscal policy impacts due to overlapping economic shocks. Critics of quasi-experimental methods like Difference-in-Differences (D-i-D) argue that these approaches face methodological limitations, particularly in economies experiencing concurrent fiscal and external

shocks (Samuels, 2024). These methodological complexities highlight the need for more nuanced analytical frameworks to evaluate fiscal interventions.

The relationship between oil price shocks and external debt sustainability is another recurring theme in the empirical literature. Oil price declines have been shown to exacerbate fiscal deficits and lead to unsustainable borrowing patterns. For instance, Nigeria's external debt rose significantly between 2015 and 2020 due to fiscal imbalances triggered by oil revenue shortfalls (Okorie & Lin, 2024). In contrast, countries like Mexico have successfully employed fiscal discipline and debt restructuring strategies to navigate similar challenges (Okorie & Lin, 2024).

3. METHODOLOGY

3.1 Theoretical Framework

This study adopts the Resource Curse Hypothesis (RCH) as its theoretical framework to explore the interconnections between oil price shocks, fiscal policy effectiveness, health expenditure, and debt sustainability in Nigeria. Originally introduced by Auty (1993), the RCH argues that resource-rich economies often face structural challenges, such as weak governance, fiscal mismanagement, and economic underperformance.

The RCH posits that resource wealth often leads to rent-seeking behaviors, poor economic diversification, and governance issues that undermine the efficient allocation of public resources. For instance, Sobrinho and Ruzzante (2022) demonstrate that oil price fluctuations significantly impact fiscal capacity, resulting in revenue volatility and inconsistent government spending. During price booms, overspending on discretionary expenditures occurs, while periods of price declines exacerbate fiscal contractions, limiting investments in critical sectors like health and infrastructure (Onwuemeka & Olanma, 2024).

Additionally, the reliance on oil revenues fosters underinvestment in health, perpetuating public health challenges. Studies by Laniran and Adeleke (2023) reveal that the lack of stable financing mechanisms exacerbates healthcare inequities, while poor governance and corruption further hinder the effective allocation of resources (Onwuemeka & Olanma, 2024). These findings illustrate how oil revenue volatility directly impacts health expenditures, undermining access and outcomes for vulnerable populations.

Debt sustainability is another critical dimension of the RCH. Fiscal mismanagement often drives resource-rich economies into debt crises, as seen in Nigeria, where weak institutional frameworks exacerbate borrowing patterns and limit taxation capacity (Sobrinho & Ruzzante, 2022; Laniran & Adeleke, 2023). This dynamic relationship between resource revenues and debt is further compounded by fiscal deficits arising from expenditure-revenue mismatches, contributing to unsustainable debt levels over time.

In contrast to the resource curse narrative, some studies suggest that strong institutions and diversified economies can mitigate the adverse effects of resource wealth. For example, Xiang (2024) and Hou et al. (2023) argue that effective governance reforms can enable resource-rich countries to harness their wealth for sustainable development, challenging the inevitability of the resource curse.

The RCH can be formalized through a dynamic macroeconomic framework to capture the effects of resource revenue fluctuations on fiscal policy and public expenditure. This model includes the following variables:

- R_t: Resource revenue at time t
- Y_t: Total national income at time t
- G_t: Government expenditure at time t
- H_t: t: Health expenditure at time t
- D_t: External debt stock at time t
- ε_t: Oil price shock at time t

The relationship between these variables can be modeled as:

Resource Revenue and National Income

$$Y_t = \alpha R_t + \beta X_t + \varepsilon_t \qquad 1$$

where X_t represents non-resource revenue, and $\alpha, \beta > 0$. This equation reflects the contribution of resource revenues to national income, influenced by oil price shocks ε_t

Government Expenditure Allocation

$$G_t = \delta R_t + \eta H_t + \phi_t \qquad 2$$

where $\delta, \eta > 0$ and ϕ_t captures discretionary fiscal adjustments. This equation highlights how government expenditure is sensitive to resource revenue, with a portion allocated to health expenditures, H_t.

Debt Sustainability Dynamics

$$D_t = D_{t-1} + (G_t - \tau Y_t) \qquad 3$$

where τ represents the tax effort. This equation shows how deficits arising from expenditure-revenue mismatches lead to debt accumulation.

The RCH provides a robust theoretical lens to analyze how oil price volatility affects fiscal capacity, leading to expenditure constraints in critical sectors like health. For instance, during oil price booms ($\varepsilon_t > 0$), governments may overspend, neglecting savings and stabilization mechanisms. Conversely, during busts (ε_t<0), fiscal contractions limit investments in health, compounding inequities and undermining outcomes.

3.2 Model Specification

3.2.1 Model for evaluating the effectiveness of Nigeria's fiscal policies in Managing Oil Price Shocks

To evaluate the effectiveness of Nigeria's fiscal policies in managing oil price shocks, this study employed a Difference-in-Differences (D-i-D) approach. This technique allowed us to compare

the changes in fiscal performance indicators before and after the oil price shocks, while accounting for any time-invariant differences between treated and control groups.

The D-i-D model is specified as follows:

$$Y_{it} = \alpha + \beta_1 POST_t + \beta_2 TREATED_i + \beta_3 (Post_t \times Treated_i) + \gamma X_{it} + \varepsilon_{it} \qquad 4$$

Where:

- Y_{it} represents the fiscal performance indicators (Health Expenditure, External Debt) for country i at time t.
- $Post_t$ is a binary variable that equals 1 for periods after the oil price shock and 0 otherwise.
- $Treated_i$ is a binary variable that equals 1 for Nigeria Fiscal policy after shcoks (the treated group) and 0 for the control group (Nigeria Fiscal policy before the shock).
- $Post_t \times Treated_i$ is the interaction term, capturing the difference-in-differences effect.
- X_{it} is a vector of control variables (GDP growth rate & inflation rate).
- ε_{it} is the error term.
- Oil shocks happened in 1986, 1990, 1991, 1997, 1998, 2000, 2001, 2003, 2008, 2014, 2015, 2016, 2020, and 2022.
- Treatmet Variable: Shock = 0; Shock = 1 if year == 1986; 1990; 1991; 1997; 2000; 2001; 2003; 2008; 2014; 2015; 2016; 2020; 2022.
- Since shocks stays in the economy for 4 quaters, a year after period of the oil shock shows the post era.
- Time variable. Post = 0; Post = 1 if year == 1987; 1991; 1992; 1998; 1999; 2001; 2002; 2004; 2009; 2015; 2016 ; 2017; 2021.

The coefficient β_3 on the interaction term $(Post_t \times Treated_i)$ measures the average treatment effect on the treated (ATT), which indicates the differential impact of the oil price shocks on Nigeria's fiscal policies compared to the control group.

4. RESULT AND DISCUSSION OF FINDINGS

4.1 Preliminary Analysis

This section outlines the preliminary analysis conducted on the data set for the study, specifically through descriptive statistics, trend analysis and unit root tests.

4.1.1 Descriptive Statistics

The descriptive statistics presented for the study variables offer crucial insights into the distribution, central tendency, variability, and skewness of the variables for understanding the dynamic relationships between oil price shocks, fiscal policy, public health outcomes, and macroeconomic indicators in Nigeria.

Table 4.1

Descriptive Statistics

Variables	AGGDDS	SSS	HEXP	INF	GDP	PED
Mean	-0.02090	-0.05968	2.35578	1.16678	11.1405	6.53509
Median	-0.00791	-0.11775	3.35207	1.11198	11.0765	6.50580
Maximum	0.33015	0.63059	6.08112	1.86234	11.759	9.83640
Minimum	-0.70628	-1.03099	-3.21888	0.73143	10.4433	0.84587
Std. Dev.	0.18476	0.39067	3.05031	0.29042	0.42245	2.12130
Skewness	-1.13379	-0.15938	-0.42783	0.86281	0.07981	-0.80710
Kurtosis	6.00665	2.73322	1.72993	3.01702	1.42097	3.26790
Jarqu-Bera	24.81829	0.302376	4.104143	5.21154	4.40795	4.68548
Probability	0.000004	0.859686	0.128469	0.07385	0.11036	0.09606
Sum	-0.877845	-2.506380	98.94280	49.0049	467.9025	274.474
SSD.	1.399627	6.257538	381.4798	3.45817	7.31718	184.497
Obs	43	43	43	43	43	43

Source: Authors' computation.

The aggregate demand shock (AGGDDS) and supply shocks (SSS) reveal Nigeria's vulnerability to oil market volatility, with mean values of -0.0209 and -0.0597, respectively, and substantial fluctuations (standard deviations of 0.1848 and 0.3907). These negative shocks indicate significant economic instability during the study period. Public external debt (PED) with a mean of 6.5351 and a high standard deviation of 2.1213, reflects frequent revenue shortfalls, necessitating borrowing, and constraining fiscal flexibility. Health expenditure (HEXP), with a mean of 2.3558 and a high standard deviation (3.0503), underscores inconsistent public health funding, linked to Nigeria's pro-cyclical fiscal policies. Inflation (INF) and GDP exhibit moderate volatility, reflecting persistent structural inefficiencies and constrained growth. The Jarque-Bera test confirms non-normal distributions for most variables, notably AGGDDS ($p = 0.000004$), illustrating the asymmetric and leptokurtic nature of oil shocks. These patterns emphasize the challenges of managing fiscal stability in Nigeria's oil-dependent economy.

4.1.2 Unit Root Test

To assess the stationarity of the time series data and avoid spurious regression, the Augmented Dickey-Fuller (ADF) test was employed. Testing for unit roots confirms whether the data are stationary or require differencing, thereby guiding model selection and ensuring reliable results. This result is shown in Table 2.

Table 4.2: Unit Root Test Result

Variable	**Test**	**T Stat. (Level)**	**P-Val. (Level)**	**T Stat. (1st Diff)**	**P-Val. (1st Diff)**	**T Stat. (2nd Diff)**	**P-Val. (2nd Diff)**	**Order of Integr)**
AGGDDS	ADF	-7.8529	0.0000	-	-	-	-	I(0)
SSS	ADF	-5.8701	0.0000	-	-	-	-	I(0)
PED	ADF	-	-	-4.9291	0.0002	-	-	I(1)
GDP	ADF	-	-	-4.4577	0.0010	-	-	I(1)
INF	ADF	-4.4823	0.0049	-	-	-	-	I(0)
HEXP	ADF	-	-	-10.4537	0.0000	-	-	I(1)

Source: Authors' computation.

The unit root test results reveal mixed integration orders, highlighting the diverse stochastic properties of the study variables. Aggregate Demand Shocks (AGGDDS) and Supply Shocks (SSS) are stationary at levels (I(0)), indicating mean-reverting behavior and allowing for direct model inclusion. This suggests that shocks to these variables are short-lived. Conversely, Public External Debt (PED), Gross Domestic Product (GDP), and Health Expenditure (HEXP) are non-stationary at levels but achieve stationarity after first differencing (I(1)). Inflation (INF), stationary at levels, supports the notion of short-term manageability through monetary policy.

4.2 Main Findings

The Difference-in-Differences (D-i-D) analysis evaluated the effectiveness of Nigeria's fiscal policies in managing oil price shocks by comparing the outcome variable, which in this case is Health expenditure (HEXP) and External public debt (PED) before and after the shock for both the control period and the treated period.

4.2.1 Effectiveness of Government Health Expenditures in managing oil price shocks

The Difference-in-Differences (D-i-D) analysis for government health expenditure (GOVTHE) was employed to assess the effectiveness of Nigeria's fiscal strategies in cushioning the health sector from the impacts of sudden oil price shocks. This analysis compares health expenditures before and after the shock between the control and treated periods. The result is shown in Table 4.3 below:

Table 4.3: Difference-in-Differences Table for GOVTHE Analysis

Outcome var | P>|t|	govthe	S. Err.	|t|
Before			
Control	5.835		
Treated	7.000		
Diff (T-C) 0.222	1.165	0.954	1.22
After			
Control	7.024		
Treated	6.600		
Diff (T-C) 0.724	-0.424	1.203	0.35
Diff-in-Diff 0.371	-1.590	1.775	0.90

Source: Authors' computation. R-square: 0.06 * Means & Standard Errors are estimated b linear regression
Inference:* p<0.01;** p<0.05; * p<0.1.

In the pre-shock period, average government health expenditure was 7.000 during the treated period and 5.835 during the control period, yielding a non-significant difference of 1.165 (p-value = 0.222). This suggests no substantial disparity in health spending before the oil price shock. Post-shock, health expenditure slightly declined to 6.600 in the treated period and rose marginally to 7.024 in the control period, with a non-significant difference of -0.424 (p-value = 0.724). The D-

i-D estimate of -1.590 (p-value = 0.90) confirms that the oil price shock did not have a statistically significant impact on government health expenditure.

These findings underscore the ineffectiveness of Nigeria's fiscal policy in safeguarding health expenditure during oil price shocks. The inability to sustain or increase health financing amid economic turbulence highlights fiscal constraints, weak budgetary frameworks, and inadequate stabilization mechanisms. Declining health expenditure during the treated period exacerbates inequities in healthcare access, undermines service delivery quality, and jeopardizes public health outcomes, as Adebayo et al. (2022) emphasize. They argue that fiscal retrenchment during economic shocks deepens social disparities, reducing resilience to external shocks.

From a broader perspective, Oduyemi (2024) identifies weak institutional frameworks and mismanagement of oil rents in Sub-Saharan Africa as drivers of the resource curse, impeding inclusive growth. This aligns with Sebil (2023), who highlights the limited effectiveness of Nigeria's fiscal policy in stimulating sectoral output growth, emphasizing the need for targeted interventions to support non-oil sectors. Integrating these insights underscores the critical importance of addressing governance inefficiencies and fostering economic diversification to reduce vulnerabilities linked to oil shocks. Ahmed and Habiba (2022) highlight the risks posed by oil price volatility to fiscal stability and advocate for countercyclical fiscal policies as a buffer against shocks. Effective policy design, such as those employing macroeconomic models like DSGE or VAR, could enhance fiscal resilience. Collectively, these perspectives highlight the need for robust fiscal frameworks that prioritize health sector stabilization during crises, ensuring equity and resilience in healthcare access while promoting long-term economic recovery.

4.2.2 Effectiveness of Domestic Public External Debt in managing oil price shocks

The Difference-in-Differences (D-i-D) analysis for external public debt (PED) provides a framework for evaluating the effectiveness of Nigeria's fiscal policies in managing oil price shocks. This analysis compares external public debt levels before and after the shock between a control period and a treated period. The result is shown in Table 4.4 below:

Table 4.4: Difference-in-Differences Table for PED Analysis

Outcome var | P>|t|	Ped	S. Err	|t|
Before			
Control	5.645		
Treated	7.245		
Diff (T-C) 0.054*	1.600	0.831	1.92
After			
Control	7.436		
Treated	7.337		
Diff (T-C) 0.894	-0.099	0.742	0.13
Diff-in-Diff 0.160	-1.698	1.208	1.41

Source: Authors' computation

R-square: 0.16 * Means and Standard Errors are estimated b linear regression

**Inference: *** p<0.01; ** p<0.05; * p<0.1

Before the oil price shock, average external public debt was significantly higher in the treated period (7.245) compared to the control period (5.645), with a difference of 1.600 (p-value = 0.054). This notable pre-shock reliance on external borrowing underscores Nigeria's vulnerability to external debt in periods of economic stability. Post-shock, external public debt increased to 7.436 in the control period but slightly decreased to 7.337 in the treated period, resulting in a non-significant difference of -0.099 (p-value = 0.894). The D-i-D estimate of -1.698 (p-value = 0.160) further confirms the oil price shock did not significantly impact external public debt levels between the treated and control periods.

These findings suggest Nigeria's fiscal policies were only partially effective in mitigating the oil price shock's impact on external public debt. The significant pre-shock difference highlights structural vulnerabilities, including reliance on external borrowing during stable periods, while the post-shock results reveal insufficient fiscal measures to substantially alter borrowing patterns. The slight reduction in external debt in the treated group compared to the increase in the control group suggests some governmental effort to limit borrowing in affected sectors. However, these measures lacked the robustness necessary to effect significant change, perpetuating challenges such as high debt servicing costs, vulnerability to exchange rate fluctuations, and constrained access to international capital markets.

These challenges align with Adamu and Lawal (2022), who recognize external borrowing as short-term relief during economic shocks but caution against its long-term risks. Similarly, Okeke and Uzochukwu (2024) and Yusuf and Ibrahim (2023) emphasize that escalating debt levels crowd out public investment in critical sectors like healthcare, education, and infrastructure, thereby undermining fiscal flexibility and long-term growth. In this context, Oyekale, Tella, and Awolaja (2024) reveal the detrimental effects of external debt and corruption on economic development within ECOWAS countries, further highlighting the urgent need for robust fiscal governance.

5. CONCLUSION AND RECOMMENDATIONS

The findings of this study reveal critical insights into Nigeria's fiscal policies in the face of oil price shocks and their implications for economic stability, public expenditure, and debt sustainability. The pro-cyclicality of fiscal policy, characterized by reduced government spending during downturns, undermines the economy's ability to stabilize in the aftermath of external shocks. This is particularly concerning as such reductions amplify economic contractions, weaken automatic stabilizers, and disproportionately affect vulnerable populations reliant on public services like healthcare and education. Furthermore, Nigeria's increasing reliance on external public debt as a fiscal response to declining oil revenues raises long-term economic and fiscal concerns, including debt sustainability challenges and constraints on productive investment.

Policy reforms are urgently needed to address the structural issues revealed by this study. First, regarding oil price shocks and fiscal policy, there is a pressing need to transition from a pro-cyclical to a counter-cyclical fiscal approach. This would involve building fiscal buffers during periods of high oil prices, such as through sovereign wealth funds or stabilization accounts, to cushion against revenue shortfalls during price declines. Such reforms align with theoretical propositions advocating for fiscal policy as a tool for macroeconomic stabilization, ensuring that government spending is maintained or increased during downturns to boost demand, stabilize incomes, and mitigate economic contractions.

The findings also highlight significant constraints on government health expenditure, particularly during periods of fiscal contraction caused by oil price shocks. A robust policy framework is required to protect critical social spending, particularly on healthcare and education, from revenue fluctuations. This could include the adoption of expenditure rules that prioritize allocations to these sectors or innovative financing mechanisms such as earmarking a portion of oil revenues for health and education. Additionally, improving the efficiency of public spending through stronger governance, monitoring, and accountability mechanisms is essential to maximize the impact of limited resources.

On public external debt sustainability issues, the study underscores the need for prudent debt management strategies to mitigate risks associated with external borrowing. While borrowing provides short-term fiscal relief, it must be strategically managed to prevent unsustainable debt accumulation, excessive debt servicing costs, and vulnerability to exchange rate shocks. Policymakers should prioritize domestic revenue mobilization, including tax reforms to widen the tax base and improve compliance, reducing over-reliance on external borrowing. Efforts to diversify the economy away from oil dependency are also critical to stabilize revenues and strengthen debt sustainability over the long term. In line with the theoretical framework emphasizing the role of fiscal discipline in economic resilience, debt management strategies should incorporate comprehensive risk assessments and borrowing frameworks that balance immediate fiscal needs with long-term sustainability.

In conclusion, Nigeria's fiscal policies need significant restructuring to better respond to the challenges posed by oil price shocks and their impact on public expenditure and debt sustainability. Establishing a counter-cyclical fiscal policy framework, safeguarding critical health and social investments, and strengthening debt management practices are vital to ensuring economic resilience and sustainable development. These policy directions not only address the current vulnerabilities identified in this study but also pave the way for a more stable and inclusive economic trajectory.

REFERENCES

Adamu, A., & Lawal, O. (2022). Public debt and economic stability in Nigeria: A critical review. *Journal of African Economies, 31*(3), 211–229.

Adebayo, A. A., Bakare, S. T., & Ilesanmi, A. (2022). Fiscal policy responses to oil price shocks: Implications for healthcare financing in Nigeria. *Journal of Policy Analysis and Management, 41*(2), 378–396.

Adebisi, A. A. (2022). Impacts of fundamental macroeconomic shocks and anti-shock policies in Nigeria: A DSGE analysis. *Journal of Economics and Allied Research, 7*(2), 175–193. Retrieved from https://jearecons.com/index.php/jearecons/article/view/205

Adenuga, I. A., Akanbi, S. A., & Abuh, E. J. (2024). Asymmetric effect of oil revenue on economic performance in Nigeria: A non-linear ARDL approach. *International Journal of Research and Innovation in Social Science, 7*(5), 1778–1791. https://dx.doi.org/10.47772/IJRISS.2023.70639

Adeyemi, O. J., Okunade, S. O., & Amosun, O. O. (2024). Nonlinear relationship between oil price shocks and sustainable development in Nigeria. *Economic Insights – Trends and Challenges, 13*(3), 73–89. https://doi.org/10.51865/EITC.2024.03.05

Ahmed, A., & Habiba, H. U. (2022). Does oil price and production influence economic growth? Evidence from Nigeria. *Journal of Economics and Allied Research, 7*(2), 146–159. Retrieved from https://jearecons.com/index.php/jearecons/article/view/194

António, C., & Rodriguez-Gil, A. (2020). Oil shocks and fiscal policy procyclicality in Angola: Assessing the role of asymmetries and institutions. *Review of Development Economics, 24*(1), 209–237. https://doi.org/10.1111/rode.12633

Anugwom, C. G. (2023). The sustainability of external debt and economic development in Nigeria. *African Journal of Economics and Sustainable Development, 6*(4), 148–165. https://doi.org/10.52589/AJESDUNER2ON9

Auty, R. (1993). *Sustaining development in mineral economies: The resource curse thesis.* Routledge.

Bamaiyi, G. (2024). Effect of oil price shocks on selected macroeconomic variables in Nigeria (1990–2021). *International Journal of Development and Economic Sustainability, 12*(1), 12–25.

Bello, K. O., & Sulaiman, T. A. (2023). Fiscal adjustments during economic downturns: A necessary trade-off? *Journal of Development Policy and Practice, 18*(1), 89–104.

David, J., Gamal, A. A. M., Mohd Noor, M. A., & Zakariya, Z. (2024). Oil rent, corruption and economic growth relationship in Nigeria: Evidence from various estimation techniques. *Journal of Money Laundering Control, 27*(5), 962–979. https://doi.org/10.1108/JMLC-10-2023-0160.

Durand-Lasserve, O., & Karanfil, F. (2023). Fiscal policy in oil and gas-exporting economies: Good times, bad times, and ugly times. *King Abdullah Petroleum Studies and Research Center (KAPSARC).* https://doi.org/10.30573/KS--2023-DP11.

Fagbemi, F., & Fajingbesi, A. (2024). Rentierism–Political instability nexus: The danger of oil-producing region crisis in Nigeria. *Arthaniti: Journal of Economic Theory and Practice.* https://doi.org/10.1177/09767479241245471.

Hou, K., Qammar, R., Zhu, C., Usman, M., & Abbas, S. (2023). Testing the resource curse hypothesis: Unleashing the role of national governance and financial development in OPEC countries. *Resources Policy, 86,* 104242. https://doi.org/10.1016/j.resourpol.2023.104242.

Ibironke, A. (2023). Oil price shocks and Dutch disease in Nigeria: A global VAR analysis with policy lessons for small open oil-exporting countries. *SSRN.* https://doi.org/10.2139/ssrn.4526843.

Igbinedion, S. O., Hussainkehinde, O., & Aisha, A. Z. (2022). Economic growth, oil rent, and agricultural value-added nexus in Nigeria: An empirical evidence. *Journal of Economics and Allied Research, 7*(2), 1–15. Retrieved from https://jearecons.com/index.php/jearecons/article/view/195

Ihebuluche, F. C., Afolabi, J., Owuru, J., Oyolola, F., Oladepo, S., & Adekunle, W. (2023). Modelling policy and macroeconomic shocks transmission over the oil-bust cycle in Nigeria: Evidence from the last four decades. *Preprint*.

Koh, W. C. (2017). Oil price shocks and macroeconomic adjustments in oil-exporting countries. *International Economics and Economic Policy, 14,* 187–210. https://doi.org/10.1007/s10368-015-0333-z.

Lajuwomi, O. O (2024). Resource governance: Does abundance of resources guarantee socioeconomic development in Nigeria? *International Review of Social Sciences Research, 4*(3), 99-122. https://doi.org/10.53378/irssr.353096.

Laniran, T. J., & Adeleke, D. (2024). Does natural resource hinder taxation capacity and accountability? A case of selected oil-abundant developing countries. *Journal of Social and Economic Development, 26*, 499–520. https://doi.org/10.1007/s40847-023-00266-9.

Leo, J. G. (2024). The macroeconomic impact of crude oil price fluctuations in Nigeria. *Futurity of Social Sciences, 2*(3), 147–181. https://doi.org/10.57125/FS.2024.09.20.09

Matthew, A. O., & Adetayo, A. O. (2022). Oil price shock and fiscal-monetary policy variables in Nigeria: A structural VAR approach. In *IOP Conference Series: Earth and Environmental Science, 1054*, 012053. https://doi.org/10.1088/1755-1315/1054/1/012053.

Narh, J. (2023). The resource curse and the role of institutions revisited. *Environment, Development and Sustainability*. https://doi.org/10.1007/s10668-023-04279-6.

Odey, F. I., Odey, J., & Njarani, J. O. (2023). External debt burden and economic growth in Nigeria. *International Journal of Economics and Financial Management, 8*(3), 73–87. https://doi.org/10.56201/ijefm.v8.no3.2023.pg73.87.

Oduyemi, G. O. (2024). Inclusive growth and resource curse in oil-rich countries of Sub-Saharan Africa. *Journal of Economics and Allied Research, 9*(2), 340–359. Retrieved from https://jearecons.com/index.php/jearecons/article/view/413.

Ogbonna, B. M., Uba, C. N., & Odionye, J. C. (2018). The Effectiveness of Fiscal Policy on Economic Stabilization in Nigeria. *Journal of economics and sustainable development, 9*(6):45-53.

Okeke, C., & Uzochukwu, M. (2024). Debt sustainability and economic resilience in Nigeria. *African Development Review, 36*(2), 239–256.

Okorie, D. I., & Lin, B. (2024). Global shocks and fiscal stimulus: A tale of an oil-dependent-exporting country. *Financial Innovation*, *10*(1), 1-37. https://doi.org/10.1186/s40854-023-00527-w.

Okunoye, I. & Hammed, S. (2020). Oil Price Shock and Fiscal-Monetary Policy Variables in Nigeria: A Structural VAR Approach, *MPRA Paper 104145*, University Library of Munich, Germany, revised 15 Sep 2020.

Oligbi, B. O. (2020). Fiscal decentralization and macroeconomic stability in Nigeria. *Journal of Economics and Allied Research, 4*(1), 95–106. Retrieved from https://jearecons.com/index.php/jearecons/article/view/52

Omotosho, B. S., & Yang, B. (2024). Oil price shocks and macroeconomic dynamics in resource-rich emerging economies under regime shifts. *Journal of International Money and Finance*, *144*, 103082. https://doi.org/10.1016/j.jimonfin.2024.103082.

Onwuemeka, I. O. (2024). Poverty amidst plenty of resources: does institutional framework reinforce the resource curse syndrome in Nigeria?. *International Journal of Management Studies and Social Science Research*, *6*(1). 276-290. doi: 10.56293/ijmsssr.2024.4825.

Onyele, K. O., Ikwuagwu, E. B., & Opara, C. C. (2023). Government Debt Sustainability and Investments in Nigeria: Trends and Risk Thresholds amidst Macroeconomic Swings. *PanAfrican Journal of Governance and Development (PJGD)*, *4*(1), 18-52. https://doi.org/10.46404/panjogov.v4i1.4481.

Oyekale, O., Tella, S., & Awolaja, O. (2024). External debt and corruption on economic development in ECOWAS countries. *Journal of Economics and Allied Research, 9*(1), 153–169. Retrieved from https://jearecons.com/index.php/jearecons/article/view/387

Ruzzante, M., and N. Sobrinho (2022): The 'Fiscal Presource Curse': Giant Discoveries and Debt Sustainability, IMF Working Paper WP/22/10.

Samuels, D. (2024). A Literature Review on Fiscal Policy in Nigeria (April 29, 2024). Preprint available at SSRN: https://ssrn.com/abstract=4810744 or http://dx.doi.org/10.2139/ssrn.4810744

Sebil, O. O. (2023). Fiscal policy and sectoral output growth in Nigeria: A new empirical evidence. *Journal of Economics and Allied Research*, *8*(3), 18–34. Retrieved from https://jearecons.com/index.php/jearecons/article/view/321

Sohag, K., Kalina, I., & Samargandi, N. (2024). Oil market cyclical shocks and fiscal stance in OPEC. *Energy*, *296*, 130949. https://doi.org/10.1016/j.energy.2024.130949

Vandyck, T., Kitous, A., Saveyn, B., Keramidas, K., Los Santos, L. R., & Wojtowicz, K. (2018). Economic Exposure to Oil Price Shocks and the Fragility of Oil-Exporting Countries. *Energies*, *11*(4), 827. https://doi.org/10.3390/en11040827.

Xiang, D., He, X., & Shi, M. (2024). Deciphering the resource wealth enigma: Unraveling the interplay of institutional quality, economic diversity, and R&D in mitigating the resource curse. *Resources Policy*, *91*, 104935. https://doi.org/10.1016/j.resourpol.2024.104935.

Xiang, D., He, X., & Shi, M. (2024). Deciphering the resource wealth enigma: Unraveling the interplay of institutional quality, economic diversity, and R&D in mitigating the resource curse. *Resources Policy*, *91*, 104935. https://doi.org/10.1016/j.resourpol.2024.104935

Yussuff, R. O. (2024). Debt and Sustainable Development in Nigeria (1990-2021). *The International Journal of Humanities & Social Studies*. https://doi.org/10.24940/theijhss/2023/v11/i12/HS2312-014.