Research Journal of Finance and Accounting
ISSN 2222-1697 (Paper) ISSN 2222-2847 (Online)
Vol.15, No.9, 2024

Public Debt and Sustainable Economic Growth in Nigeria

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Abstract

The Nigerian government has borrowed for more than three decades to cater for the growing fiscal deficit based on a weak tax revenue base. However, the development needs of a present generation must be managed without compromising the capacity of the future generations to meet their own needs in the same economy. This study investigates the relationship between government public borrowing and economic growth sustainability for the period 1981 to 2022. The study utilizes the disaggregated government borrowing in addition to the sustainable development variables. The Fully Modified OLS estimation technique (FMOLS) was deployed for the analysis of the study variables. The effect of domestic borrowing is negative in influencing the nation's sustainability because of high interest rate and the crowding out of private sector investment. The effect of external borrowing is positive and significant on sustainability and the applicable interest rate is relatively lower as the loan's proceeds are generally applied more to capital projects and infrastructure. The effect of other macroeconomic variables, such as interest rate and exchange rate, were negative and significant in affecting sustainability. The study recommends that the government improves negotiation for better interest rates and improve the utilization of domestic borrowed funds. Also, the government must consciously put measures in place to strengthen the domestic financial markets to have access to longer-tenured and cheaper funds. In addition, the government should ensure that borrowings are adequately channeled to finance essential public infrastructure like electricity and transportation, improve the productivity of the real sector and improve the capital stock for sustainable economic growth in the country.

Keywords: Domestic debt, economic growth, external debt, public debt, sustainability.

DOI: 10.7176/RJFA/15-9-05

Publication date: October 30th 2024

1.0 Introduction

Sustainable development is the organizing principle for meeting human development goals while at the same time sustaining the ability of natural systems to provide the resources and ecosystem services upon which the economy and society depend. It is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development has continued to evolve in terms of protecting the world's resources, while its true agenda is to control the world's resources. The goal of sustainable development is to achieve balance/harmony between environmental sustainability, economic sustainability and socio-political sustainability. Elimination of poverty, equitable distribution of wealth, good jobs and economic growth are part of the sustainable development goals of a more prosperous, equitable, and sustainable world (Odusola, 2017).

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity. The Sustainable Development Goals (SDGs) are the blueprint to achieve a better and more sustainable future for all. The goals address global challenges, including those related to poverty, inequality, climate, environmental degradation, prosperity, peace, and justice. Taxation, government expenditures, and public debt are the fiscal tools available to the government to influence society's growth and impact environmental sustainability. Public debt is money that the government owes to any other entity. It includes money owed to individuals, mutual funds, pensions, and foreign governments/institutions. Public debt may be raised internally or externally. Internal debt refers to public debt floated within the country, while external debt refers to loans floated outside the country. According to Ajibola et al. (2015), external debt is debt owed by a country to other countries or institutions abroad.

Public debt or public borrowing is considered an essential source of income for the government. If revenue

collected through taxes and other sources is not adequate to cover government expenditures, the government may resort to borrowing. Such borrowings become more necessary in times of financial crises and emergencies like war, droughts, or floods. The instrument of public debt takes the form of government bonds or securities of various kinds. Such securities are drawn as a contract between the government and the lenders. By issuing securities, the government raises public loans and incurs a liability to repay both the principal and interest amount as per the contract. In Nigeria, the government issues treasury bills, treasury certificates and bonds as instruments of public borrowing.

The main reason for raising external loans by developing countries, Nigeria inclusive, is to bridge the domestic resource gap in order to accelerate economic development (Onodugo, 2014). Such borrowing is healthy, provided the loans are judiciously used for production (not consumption) and handled in such a way as to facilitate the eventual repayment and liquidation of the debt. According to Ogunyemi (2011), the history of public debt in Nigeria could be traced to the 1920s when the government started to borrow externally for the purpose of creating and expanding infrastructural facilities in order to quicken the pace of its economic growth. Some of the reasons adduced for Government borrowings in Nigeria include the need to meet budget deficit (such as the 2023 budget deficit), to meet the expenses of war and other extraordinary situations (Boko Haram, Niger Delta Militants, Banditry, Internally Displaced Persons, Flood, and other unexpected difficulties), and to finance development activities by providing the much-needed infrastructure.

In recent years, the Nigerian government has extensively used public debt, which has come to be seen as a veritable source of funds for all tiers of government. However, in spite of the increase in government revenue and increasing debt profile, more needs to be seen in terms of infrastructural development that could drive a sustainable environment. The country's debt burden was so heavy in the late 1990s that the government had to beg for debt forgiveness from its various creditors between 2003 and 2005. Following the successful Paris Club debt deal in 2005 and the exit from the London Club debts in 2006, Nigeria's external debt stock declined to $3,654.21 million as of 31st December 2007 (Debt Management Office, 2008).

The country was able to secure debt relief in 2005 and 2006, but the relief was short-lived. Just a few years after the debt forgiveness, the country started to borrow massively, so much so that the total debt profile had again risen to 64 billion Naira by December 2017 and N97.34 trillion ($108.229 billion) by 31st December 2023. Researchers have argued that public debt is desirable because rapid economic growth and welfare improvement would be achieved if borrowed funds were utilized to finance economically and socially viable projects. For example, the money borrowed to construct the Lagos-Ibadan expressway and the Abuja-Kaduna railway could be considered productive debts. New and additional investments would lead to the creation of employment and a greater output of welfare-enhancing goods and services. Moreover, if borrowed funds are spent on social and security projects that are of more benefit to the lower-income groups, it could lead to a reduction in income inequality and boost economic welfare. Furthermore, those who lend money to the government by purchasing government securities will become richer as they acquire additional assets to increase their wealth portfolio. Based on the perceived benefits, but without regard to the Fiscal Responsibility Act (2007) on the rules governing government borrowing in Nigeria, successive administrations in the country have stepped into the perpetual debt trap with the result that the debt-to-GDP ratio by the end of 2023 was 42.34% as opposed to 11.4% in 2007 (Debt Management Office, 2024).

However, it could be argued that excessive government borrowing within the economy tends to crowd out viable private investments. Uncontrolled public debts also impose potential future obligations on taxpayers when borrowed funds are diverted to prestigious or white-elephant projects that have no direct relevance to economic growth and development. Similarly, funding excessive interest rates on public debt in hard currency deprives the nation of foreign exchange needed to procure critical inputs required in the industrial sector, especially in a country like Nigeria, which is highly import-dependent. This may lead to declining industrial capacity utilization and loss of jobs. In developing economies, public debt is an ineffective way of controlling inflation. As a matter of fact, debt servicing may create inflationary effects even under the condition of less than full employment. Specifically, the financing of domestic debt usually causes aggregate demand to increase when creditors bring the income generated through their investment in government securities into circulation. Debt-servicing problems are aggravated when short- and medium-term projects with amortization are due before projects are completed. Finally, public borrowing may result in unbearable conditionality of the International Monetary Fund (IMF), like trade liberalization, withdrawal of subsidies on essential products, expenditure reduction, non-increase of salary of public servants and other stiff conditions that could have grave repercussions on living standards of the people.

Environmental sustainability is the key strategy against the backdrop of the growth of the human population and

the rampant exploitation of the environment by humans. The underlying concern of modern society is that while today's people are enjoying the comforts of economic development, future generations are on the verge of confronting scarce natural resources and a polluted environment. It is our most important responsibility to leave the planet as a self-sustainable system providing equal opportunities for survival not only to our future generations but also to all other species co-habiting with us (Arora, 2018; Oyadeyi et al., 2024). As reported by the Central Bank of Nigeria, external debts in Nigeria averaged 6,375.33 USD million from 2008 until 2015 and reached a record low of $3.63 billion in the last quarter of 2009. They increased to $10.72 billion in the fourth quarter of 2015 from $10.62 billion in the third quarter of 2015 and stood at $42,5 billion by the end of 2023 without much increase in infrastructural development.

A country's future economic performance can be significantly influenced by the way its government handles its finances and the amount of debt it has (Heise, 2023). Lower public debts are usually linked with fiscal surpluses, whereas countries facing fiscal deficits tend to borrow money from both domestic and foreign sources, which fosters the accumulation of public debt (Monamodi, 2021). In order to mitigate the challenges posed by public debt in Nigeria, the Debt Management Office (DMO) was established in October 2000 to certify and coordinate the management of the nation's debt, which was hitherto done by a myriad of establishments in an uncoordinated fashion. In spite of the establishment of the DMO, Nigeria's public debt was on a steady increase from 2009, when the external debt stood at $3.627 billion, to the 4th quarter of 2018, when the external debt alone stood at $25.27 billion in addition to the N16.63trillions of internal debt. According to the National Bureau of Statistics, Nigeria's total public debt exposure, which, as of 31st December 2018, stood at $79.4 billion, rose to N97.34 trillion or $ 108.229 billion by 31st December 2023. This is more than five years' budget of the nation (going by 2023 standard)

With a debt burden of US$130 billion being serviced by 95% of government revenues and debt servicing now exceeding both recurrent and capital expenditures, Nigeria's debt levels are clearly unsustainable. Add to this US$10 billion from the 2024 budget deficit, and the question begs: Is Nigeria heading towards the default direction of Ghana, Zambia, and Ethiopia? According to Adebajo (2024), the discussion on restructuring both domestic and external debt must commence alongside the ongoing economic reforms and revenue drive to avoid Paris and London club imposition. The goal is to drive the Nigerian economy out of stagflation and reach sustainable GDP growth targets.

The objective of this study is to examine the impact of public debt on a sustainable environment through infrastructural development in Nigeria. The study focuses on public debt and government (capital) expenditure as instruments of fiscal Policy. The study covers a period of forty-two years (1981 – 2022). 1981 was the year when austerity was first declared in Nigeria, and the government started to borrow massively (purportedly to develop infrastructure) due to the fall in crude oil prices in the international market. A significant question to address is: "How much impact has public debt on infrastructural development in Nigeria during the period under study to enhance sustainable environment?"

For empirical analysis, time series data on public debts and government expenditures from 1981 to 2022 were collected and analyzed. The study's outcomes are expected to guide decision-makers in formulating policies that would promote sustainable economic growth in Nigeria.

2.0 Brief Literature Review

Theoretically, the classical economists advocated limiting the role of government to three functions - Maintenance of internal law and order, protection against external evasion and provision of certain public goods (Ajayi et al., 2023). They discouraged government participation in regulating market activities. These earlier economists emphasized that the market is self-equilibrating as they asserted that there is perfect mobility of labour, the presence of ideal market competition, and full employment of resources. It was envisaged that any economic downturn would naturally self-correct and reach an equilibrium state without government intervention. However, the views of the classical school of thought could be more realistic in the modern economy (Lefteris, 2007). Also, the classical economists asserted that the primary drive of public debt is a result of increased rates in government spending and the retail sector's willingness to provide credit (Ajayi et al., 2023). Furthermore, they noticed that heavy governmental borrowings to finance spending would bring about an increase in interest rates and a decline in private investment in the credit market, thereby resulting in crowding out of private sector investment (Lansley, 2023; Malachy et al., 2022). The classicist economists had a unique perspective on public debt and its impact on the economy with the assumption that Savings, private investment and employment decline as the money supply remains constant when money is transferred to the government as borrowing;

government funds must be efficiently and effectively used in only developmental projects and regarded public borrowings as unproductive, opposing government seeking additional funds as it will be used for unproductive uses. Moreover, the two main ways of financing public expenditure are taxation and public borrowing.

In the words of Diatkine (2021), Adam Smith viewed debt as stagnation of "the natural progress of a nation towards wealth and prosperity" Smith and other classical economists vehemently opposed the government running a budget deficit as total reliance on domestic debt causes havoc to the wellbeing of the economy. This is because the repayment of debt leads to an increase in tax, consequently resulting in a flight of capital and devaluation of the currency, leaving a negative impact on the producers. Generally, classical views of public debt are primarily pessimistic. Smith, Hume, Say, Ricardo, Jefferson, Mill, Marx, and others believe that government borrowing is invariably wasteful, ruinous to prosperity, and even morally unjust. After the market failure and the great depression of the 1930s, Keynes (1936) stated that the intervention of the state was necessary for economic activities to regulate and stabilise the economy. This view revolutionizes the world economic system after the great depression in the 1930's. The theory states that the government intervenes in regulating the economy by utilizing numerous ways of financing its spending (Zahariev,2021). The Keynesian theory opposed the classical view of restricting the use of debt financing. It also refuted the view of classical economists that the government should always run a balanced budget (Anifowose & Ajayi,2021). The theory entails that the continuous unbalanced budget and persistent accumulation of public debt can negatively affect the country's capacity to maintain its financial stability (Van et al., 2020). The Keynesian theory argumentatively regarded substantial public debt as advantageous rather than a liability. This is because they believe that continual deficit spending is necessary to achieve full employment, which is widely accepted, and that governments seeking economic expansion must engage in this practice (Monogbe et al., 2015). Clements et al. (2003) emphasized the negative impact of excessive borrowing on economic growth, particularly excessive foreign borrowing, which has the potential to compete with public investment, mainly when used for debt servicing. Taylor (1993) drew attention to the liquidity constraints brought on by debt, which led to a decrease in government spending as a result of debt servicing.

The Debt Overhang Theory (Okwoche, 2022) helps to understand how increasing debt levels can influence growth. This theory helps to understand how borrowing affects factors such as capital production, investment, and overall economic growth (Okwoche, 2022). The Debt Overhang Theory also addressed the "conditionality" of debt – how the terms of borrowing impact economic transformation. Research indicates a negative relationship between debt and investment, which can lead to a debt overhang situation. In this scenario, high debt levels discourage further investment. The theory illustrates how excessive debt can distort and impede economic growth, potentially undermining the effectiveness of economic reforms. Understanding the specific conditions tied to debt is essential for evaluating its impact on sustainable economic growth. Furthermore, by examining the debt overhang issue, the effect of debt management strategies on growth can be effectively addressed. The theory underscores that effective debt management is crucial to mitigating the adverse effects of debt overhang (Yusuf & Mohd, 2021).

Empirical studies examining the relationship between public debt and economic growth have yielded mixed findings, reflecting the complexity of the issue and the diverse factors at play. Some studies have found evidence of a nonlinear relationship between public debt and economic growth, suggesting that moderate levels of debt may have a positive impact on growth, while excessive levels can be detrimental. Studies by Cecchetti et al. (2011) and Kumar and Woo (2010) found evidence of a negative relationship between public debt and economic growth, particularly when debt levels exceed certain thresholds. However, research by Reinhart and Rogoff (2010) found a threshold beyond which high levels of public debt are associated with lower economic growth rates (Heimberger, 2023). Some studies showed that a modest level of debt has a positive significance on the growth of the economy, whereas a vast debt level poses a significant risk (Alenoghena et al., 2023)

Izedonmi and Ilaboya (2012) assessed the public debt-growth dynamics in Nigeria from 1980 to 2010 using the cointegration and error correction mechanism. They found a negative and significant relationship between public debt burden and economic growth in Nigeria. Also, Burhanudin et al. (2017) investigated the real effect of government debt on sustainable economic growth in Malaysia, using the ARDL approach for the period of 1970-2015. The study showed a positive, significant long- and short-run relationship between government debt and sustainable economic growth. The findings indicated that Malaysia's public debt is an important macroeconomic element for sustainable economic growth. In 2020, Aimola and Odhiambo studied the debt trend in Nigeria over 37 years, noticing a prominent change in public debt, fiscal dominance, cost of borrowing, decline in export earnings, and inefficient management. They opined that government borrowing from banks and adverse bank selection were crucial variables affecting the distribution of loans to the private sector.

Sani and Nwite (2021) examined the impact of public debt on economic growth in Nigeria and found that public borrowing has a negative impact on economic growth in Nigeria. Ekperiware et al. (2022) investigated the effect of public debt on economic growth in Nigeria during the period 1981 to 2020. the study employed the Vector Error Correction Model and used the disaggregating public debt to domestic and external debt servicing cost, and found that in the short run, domestic debt is inversely related to growth but positively related in the long run provided the debt to GDP ratio is not higher than 30%. The study also found that external debt has a significantly negative relation to economic growth both in the short and long run. It recommended that the government should only borrow productive debts. In the same year, Akanbi et al. (2022) examined the relationship between Nigeria's economic growth and the repayment of its external debt during the period 1984–2020, employing a quantitative research design—Regressive Distributed Lag (ARDL) as the estimation method. The study's findings showed a statistically insignificant negative association between economic growth and paying off external debt.

Osakede and Adeleke (2022) investigated the impact of external borrowing on infrastructure, human development, and economic growth in Africa. Data from 1990 to 2019 showed no threshold effect of external debt on infrastructure or human development. The fixed-effect model showed an insignificant impact on infrastructure and a significant negative effect on human development. The findings suggest borrowed funds are not directed towards growth-enhancing investments, undermining future income potential and debt repayment chances.

Yusuf and Mohd (2021) examined Nigeria's economic growth using data from 1980-2018 and the Autoregressive Distributed Lag technique. Results showed that external debt hindered long-term growth, while domestic debt positively impacted growth. The study suggests directing borrowed funds towards diversifying the economy's productive base, promoting domestic resource mobilization, efficient debt management, and reliance on domestic debt for deficit financing.

Olaoye (2023) studied the impact of public debt on macroeconomic indicators of economic growth in Sub-Saharan Africa and also investigated whether previous debts impacted Sub-Saharan African economies positively. Using the GMM approach and 2-stage least square estimation method, the study revealed that debt relief programmes had only a marginal effect on the region's economic growth and that corruption had a negative impact on the effectiveness of debt relief in the region. In another related study, Khan et al. (2023) examined the relationship between external debt and economic growth in 56 countries from 1990 to 2021 using a comprehensive dataset. They Used Panel Autoregressive Distributed Lag and Simultaneous Quantile Regression to provide insights. Their findings revealed that high external debt levels could hinder long-term economic growth, emphasizing the need for prudent debt management.

3.0 Methodology

3.1 The Model

We construct an econometric model with Sustainability [(SUST), using gross fixed capital formation as proxy). Apostu et al. (2023) and Ajose & Oyedokun (2018) have gone at great lengths to justify the use of gross fixed capital formation as a proxy for sustainable development. Domestic Debt (DDEBT), External Debt (EXDEBT), Interest Rate (INTR), Exchange Rate (EXCHR) and GDP Growth (GDPR). Therefore, the equation used in the study is specified thus:

$$SUST_{it} = \beta_0 + \beta_1 DDEBT + \beta_2 EXDEBT + \beta_3 INTR + \beta_4 EXCHR + \beta_5 GDPR + \mu_{it} \quad -(1)$$

For estimation purposes, the equation needs to be log-linearised to simplify the variable scales and minimize the data fluctuations.

$$LSUST_{it} = \beta_0 + \beta_1 LDDEBT + \beta_2 LEXDEBT + \beta_3 LINTR + \beta_4 LEXCHR + \beta_5 LGDPR + \mu_{it} \quad -(2)$$

Equation (2) is structured to estimate the relationship between Sustainability and government borrowing and other related macroeconomic variables in Nigeria for the period under review. Equation (2) is designed to underscore how changes in government borrowing (split into domestic and external) over the years influence the magnitude and direction of the change in the nation's sustainability capacity. The apriori expectations signs of the coefficients may be specified as follows: $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 < 0$, $\beta_4 > 0$ and $\beta_5 > 0$. The sign (> 0) implies a positive relationship between (SUST) and the coefficients of the independent variables. Conversely, the sign (< 0) indicates a negative relationship between (SUST) and the INTR variable.

The study would also examine the effect of total debt on sustainability as shown in the model on equation (3) as follows:

$$LSUST_{it} = \beta_0 + \beta_1 LTDEBT + \beta_3 LINTR + \beta_4 LEXCHR + \beta_5 LGDPR + \mu_{it} \quad - \quad - \quad - \quad (3)$$

Total Debt comprises Domestic and External Debt and carries the same apriori positive sign (> 0) in terms of its relationship with sustainability.

3.2 Analytical Framework

As proposed by Phillips and Hansen (1990), the Fully Modifies OLS estimation technique (FMOLS) is designed to deploy a semi-parametric adjustment to eliminate the problems often associated with the long-run correlation between the cointegrating equation and the stochastic regressors. Their proposal of the FMOLS estimator shows that it is characteristically unbiased with an additional feature of becoming a fully efficient mixture possessing the normalized asymptotics, which accommodates for standard Wald tests and applying the standard Chi-square statistical extrapolation.

The cointegrating regression technique employs preliminary estimates of the one-sided and symmetric long-run covariance matrices of the dregs. Suppose $\hat{U}_{1t}$ refers to the residue obtained after estimating Equation 3, then $\hat{U}_{12}$ may be produced incidentally and affirmed as emanating from the regression analysis process.

$$X_t = \hat{\Gamma}_{21}' D_{1t} + \hat{\Gamma}_{22}' D_{2t} + \hat{\epsilon}_{2t}$$

Then, r can be estimated directly from the differenced output of the regressions process. Hence, we can generate.

$$\Delta X_t = \hat{\Gamma}_{21}' \Delta D_{1t} + \hat{\Gamma}_{22}' \Delta D_{2t} + \hat{u}_{2t} \quad (3.2)$$

Suppose we declare $\bar{\Omega}$ and $\bar{\Lambda}$ to be the covariance of the long-run matrices that were generated deploying the residuals $\left(\hat{U}_t = \hat{U}_{1t}, \hat{U}_{2t}\right)'$, then we declare the modified data as:

$$y_t^+ = y_t - \hat{\omega}_{12} \hat{\Omega}_{22}^{-1} \hat{u}_2 \quad (3.3)$$

And the assessed bias of the correction term now defined:

$$\hat{\Lambda}_{12}^+ = \hat{\Lambda}_{12} - \hat{\omega}_{12} \hat{\Omega}_{22}^{-1} \hat{\Lambda}_{22} \quad (3.4)$$

Therefore, the FMOLS estimator can be specified as:

$$\hat{\theta} = \begin{bmatrix} \hat{\beta} \\ \hat{\gamma}_1 \end{bmatrix} = \left(\sum_{t=2}^{T} Z_t Z_t' \right)^{-1} \left(\sum_{t=2}^{T} Z_t y_t^+ - T \begin{bmatrix} \hat{\Lambda}_{12}^{+\prime} \\ 0 \end{bmatrix} \right) \quad (3.5)$$

where $Z_t = (X_t', D_t')'$ is the fundamental basis to FMOLS estimation and comprises the improvement of the long-run covariance matrix estimators which is given as $\hat{\Omega}$ and $\hat{\Lambda}$.

As a precondition to pronouncing the alternatives available for estimating $\hat{\Omega}$ and $\hat{\Lambda}$, it will be essential to properly define the scalar estimator

$$\hat{\omega}_{1.2} = \hat{\omega}_{11} - \hat{\omega}_{12} \hat{\Omega}_{22}^{-1} \hat{\omega}_{21} \quad (3.6)$$

Equation (3.6) can be affirmed as the long-run variance of $\hat{U}_{1t}$ that is estimated conditional on $\hat{U}_{2t}$. Hence, we may define the correction of a degree-of-freedom to $\hat{\omega}_{1.2}$. Hereafter, it can be proven that the null hypothesis stated for the Wald statistic $R\theta = r$ is declared as

$$W = (R\hat{\theta} - r)'(R\,V(\hat{\theta})\,R')^{-1}(R\hat{\theta} - r) \quad (3.7)$$

Equation 3.7 carries the asymptotic χ^2_g (Chi-Square distribution) where g is defined as the limits that may be enforced by R. The constraints which may be imposed on the perpetual term or any other non-trending variables cannot be tested using the theory underlying equation (3.7).

3.3 Estimation Procedure

The approach to the estimation technique for this research study adopts a five-step procedure. The first step, preliminary analysis, involves the descriptive statistics and correlation of the regressors. The second step is the stationarity test, which establishes the order of integration using the ADF - Fisher Chi-square test statistic. The third step is the cointegration test using the Engle-Granger single-equation approach to cointegration. The fourth step is the impact relationship analysis between the dependent and the independent variables, which is run over the sample period 1981 to 2022, using the Cointegrating Regression Method.

3.4 Sources of Data

The data for this study is extracted from the World Development Indicators (WDI) on the selected variables used for analysis: Sustainability data was proxied by Gross Fixed Capital Formation, interest rate (lending rate), exchange rate, and GDP growth. WDI was an appropriate source because it offers a broad range of dependable data. The data for domestic borrowing, external borrowing, and government expenditure were secured from the Central Bank of Nigeria (CBN) Annual Statistics 2022, covering the period of the study time, which was from 1981 to 2022, making 42 annual observations.

4.0 Data Analysis and Presentation of Results

4.1 Descriptive Statistics

This part of the research study inspects the statistical attributes of the variables employed in the study. The features of the study variables presented in Table 4 include the mean, median, standard deviation, kurtosis, Jarque–Bera and probability. Therefore, the means of sustainability, domestic debt, external debt, government revenue, interest rate, exchange rate and economic growth are 35.61, 11.75, 19.54, 13.09, 17.32, 115.66, and 3.05, respectively.

Table 1 - Descriptive Statistics

	SUST	DDEBT	EXDEBT	GOVR	INTR	EXCHR	GDPR
Mean	35.607	11.750	19.538	13.092	17.324	115.656	3.046
Median	33.578	10.855	9.226	12.431	16.922	114.899	3.449
Maximum	89.386	23.043	60.370	27.101	31.650	425.979	15.329
Minimum	14.169	5.772	1.244	5.475	8.917	0.618	-13.128
Std. Dev.	18.737	4.171	19.739	6.046	4.817	119.183	5.319
Skewness	1.104	0.921	0.819	0.602	0.357	1.025	-0.832
Kurtosis	4.025	2.813	2.212	2.473	3.601	2.230	2.736
Jarque-Bera	10.378	6.238	5.776	3.026	1.527	7.452	10.119
Probability	0.006	0.044	0.056	0.220	0.466	0.024	0.006
Observations	42	42	42	42	42	42	42

Source: Authors' Computation

The maximum values of the variables, as presented in the same order, are 89.39, 23.04, 60.37, 27.10, 31.65, 425.98 and 15.33 for sustainability, domestic debt, external debt, government revenue, interest rate, exchange rate and economic growth, respectively. Also, the respective minimum values for the variables sustainability, domestic debt, external debt, government revenue, interest rate, exchange rate and economic growth are 14.17, 5.77, 1.24, 5.48, 8.92, 0.62 and –13.13. Similarly, the period of analysis for all the variables covers from 1981 to 2022, making 42 observations. The variables that recorded the highest standard deviation values (variability) are the exchange rate and external debt, with 119.18 and 19.74, respectively. The skewness of the data indicates that it is positively skewed, with sustainability and exchange rates recording more than positive ones. Hence, the distribution is positively skewed (to the right). The peak of the data distribution as measured by kurtosis shows that the two variables with scores above 3 are sustainability and interest rate, with the values 4.03 and 3.60 indicating that the distribution is leptokurtic with a sharper peak.

The values of the probability estimates of the distribution may be compared to the test of normality (Jarque-Bera) to decide on the asymptotic test. The table figures indicate that the estimated probability values for the variables are low. With the means values very close to the median values, we can conclude that the residuals of the distribution are normal.

4.2 Correlation Matrix of Regressors

The estimates of the study correlation values for all the variables are presented in Table 3. The result indicates that the correlation of the variables is generally low except for domestic debt and external debt. This is quite normal as the time to government borrow funds makes them take money from any source during the pressing need. Hence, the overall level of correlation estimates among the variables indicates shows that the variables deployed in the study do not suffer from multicollinearity.

Table 2 – Correlation Matrix of Variables

Correlation	SUST	DDEBT	EXDEBT	GOVR	INTR	EXCHR	GDPR
SUST	1						
DDEBT	0.424	1					
EXDEBT	0.302	0.698	1				
GOVR	-0.179	-0.029	0.445	1			
INTR	-0.299	0.335	0.535	0.408	1		
EXCHR	-0.609	-0.437	-0.447	-0.271	-0.148	1	
GDP_GROWTH	-0.424	-0.246	0.155	0.461	0.440	0.146	1

Source: Authors' Computation

4.3 The Lag Selection Process

The results of the lag selection exercise (shown on Table 3) indicate that majority of the statistics support the adoption of one lag for use in this study. More specifically, LR, SC and HQ all support lag one selection for use in this study. Therefore, lag one is selected for use in our other test exercises in this study.

Table 3 – Lag Selection

VAR Lag Order Selection Criteria						
Endogenous variables: SUST DDEBT EXDEBT GOVR INTR EXCHR GDPR						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-934.020	NA	2.14E+12	48.25744	48.55603	48.36457
1	-725.104	332.1235*	6.12E+08	40.0566	42.44530*	40.91365*
2	-677.438	58.66562	8.42E+08	40.12502	44.60384	41.73198
3	-606.245	62.06552	5.74e+08*	38.98693*	45.5558	41.3438
* indicates lag order selected by the criterion						

Source: Authors' Computation

4.4 The Stationarity Test

The stationarity test conducted is necessary to establish the unit root status of all the variables in the study. The order of integration affects the long-run cointegration status of the study variables. The summary of the unit root test is presented in Table 4. The ADF test statistics show that sustainability, domestic debt, external debt, government revenue, interest rate, exchange rate and economic growth become stationary at order one, that is, I(1). Therefore, the variables become stationary at first difference. When the variables are compared with the levels of their first differenced (the ADF unit root test statistic) values and the associated probabilities, the conclusion can be reached that all variables are integrated in order of one I(1).

Table 4 - Stationarity Test

Null Hypothesis: Unit root (individual unit root process)					
Series: SUST, DDEBT, EXDEBT, GOVR, INTR, EXCHR, GDPR					
Method			Statistic	Prob.**	
ADF - Fisher Chi-square			34.5957	0.0017	
ADF - Choi Z-stat			-1.45231	0.0732	
** Probabilities for Fisher tests are computed using an asymptotic Chi					
Intermediate ADF test results UNTITLED					
Series	t-statistic	Prob.	Order of Integration	Max Lag	Obs
SUST	-4.5569	0.0007	I(1)	1	41
DDEBT	-5.1142	0.0001	I(1)	1	41
EXDEBT	-4.5526	0.0007	I(1)	1	41
GOVR	-5.9951	0.0000	I(1)	1	41
INTR	-4.0387	0.0031	I(1)	1	41
EXCHR	-4.2114	0.0019	I(1)	1	41
GDPR	-7.8324	0.0000	I(1)	1	41
Test critical values:	1% level		-3.6056		
	5% level		-2.9369		
	10% level		-2.6069		

Source: Authors' Computation

4.5 Engle-Granger Cointegration Test

The conduct of the Engle-Granger cointegration test on the study variables requires the declaration of all variables as endogenous to enable the determination of a long-run equilibrium relationship among the variables. The result of the cointegration test conducted is presented in Table 4. The Engle-Granger tau-statistic (t-statistic) along with the normalized auto-correlation coefficient (termed the z-statistic) in both cases reject the null hypothesis of no cointegration among the variables at the 5% significance level (shown in Table 4). The associated probability values are assessed from the MacKinnon reaction to the surface simulation results. Given the sample size and the probabilities of the variables, the critical values indicate the evidence of five cointegrating equations at the 10% level of significance using the tau-statistic (t-statistic) and z-statistic estimations. Hence, the tests confirm the existence of long-run equilibrium cointegrating relationship among the variables: SUST, DDEBT, EXDEBT, GOVR, INTR, EXCHR and GDPR.

Table 5 - Engle-Granger Cointegration Test

SERIES: SUST, DDEBT, EXDEBT, GOVR, INTR, EXCHR, GDPR								
Dependent	tau-statistic	Prob.*	z-statistic	Prob.*				
SUST	-4.733	0.175	-30.094	0.145				
DDEBT	-4.404	0.276	-26.173	0.292				
EXDEBT	-4.404	0.276	-26.922	0.259				
GOVR	-4.219	0.346	-25.321	0.332				
INTR	-5.093	0.098	-32.019	0.096				
EXCHR	-1.044	1.000	-5.298	0.999				
GDPR	-6.957	0.002	-44.914	0.002				
Intermediate Results:								
		SUST	DDEBT	EXDEBT	GOVR	INTR	EXCHR	GDPR
Rho – 1		-0.734	-0.638	-0.657	-0.618	-0.781	-0.129	-1.095
Rho S.E.		0.155	0.145	0.149	0.146	0.153	0.124	0.157
Residual variance		59.059	4.084	59.696	12.624	6.124	2566.889	9.663
Long-run residual variance		59.059	4.084	59.696	12.624	6.124	2566.889	9.663
Number of lags		0	0	0	0	0	0	0
Number of observations		41	41	41	41	41	41	41
Number of stochastic trends**		5	5	5	5	5	5	5
**Number of stochastic trends in asymptotic distribution								

Source: Authors' Computation

4.6 The Cointegrating Regression Results

4.6.1 Assessing the Effect of Government Domestic and External Borrowing on the Nation's Sustainability

The result of the FMOLS analysis is presented in Table 6. The test shows that out of the effects of six variables, four variables are significant in explaining the trend of sustainability during the period under review. The variables with significant impact include external borrowing, interest rate, exchange rate and economic growth. On the other hand, the effects of domestic borrowing and government revenue are not significant in explaining the trend of sustainability in Nigeria. More specifically, a 1% change in external debt will induce a 0.69 change in sustainability in the same direction, given that other explanatory variables in the model are held constant. The effect of domestic borrowing is negative and not significant on sustainability. The different results show that while the impact of interest rate and exchange rate is negative and significant on sustainability, the effect of economic growth is positive and significant. In addition, while the R-squared shows 76%, the adjusted R-squared indicates that the variation in the explanatory variables explains 72% of the total variation in sustainability. Hence, the model is a good fit.

Table 6 – Government Domestic and External Borrowing on Sustainability

Dependent Variable: SUST				
Method: Fully Modified Least Squares (FMOLS)				
Included observations: 41 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DDEBT	-0.8167	0.5142	-1.5882	0.1215
EXDEBT	0.6907	0.1096	6.3018	0.0006
GOVR	-0.2216	0.2832	-0.7824	0.4394
INTR	-1.9757	0.3649	-5.4148	0.0010
EXCHR	-0.0524	0.0115	-4.5451	0.0001
GDPR	1.7878	0.3122	5.7267	0.0020
C	79.9271	7.6145	10.4966	0.0003
R-squared	0.7639	Mean dependent var		34.29506
Adjusted R-squared	0.7223	S.D. dependent var		16.90546
S.E. of regression	8.9094	Sum squared resid		2698.853
Long-run variance	48.4477			

Source: Authors' Computation

4.6.2 Examining the Effect of Total Government Borrowing on Nigeria's sustainability

The result of the examination of the impact of total government borrowing on the country's sustainability is presented in Table 7. The table shows that out of the five variables examined for the impact on sustainability, the effect of four of the variables is significant in explaining the trend in Nigeria's sustainability. The variables with considerable impact include total government borrowing, interest rate, exchange rate and economic growth. In specific terms, a 1% change in total government borrowing will induce a 0.45% change in sustainability in the same direction.

Table 7 - Total Government Borrowing and Sustainability

Dependent Variable: SUST				
Method: Fully Modified Least Squares (FMOLS)				
Included observations: 41 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TDEBT	0.4590	0.0899	5.1033	0.0204
GOVR	0.2820	0.3256	0.8660	0.3924
INTR	-2.2297	0.4626	-4.8202	0.0013
EXCHR	-0.0443	0.0144	-3.0767	0.0040
GDPR	-1.6637	0.3610	-4.6087	0.0001
C	66.0914	6.2790	10.5258	0.0000
R-squared	0.7423	Mean dependent var		34.29506
Adjusted R-squared	0.7055	S.D. dependent var		16.90546
S.E. of regression	9.1740	Sum squared resid		2945.704
Long-run variance	79.6157			

Also, the R-squared indicates 74%, while the adjusted R-squared shows that the variation in the explanatory variables explains 71% of the variation in sustainability. Accordingly, the model is a good fit for the variable relationship in the study.

5. Conclusions and Policy Recommendations

This study investigates the relationship between government public borrowing and economic growth

sustainability for the period 1981 to 2022, making 42 annual observations. The time scope covered in the survey includes the period of remarkable growth in the nation's macroeconomic variables, including sustainability variables. The fully modified ordinary least squares techniques was deployed for the analysis of the data set. The study conclusions are drawn on the basis of the magnitude and signs of the coefficients that resulted from the cointegrating regression analysis that was conducted.

While external borrowing positively and significantly affected Nigeria's sustainability during the period, the effect of domestic borrowing was negative and not significant in influencing the country's sustainability. Other macroeconomic variables, such as interest rate and exchange rate, were negative and significant in affecting sustainability. The effect of domestic borrowing is negative in influencing the nation's sustainability because when the government borrows from the domestic market, the borrowing rates are relatively high and expensive, and there has been evidence of crowding out of the private sector in Nigeria (Abiodun, 2020; Aljanabi, 2020; Alenoghena et al., 2023). The effect of external borrowing on the economy is positive on sustainability because the applicable interest rate is relatively low, and the loan's proceeds are generally applied more to capital projects and infrastructure (Mbulawa, 2015; Akindipe, 2018; Omodero, 2019). Also, the effect of total government public borrowing during the period is positive and significant, indicating that on a general scale, it is productive and beneficial to the nation's sustainability to borrow.

Based on the findings in this study, it is recommended that the government improves negotiation for better rates and utilization of domestic borrowed funds. Also, the government must consciously put measures in place to strengthen the domestic financial markets to enable the government access to longer-tenured and competitive funds for public project execution. In addition, the government should ensure that the funds from government borrowing are adequately channeled to finance essential public infrastructure like electricity and transportation to improve the productivity of the real sector, create employment, reduce poverty incidence and improve the capital stock of sustainable development in the country. Finally, the government should strengthen the Naira to reduce the exchange risk and minimize the adverse effects on fund repayment in instances of external borrowing.

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