**Fiscal Sustainability in Nigeria: Does Changes in Oil Prices Matter?**

**ABSTRACT**

In this study, we explore the link between oil price fluctuations and fiscal sustainability in the context of debt servicing in Nigeria. The idea is that high oil prices tend to offer a unique opportunity for Nigeria to use the windfall gains to foster effective and sustainable debt management. Thus, we construct a dynamic parsimonious error correction model to quantify the effect of Brent crude and West Texas Intermediate oil prices and exchange rate on public debt serving between 1990 and 2022 with the data sourced from the World Bank and the Organisation of Petroleum Exporting Countries (OPEC). The findings showed that all the variables are integrated of order one, I(1) and have a long-run relationship at the 5% level. Evidence of a positive and significant effect of Brent crude oil prices on debt servicing was established from the results. This explains that an increase in Brent crude oil prices enhances the process of fiscal sustainability in Nigeria by meeting debt service obligations. Similarly, the results showed that West Texas Intermediate crude oil price affected debt servicing positively, but this finding is not significant at the 5% level. However, evidence of a negative effect of a negative and significant effect of exchange rates on debt servicing. This implies that an increase in the exchange rate decreases the value of the naira with adverse implications on the potential of the government to meet the debt service obligations. Given the findings, this study recommends that government must optimize the windfall gains from high oil prices to enhance public debt sustainability for better fiscal performance. This could potentially create more pathways for fiscal sustainability and ensure that debt servicing remains effective and sustainable in Nigeria.

**Keywords**: *Fiscal sustainability,* *Oil prices, Brent crude, West Texas Intermediate, exchange rate and Nigeria*

**1. Introduction**

Fiscal sustainability summarises the government’s ability to meet its expenditure obligations while remaining solvent in terms of servicing public debt in perpetuity without explicit default. This concept is crucial for maintaining macroeconomic stability and achieving the Sustainable Development Goals (SDGs). The idea is that a government that practices fiscal sustainability can effectively fund both current and future public services, ultimately enhancing the well-being of its citizens. According to Alshaib *et al.* (2023), fiscal sustainability offers developing countries an opportunity to close the financing gap, reduce their debt burdens, and gather resources for the SDGs. Moreover, it is widely believed that having fiscally sustainable policies is key to economic prosperity, as it allows the government to handle its spending and debt responsibly.

As one of Africa's largest oil producers, Nigeria's fiscal sustainability is closely linked to the vagaries of global oil prices. The fluctuations in prices may pose problems in other areas of budget allocations, public spending, and overall economic stability. In the past decade, the volatility of oil prices - driven by geopolitical tensions, changes in global supply and demand, and the shift towards clean and renewable energy has been extremely difficult for the Nigerian government to deal with. Not only does it make budgeting a difficult task, but it raises the prospect of economic shocks, resulting in budget deficits and high levels of public debt. According to Abdul-Mumuni *et al.* (2023), the fluctuations in crude oil prices affect economies that export or import oil differently. They further elaborated that the increase in the price level for crude oil is expected to yield favorable returns for the economy of an oil exporting country, while the economy of an oil importing country is likely to be negatively impacted by rising crude oil prices. Oil exporting nations face more fiscal management challenges since their governments rely substantially on the oil sector, which tends to be very volatile and may reduce long-term growth rates and social spending (Oduyemi and Owoeye, 2020). This tends to pose a threat to the implementation of fiscally sustainable policies.

Furthermore, Nwoba, Nwonu, and Agbaeze (2017) assert that fluctuations in crude oil prices cause economic anxiety, which in turn lowers the standard of living of the populace. This is in line with the understanding that fluctuations in oil prices frequently create uncertainty about future oil revenues and overall exports. The pro-cyclicality of government spending in oil-exporting countries has been linked to the instability in crude oil prices, which in turn has been linked to lower human development. It is also believed that the borrowing capacity of oil-exporting countries also varies following fluctuations in oil prices. For instance, a decline in oil prices often reduces the creditworthiness of oil-exporting countries, thus reducing their capital to invest in critical economic and social services to engender sustainability of the development goals.

As an oil-rich economy, Nigeria is largely dependent on crude oil for revenue generation, export revenues, and the building of external reserves. The fiscal policy framework is often planned and linked to a specific predicted price and level of crude oil output. This has put the economy in a vulnerable position and exposed it to the vagaries in the international oil market. As oil revenue accounts for a sizable amount of Nigeria's export earnings, fluctuations in oil prices pose a threat to fiscal sustainability. Yusuf (2015) explains that oil plays a significant role in Nigeria's fiscal execution in terms of achieving income and spending goals and determining borrowing capacity. This is in line with Kamer's (2023) acknowledgement of Nigeria's status as one of Africa's leading producers and exporters of oil. This has renewed the interest in the implications of oil price fluctuations on macroeconomic sustainability in Nigeria. Following the volatility of oil prices in the global market, it becomes imperative to explore how it has affected Nigeria’s ability to achieve the goal of fiscal sustainability in terms of its contribution to the debt service obligations as the country faces difficult times due to rising debt burden from domestic, bilateral and multilateral sources. Given the introduction, the rest of the research is organized as follows: The relevant literature is presented in Section II, and the methodology and data sources are presented in Section III. Section IV presents the findings and discussion, while Section V provides the conclusion and policy insights.

**2. Review of Related Literature**

The resource curse theory was introduced by Auty (1993) in his seminal work "Sustaining Growth in Mineral Economies." This theory suggests that countries rich in natural resources, particularly non-renewable ones like oil, often struggle with economic challenges including implementing sustainable fiscal policies and mitigating underdevelopment. Several factors contribute to this issue, including a heavy dependence on resource exports, fluctuating commodity prices, corruption, ineffective governance, and Dutch disease, which occurs when a resource boom leads to currency appreciation that harms other economic sectors. Collier and Hoeffler (2002) argue that the presence of natural resources can ignite conflicts within societies, as different groups struggle for control over these valuable assets. This competition often hampers the effective use of resources to foster social and economic development, limiting opportunities for sustainable development. Consequently, the development goals that resource-rich countries aim for are often unrealistic and hindered by low economic growth, instability, authoritarian regimes, conflict, and weak institutions.

The resource curse can hinder countries from diversifying their economies, making them more vulnerable to external shocks and slowing down long-term development. Additionally, the presence of valuable resources can lead to political instability and the rise of authoritarian regimes as powerful groups compete for control and benefits. To combat the resource curse, countries typically implement strategies that promote economic diversification, improve governance, tackle corruption, and encourage sustainable development. Moreover, a resource-dependent economy can benefit from transparent management of resource revenues through tools like sovereign wealth funds, which can help mitigate negative impacts. Auty (1998) suggests that the resource-curse theory illustrates why nations rich in natural resources often struggle to leverage their wealth for economic growth.

Often, these countries have slower rates of economic growth than those with limited natural resources. An example of this would be the Dutch Disease syndrome, which produces an environment that impedes economic diversification and generally threatens non-oil operations. One drawback of the resource curse theory is its inherent negative correlation between economic performance and the presence of natural resources. Consequently, this theory fails to account for certain nations that have successfully avoided the resource curse. This indicates that there may be significant factors missing from the resource curse framework. One crucial factor could be the quality of institutions, the structure of the economy, or other relevant elements.

Furthermore, several studies have empirically analysed how the vagaries of oil prices shape fiscal policy decisions of oil-producing and oil-exporting countries. The findings of these studies vary across jurisdictions, time frame and methodology. Some of these studies showed that changes in oil prices positively affect government revenue (Al-Jabri, Raghavan & Vespignani, 2022; Magazzino , 2022; Hathroubi & Alou, 2022; Sohag, Kalina & Samargandi, 2024; Huseynli, 2025; Aremo, Orisadare & Ekperiware, 2012). On the other hand, studies such as Agboola, Chowdhury, & Yang (2024; El-Naser, Dincă & Dincă, 2025) reported that an increase in oil prices adversely affects the government's capacity to meet debt servicing and expenditure obligations. However, Eze & Apiri (2020) found that oil prices do not significantly affect total external debt in Nigeria.

**2.1 Stylized Facts on Debt Servicing**

As an integral aspect of fiscal sustainability, debt servicing, which covers the interest payments and principal repayments on any outstanding debt, has continued to vary in Nigeria in the past two decades. When these costs are high, they can put a real strain on government budgets, often forcing them to redirect funds away from crucial public services such as healthcare, education, and infrastructure. The rising debt servicing obligations are largely linked to the growth of public debt from various sources, especially bilateral and multilateral sources. The trajectory of debt servicing in Nigeria between 2002 and 2022 is presented in Figure 1

**Figure 1: Debt service (% of export of goods and services), 2000-2022**

The trajectory of debt service, measured as a percentage of exports of goods and services, shown in Figure 1, varied quite a bit throughout the study period. It rose from 8.21% in 2000 to 12.46% in 2021, then dipped to 4.47% in 2004. Interestingly, debt service payments hit a peak of 15.41% in 2005. This sharp rise can be attributed to a significant amount of external debt, primarily owed to the "Paris Club" of creditors. This situation developed over years of heavy borrowing to support development projects, coupled with economic downturns that made it tough for the country to repay the loans, leading to a hefty accumulation of interest on the outstanding debt. Fortunately, in 2007, debt service obligations dropped dramatically to 1.14% after a major debt relief package from the Paris Club eased Nigeria’s debt burden. From 2008 to 2015, debt servicing in Nigeria saw an upward trend, climbing to 5.09% in 2021 before slightly decreasing to 4.29% in 2022. This trend highlights the rising costs of debt servicing, which have significantly impacted the fiscal space of the Nigerian economy.

**3. Data and Methodology**

**3.2 Model Specification**

Our research built upon the earlier works of Ako-Nai & Ayoola (2013) and Nwoba, Nwonu & Agbaeze (2017), but we made some adjustments by concentrating on debt service as a percentage of exports and incorporating the price of West Texas Intermediate crude oil. The framework for this study is grounded in the resource curse theory, which suggests that countries rich in natural resources, particularly non-renewable ones like oil, often face economic hurdles, including struggles to meet their debt service commitments. Notably, the data for the variables were sourced from the World Bank and the Organization of Petroleum Exporting Countries (OPEC). The function specification of the model is as follows:

EXDS = f (BCP, WTI, EXH) (3.1)

Where: EXDS = External debt service, BCP = Brent crude oil price, WTI = West Texas Intermediate crude oil price, EXH = Exchange rate

The linear econometric model of the functional equation is provided below:

EXDSt = α0 + α1LOG(BCP)t + α2LOG(WTI)t + α3LOG(EXH)t + U1t *(3.2)*

Where: α0 = Intercept, α1 **–** α3 **=** Slope parameters to be estimated, LOG = Natural log notation, U1t = Disturbance term,

The error correction model (ECM) of the equation is specified as follows:

$ΔEXDS=β\_{0}+\sum\_{i=1}^{K}β\_{1}ΔEXDS\_{t-i}+\sum\_{i=1}^{K}β\_{2}ΔLOG(HDI)\_{t-i}+\sum\_{i=1}^{K}β\_{3}ΔLOG(WTI)\_{t-i}+\sum\_{i=1}^{a}β\_{4}ΔLOG(EXH)\_{t-i}$+ $πECT\_{t-1}+μ\_{1t}$ *(3.3)*

Where:  = Intercept, β1 – β4 = Coefficients of the lagged explanatory variables, K = maximum lag length for the variables, Δ = First difference operator, ECT = Error correction term and  = Error correction coefficient

**3.3 Method of Data Analysis**

In this study, we used the Augmented Dickey-Fuller (ADF) test, which was first introduced by Dickey and Fuller (1981), to guide our analysis. After performing the unit root test, we moved on to a cointegration test to see if the variables have a long-term relationship. The method we chose for the cointegration test was based on the results of this initial test. For our cointegration analysis, we applied the Johansen method, as described in 1988. We also included the error correction mechanism (ECM) in our data analysis. This approach is particularly useful because it allows us to re-parameterize the model, enabling us to assess the dynamic effects of oil prices on fiscal sustainability, especially debt servicing, in line with Engel and Granger's (1987) proposition. Additionally, the ECM gives us insights into the speed of adjustment, helping us understand how the model approaches a long-run equilibrium. Our data analysis techniques also featured descriptive statistics, which covered aspects like mean distribution, standard deviations, and the normal distribution of each variable throughout the study period. To test for serial correlation, we used the Breusch-Godfrey (BG) test, introduced by Breusch and Godfrey in 1978. This BG test evaluates the null hypothesis that there’s no serial correlation in the error terms at a 5% significance level. Likewise, we applied White’s test from 1980 to check for heteroskedasticity, testing the null hypothesis that the variance of the error terms remains constant.

**4. Results and Discussion**

**4.1 Descriptive Statistics**

The descriptive statistics for this study are presented in Table 1.

**Table 1: Descriptive statistics for the variables**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Statistics** | **EXDS** | **BCP** | **WTI** | **EXH** |
| Mean | 1.5316 | 51.18333 | 49.50545 | 146.5576 |
| Median | 1.1423 | 43.67000 | 43.29000 | 129.3565 |
| Maximum | 3.8142 | 111.6300 | 99.06000 | 423.1660 |
| Minimum | 0.7104 | 12.80000 | 14.39000 | 8.037808 |
| Std. Dev. | 0.4716 | 32.35554 | 28.67539 | 116.3360 |
| Jarque-Bera | 2.8157 | 3.053157 | 3.065847 | 3.805262 |
| Probability | 0.8915 | 0.217278 | 0.215904 | 0.149176 |
| Observations | 33 | 33 | 33 | 33 |

**Source: Computed from E-views Software**

The summary statistics showed that, on average, debt service payments stood at 1.53%. This means that, from 1990 to 2022, these obligations represented a small proportion of the total exports of goods and services. Additionally, the average prices for Brent crude and West Texas Intermediate during this period were US$51.18 and US$49.505 per barrel, respectively. It is also clear from the findings that the exchange rate averaged 146.56 naira for every dollar throughout the study period. Interestingly, the standard deviation for each variable was higher than the mean, suggesting that the data points for each variable are closely grouped around their mean values. Furthermore, the results indicated that the Jarque-Bera statistic's probability value for each variable exceeded 0.05, which means all the variables follow a normal distribution at the 5% significance level. This evidence of normal distribution across the variables is quite significant, as it lays a solid foundation for estimating the model.

**4.2 Unit Root Test**

As highlighted previously, the unit root test was based on the Augmented Dickey-Fuller (ADF) method. The results are presented in Table 2.

**Table 2: ADF Unit Root Test Result**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable  | ADF stat. at levels | ADF stat. at 1st diff. | Critical Value at 5% | DecisionI(d) |
| $$EXDS\_{t}$$ | -0.915 | -11.041\*\*\* | -2.96 | I(1) |
| $Log(BCP\_{t}$) | -0.909 | -5.019\*\*\* | -2.96 | I(1) |
| $Log(WTI\_{t}$) | -0.975 | -5.141\*\*\* | -2.96 | I(1) |
| $Log(EXH\_{t}$) | -1.895 | -5.246\*\*\* | -2.96 | I(1) |

**Source: E-views output (2025)**

**Note: \*, \*\* and \*\*\* denote Significant at 10%, 5% and 1% levels respectively**

The results from the ADF unit root test indicated that all the variables are nonstationary, as their ADF statistics exceeded the 5% critical value. This means we cannot reject the null hypothesis of a unit root (nonstationary) process for any of the variables. Given this evidence of nonstationarity, we then applied the first difference test, which revealed that the variables become stationary after the first difference. In other words, all the variables are integrated of order one, I(1), which means we need to check for cointegration among them.

**4.3 Cointegration Test**

In this study, we used the Johansen maximum likelihood method for cointegration, as mentioned earlier, to determine whether there is evidence of cointegration, based on the I(1) results from the ADF unit root test. The results are presented in Table 3.

**Table 3: Johansen cointegration test results**

|  |
| --- |
| **Series: EXDS LOG(BCP) LOG(WTI) LOG(EXH)** |
| Trace Test Results |
| Null Hypothesis | Trace statistic | 5 per cent critical value |
| r =0\* | 87.14 | 47.21 |
| r ≤ 1\* | 41.63 | 31.72 |
| r ≤ 2 | 17.19 | 12.45 |
| r ≤ 3 | 2.43 | 4.81 |
| Maximum Eigenvalue Test Results |
| Null Hypothesis | Max-Eigen statistic | 5 per cent critical value |
| r =0\* | 48.32 | 33.54 |
| r ≤ 1\* | 39.63 | 28.16 |
| r ≤ 2 | 22.08 | 16.25 |
| r ≤ 3 | 1.03 | 3.74 |

**Source: E-views output (2025)**

**Note: \* denotes rejection of the hypothesis at the 0.05 level**

The results showed that there are two cointegrating equations based on the trace test results. Likewise, the maximum eigenvalue test also confirmed the presence of two cointegrating equations. With these findings, we can reject the null hypothesis of no cointegration at the 5% significance level. This means there is a long-term relationship between debt service payments and the independent variables, which sets the stage for modelling this relationship in an error correction model, as suggested by Engel and Granger (1987). The evidence of a long-term relationship between debt service payments and oil prices supports the work of Ako-Nai & Ayoola (2013), who found that changes in oil prices are cointegrated with debt servicing. So, this suggests that fluctuations in oil prices can be a reliable indicator for predicting long-term changes in fiscal sustainability in Nigeria.

**4.4 Model Estimation**

Given the evidence that the variables are cointegrated, we applied a general-to-specific approach to estimate the Error Correction Model (ECM). The summarised estimated parsimonious ECM is presented in Table 4.

**Table 4: Parsimonious ECM**

|  |  |  |
| --- | --- | --- |
| Dependent Variable: D(EXDS) |  |  |
| Method: Least Squares |  |  |
| Variable | Coefficient | t-Statistic | Prob. |
| C | 0.136 | 1.0491 | 0.2188 |
| D(EXDS(-1)) | 0.418\*\*\* | 3.518 | 0.0026 |
| DLOG(BCP) | 0.016\*\*\* | 4.172 | 0.0001 |
| DLOG(BCP(-1)) | 0.014 | 1.367 | 0.7408 |
| DLOG(WTI(-1)) | 0.051 | 1.802 | 0.0941 |
| DLOG(EXH(-1)) | -0.091\*\*\* | -5.044 | 0.0000 |
| ECT(-1) | -0.874\*\* | -2.189 | 0.0214 |
| R-squared | 0.715 | Mean dependent Var | 0.00124 |
| Adjusted R-squared | 0.693 | S.D. dependent Var | 0.00145 |
| F-statistic | 11.290 | Durbin-Watson stat | 2.1542 |
| Prob(F-statistic) | 0.000042 |  |  |

**Source: E-views output (2025)**

**Note: \*, \*\* and \*\*\* denote Significant at 10%, 5% and 1% levels respectively**

The error correction coefficient (-0.874) is negative and significant at the 5% level. This suggests that long-term distortions in the model can be corrected at the speed of 87.4% each year. It also authenticates the evidence of long-term relationships among the variables as established earlier from the Johansen cointegration test results. As observed from the dynamic slope parameters, a one-period lag of external debt is positively linked to its current, indicating that previous debt service payments are important in predicting changes in future debt servicing. There is evidence of a positive and significant effect of Brent crude oil prices on debt servicing. This explains that an increase in Brent crude oil prices enhances the process of fiscal sustainability in Nigeria through meeting the debt service obligations. This is not surprising following the large dependence of Nigeria on crude oil exports for foreign exchange earnings to meet fiscal obligations including debt servicing. The significant positive contribution of Brent crude oil prices to fiscal sustainability corroborates the findings of Hathroubi & Alou (2022) and Sohag, Kalina & Samargandi, (2024) who established that oil prices aid fiscal sustainability by boosting government revenue. Similarly, the results showed that West Texas Intermediate crude oil price affected debt servicing positively, but this finding is not significant at the 5% level. This aligns with the findings of Eze & Apiri (2020), indicating that an increase in the price of West Texas Intermediate crude oil does not significantly improve the debt service obligations. This could be linked to the fact that the West Texas Intermediate crude oil price does not specifically apply to Nigeria. However, evidence of a negative effect of a negative and significant effect of exchange rates on debt servicing. This implies that an increase in the exchange rate decreases the value of the naira with adverse implications on the potential of the government to meet the debt service obligations. Thus, it followed from the results that the depreciation of the naira associated with an increase in exchange rates undermines the goal of fiscal sustainability through negative implications on debt servicing. The adjusted R-squared value of 0.693 indicates that the oil price indicators and exchange rate together explain 69.3% of the total variations in external debt during the study period. Additionally, the results revealed that the probability value of the F-statistic, which is 0.0000, is below 0.05. This suggests that the explanatory variables are jointly significant in accounting for changes in debt servicing.

**Table 5: Post-estimation test results**

|  |  |  |
| --- | --- | --- |
| Test Type | Test Stat. | Prob |
| Breusch-Godfrey Serial Correlation LM Test | 0.165 | 0.4127 |
| White’s heteroscedasticity test | 4.718 | 0.1246 |
| Ramsey RESET |  0.1812 | 0.9651 |

**Source: E-views output (2025)**

From the results, we accepted the null hypotheses regarding serial independence and the homoscedasticity of the residuals at a 5% significance level. This conclusion comes from the fact that the test statistics are linked to probability values exceeding 0.05. Additionally, the findings indicated that there is no specification error in the model, as evidenced by the F-statistic (0.1812) being associated with a high probability value (0.9651). Consequently, these results suggest that the parsimonious ECM is reliable for policy recommendations and long-term forecasting.



**Figure 2: Cumulative sum (CUSUM) of squares graph**

**Source: E-views output (2025)**

It is evident from Figure 2 that the CUSUM of the squares graph is within the two critical bounds at the 5% level. This indicates that the estimated parameters have remained stable throughout the study period.

**5. Conclusion and Policy Insights**

The core of this study is to deepen the understanding of how fluctuations in oil prices affect fiscal sustainability in Nigeria, particularly regarding debt servicing. This arises in response to increasing concerns about the changing dynamics of oil prices in the global market and the ongoing floating of the naira in the foreign exchange market. In this context, we examined how the prices of Brent crude oil, West Texas Intermediate crude oil, and the exchange rate contribute to achieving fiscal sustainability through improved debt servicing. The findings indicated that the prices of Brent crude and West Texas Intermediate crude oil positively impacted debt servicing during the study period. In contrast, only the price of Brent crude oil significantly influences debt servicing, suggesting that the Nigerian government should capitalise on the increased revenue associated with the rising price of Brent crude to promote fiscal sustainability by servicing both domestic and external debts. The government must optimise oil revenues to enhance public debt sustainability for better fiscal performance. Additionally, the findings revealed that exchange rates negatively affect debt servicing. This implies that an increase in the exchange rate poses a threat to the goal of fiscal sustainability in Nigeria. Therefore, the Central Bank of Nigeria must prioritise maintaining strong foreign currency reserves to mitigate the risks associated with fluctuations in exchange rates. Furthermore, policymakers, including the Debt Management Office (DMO), must enhance their efforts by diversifying debt currencies while also considering the use of financial instruments such as currency swaps to safeguard against exchange rate risks. This approach could potentially create more pathways for fiscal sustainability and ensure that debt servicing remains effective and sustainable.

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