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Article

The economic implications of Nigeria's foreign debt servicing and sustainability

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Abstract: Despite extensive literature examining the role foreign debt plays in the growth of the Nigerian economy, seldom do they simultaneously consider the effect of external debt servicing and sustainability. Accordingly, this study examined the impact of external debt servicing and sustainability on the economic growth of Nigeria for the period between 1980 and 2022. The auto-regressive distributed lag (ARDL) model was adopted to measure the effect of the explanatory variables on the dependent variable. Empirically, the study demonstrated that the impact of debt sustainability was insufficient on the economy; notwithstanding being positive in the long run. Thus, suggesting the presence of a sovereign Ponzi finance in Nigeria's debt management. However, the effects of external debt servicing and foreign debt interest payment were significant and negative on the economy in the short and long run periods. Thus, showing that resources being used to service the debt of the nation, crowd-out funds that could have been used to spur growth of the economy. Generally, the study affirmed the applicability of the debt-overhang hypothesis for the country. Conversely, exchange rate significantly and positively impacted the economy, indicating that an improvement in the value of the Naira, will be indicative of an improvement in the economy. Hence, the study recommends amongst others that effective external debt management strategies such as the debt for equity swap programme should be adopted by fiscal authorities in the country.

Keywords: foreign debt; debt servicing; debt sustainability; economic growth; Nigeria

1. Introduction

External debt is a major source of public receipts and financing capital accumulation in any economy [1,2]. It is a medium used by countries to bridge their deficits and carry out economic projects that are able to increase the standard of living of the citizenry and promote sustainable growth and development. Hameed et al. [3] stated that external borrowing ought to accelerate economic growth especially when domestic financing is inadequate. External debt also improves total factor productivity through an increase in output which in turn enhances Gross Domestic product (GDP) growth of a nation. The importance of external debt cannot be overemphasized as it is an ardent booster of growth and thus improves living standards thereby alleviating poverty.

It is commonly acknowledged in the global community that most developing countries' heavy foreign debt can stymie economic growth and stability [4]. Developing countries such as Nigeria have frequently taken on enormous amounts of external debt, resulting in rising trade debt arrears at relatively concessional interest rates. According to Gohar and Butt [5], accumulated debt service payments pose numerous challenges for countries, particularly developing countries, because a loan is being serviced for over the amount it was originally granted, hampering the

economic development process in such nations. The Nigerian economic system's inability to adhere to its fiscal debt service payments obligations has culminated in debt overhang or debt service burden, and this has inhibited her advancement and growth [4]. Nigeria's debt servicing challenge extends back to 1978, after a downturn in crude oil prices worldwide. Prior to this occurrence, Nigeria had amassed a number of debts from the World Bank; these included in 1958 with a loan of US $28 million for railroad expansion, and the Paris Club debtor nations in 1964 from the Italian government with a loan of US $13.1 million for the construction of the Niger dam. In 1978, the International Capital Market (ICM) made its first notable borrowing of US $1 billion, known as the "Jumbo loan" [6].

External credit has an enormous effect on the development of a country and investment in as far as it is employed over productive purposes; nevertheless, excessive amounts of servicing foreign debts set in and restrict the nation's growth process, as the focus moves from funding private investment to debt repayment. This illustrates that while external debt might have a favourable impact on growth at low levels of debt or loan interest, it starts to exert an adverse effect on growth at certain points or thresholds. Furthermore, Fosu [7] demonstrated that excessive debt service payments divert investment away from healthcare, education, and social services. This obscures the motivation for external borrowing, which is to stimulate growth and development rather than becoming entangled in a pool of debt servicing payments that consume the majority of the nation's wealth and stifle growth due to excessive interest payments on external debt.

Nigeria, a nation in transition, has gone through a number of initiatives, including the Structural Adjustment Programme (SAP) of 1986, to open up its economy and promote Gross Domestic Product (GDP) growth. To enable the execution of these programmes, the government borrowed substantially from multilateral sources, resulting in a large external debt payment load, and the World Bank classed Nigeria as a heavily indebted poor country (HIPC) in 1992. The constant increase in external debt service obligations has resulted in massive imbalances in fiscal deficits and budgetary restraints, which have hampered Nigeria's economic progress. The debt problem in Nigeria may have unfavourable consequences. circumstances such as crowding out of private investment and poor GDP growth.

According to Were [8], enormous foreign debt is not always indicative of slower growth in the economy; it instead indicates a country's inability to fulfil its obligations for debt service, driven by insufficient information on the nature, structure and size of the debt in consideration leading to the dilemma. It is hardly not an exaggeration to say that this is one of Nigeria's most significant economic challenges. Furthermore, the Nigerian economy's incapacity to efficiently satisfy its debt payment requirements has left the country with a heavy debt burden.

The upshot of this debt payment burden generates additional challenges for the country, particularly the rising fiscal deficit caused by greater levels of servicing debts. Nigeria's debt managers have in the past preached that the country has a low debt-to-GDP ratio, entailing a resilient economy, and hence, the risk of expanding the borrowing capacity of the country is minimal. While as at 2022, Nigeria's debt-to-GDP ratio was about 47%, a comparative analysis with other African nations such as Ghana (84.9%), South Africa (72.2%), Kenya (70.1%) and Egypt (95.8%) [9] has

always been the rationale for more foreign borrowing. However, while these economies have substantial higher debt-to-GDP ratio, the crux of the debt challenge has been Nigeria's growing tendency to default in its debt servicing obligations resulting from an overwhelming debt service-to-revenue ratio. Nigeria's current debt-to-GDP ratio is over 50% and still rising. In addition, the current economic challenges bedeviling the economy is constraining expanding foreign debts due to weak revenue collections. This poses an imminent risk to the country's future economic growth since more investment is required for output expansion.

Nevertheless, developing economies, including Nigeria, with a market economy, have been suggested to seek foreign money to accelerate their economic process [10]. This demonstrates that effective application of such borrowing from abroad can reshape the economy while simultaneously promoting development. The outcome may promote swift convergence between Nigeria and the advanced nations. The question thus becomes: why has not external borrowing accelerated Nigeria's economic growth? Furthermore, Nigeria entered an economic recession during a period of heavy external debt. So, does this imply that foreign borrowings have not yet been employed to trigger the economy?

Furthermore, despite significant literature exploring the role of foreign borrowing in the growth and even, in some cases, development of the Nigerian economy, it is rare for them to evaluate the impact of external debt servicing on sustainability. Thus, in addition to examining the influence of external debt on economic growth, this study will also investigate the impact of debt sustainability on the growth of the Nigerian economy.

The remaining sections of this research structure are as follows: Section 2 contains the reviewed literature; Section 3 contains the study's data and methodology; Section 4 contains the findings and discussion; and Section 5 contains the results and recommendations.

2. Literature review

2.1. Theoretical review

Substantial theoretical advancements have been made on the topic of foreign debt and economic growth. These theories are applicable to this study since they serve as a foundation for this research, and thus the following theories were discussed: the dual-gap theory, debt overhang theory, and dependency theory.

2.1.1. The dual-gap theory

According to the dual-gap paradigm, emerging nations must bridge two economic gaps. The first gap is between the economy's savings and investments. A growing nation starts with extremely minimal savings, but it must make a significant push by investing extensively. How might countries try to close the savings-investment gap? There have been disagreements among economists over whether developing countries require aid from wealthier countries. Other opposing viewpoints hold that emerging nations must trade in order to generate trade surpluses that may later be used to close the gap [11]. These factors contributed to the second gap, which is the difference between exports and imports.

Thus, external loans become necessary. The most significant factor when negotiating foreign debt is basic and straightforward: only sign up for loan from abroad if the funds can create more income than the cost of funds when invested. As a result, borrowing nations would increase their productivity and national output by means of investment made possible by borrowed monies. The dual-gap idea refers to the role of foreign money in economic development. Foreign capital has a role in allowing emerging nations to invest beyond what they can save locally, and this is necessary due to internal savings deficits [12].

A developing economy, by description, exports only primary products and demands significant imports of consumer and capital goods. The aforementioned clearly demonstrates the presence of a cost gap, as most poor nations would be vulnerable to current-account deficits [11].

In addition, some scholars have identified additional ways in which foreign debt may hinder economic growth. Based on Borensztein [13], foreign debt has an impact on growth through the credit rationing effect, which occurs when nations lack the ability to contract new borrowings because of their prior inability to pay.

2.1.2. Debt-overhang theory

Debt-overhang happens whenever a country's debt exceeds its financial repayment capacity. According to Krugman [14], debt overhang occurs when the predicted payback amount exceeds the actual amount committed for. Borensztein [13] also described debt overhang as a situation in which the debtor country receives relatively little return on new investment owing to large debt payment commitments. The "debt overhang effect" occurs when accumulated debt stock prevents entrepreneurs from investing in the private sector amid worry of being heavily taxed by the government.

This has been referred to as a tax disincentive. The tax disincentive here indicates that considering the debt load and thus tremendous debt servicing payments, it is presumed that any subsequent income accumulated to potential investors would be severely taxed by government entities with the objective to minimise the amount spent on debt service, driving off investors and resulting in disinvestment in the economy as a whole and thus a slowing of growth [15].

2.1.3. The dependency theory

According to dependency theory, the poverty of periphery nations is caused not by their lack of convergence or full integration into the global system, as is frequently asserted by open-market economists, but by how they are integrated. From this perspective, bourgeois scholars represent a single school of thinking. To them, underdevelopment and less developed countries' persistent reliance on advanced nations are the outcome of local errors. They believe this problem is caused by a lack of close integration, capital diffusion, a low level of technology, a weak institutional framework, inadequate leadership, corruption, mismanagement, and so on [16].

They believe that third-world nations' underdevelopment and reliance are caused by internal factors rather than external ones. According to this school of thought, a solution to the issue of concern is for third-world governments to seek foreign support in the form of aid, loans, investments, and so on, while allowing multinational corporations (MNCs) to operate uninterrupted. Since most LDCs are impoverished,

they rely on wealthy nations for nearly everything, including technology, aid, technical help, and culture. Most impoverished countries are dependent on the products of Western metropolitan economies and Breton Woods institutions [17]. The dependency theory provides a detailed description of the elements that contribute to the developing countries' predicament.

Dependency theory called for an inward-looking method for development, including the state playing a larger role in creating trade barriers, discouraging inward investment, and encouraging the nationalisation of vital industries. Although it remains widespread, dependence theory has faded from the general body of economic theory following the fall of Communism in the early 1990s. The significant inadequacies linked to governmental engagement in the economy, as well as the increase of corruption, have been vividly highlighted in nations that have pursued this development model.

2.2. Empirical review

External debt is intended to assist a country's economic growth and development, however projected excessive debt service payments and the challenging issue of debt sustainability represent a severe danger to that country's economy. As a result, economic academics have endeavoured to analyse the impact of servicing foreign debts and sustainability on debtor nations' economies, yielding a variety of conclusions.

Ejigayehu [18] also examined the impact of borrowing from abroad on the economic growth of eight HIPC in Africa including Ethiopia, Uganda, Senegal, Benin, Mali, Madagascar, Tanzania, and Mozambique. Theoretically, the research tested the debt overhang and debt crowding out effects, with the ratio of foreign loans to GDP as an indicator for debt overhang and debt service to export ratio as a substitute for debt crowding out. The empirical inquiry was conducted using a cross-sectional regression model. The estimation outcome demonstrated that external debt influences economic growth by means of debt crowding out instead of a debt overhang.

Daud et al. [19] examined the impact of foreign debt on Malaysia's growth in GDP. The growth model was evaluated using the Autoregressive Distributed Lag (ARDL) bound test. Additionally, the study investigated the presence of the threshold impact when determining the ideal level of external borrowing. The study's empirical findings suggest that the accumulation of foreign debt is connected with a surge in the economic growth of Malaysia up towards an optimal level, and that any subsequent increase in foreign indebtedness over the level has a negative impact on the Malaysian economy.

Faraji and Makame [20] evaluated the consequences of debt from abroad on Tanzania's economic growth using time series data on foreign indebtedness and economic performance from 1990 to 2010. According to the findings, both foreign debt and service costs have substantial effects on GDP growth, with overall foreign debt having a beneficial impact but payments for debt service having a negative effect

Forgah et al. [21] investigated the three-way connection between Cameroon's foreign debt, local investment, and growth in the economy. The study focused on the feedback impact of borrowing from abroad on GDP growth through gross domestic

investment; it used a system estimating approach with Two Stage Least Squares as an estimation technique across a 34-year period (1980–2013). The findings show that, while domestic investment boosts economic growth, borrowing from abroad slows economic growth in Cameroon, highlighting the impact of debt overhang. The study concluded that external loans had an unfavourable effect on economic growth.

Babu et al. [22] examined the impact of borrowing from abroad as a share of GDP on economic growth in the East African Community (EAC). The study uses annual data from 1970 to 2010, and adopts a panel fixed-effects model determined by the Solow growth model supplemented for debt. The data indicate that foreign debt has an adverse and substantial impact on the per capita GDP growth rate.

In a bid to reconcile the debt-growth divide, Kidochukwu [23] empirically studied the essential amounts of foreign debt buildup for Nigeria's long-term economic growth. The study estimators included least squares (LS), generalised linear method (GLM), and maximum linear-autoregressive conditional heteroscedasticity (ML-ARCH). The study's findings revealed that the upper limit essential level of Nigeria's international debt threshold that triggers steady-state growth ranged between 14% and 15%. The projected growth-augmenting limit also revealed that, at the initial phase of debt being acquired, its role in production growth is increasing but at a diminishing pace, which explains the alternating signs of the linear (beneficial) and nonlinear (harmful) debt parameters.

Ibi and Aganyi [24] examine the influence of borrowing from abroad on Nigeria's economic growth. The Vector Auto-Regression (VAR) framework was employed by the study for analysis; determining the significance of international credit and foreign borrowing-to-exports ratio's economic growth drive. Relying on the two-stage analysis of data, the results show a weak causal relationship between international debt and GDP growth in Nigeria. This suggests that debt from abroad cannot be utilised for predicting Nigeria's economic growth, either positively or negatively.

Hassan et al. [25] used the ordinary least squares method to analyse the impact of public debt on Nigerian GDP expansion between 1986 and 2013. The analysis finds that the influence of public debt on economic growth over the focal period was inadequate, with foreign debt, that has remained huge throughout the years, providing minimally to real GDP. The study concludes that if the current borrowing pattern is not reversed, the economy will most likely move into a recession, necessitating surplus budgeting and sparking spikes in unemployment, declines of overall investment, descending reserves, a declining exchange rate, greater inflation, and, as a result, worsening poverty.

Emerenini [26] provides a thorough grasp of the dynamics of indebtedness in Nigeria. The research objectively examined the impact of borrowing from abroad on economic growth from 1981 to 2012. Specifically, the study sought to assess the influence of stock of foreign debt and servicing of debt on economic growth. The ordinary least squares (OLS) and Engle and Granger cointegration were used in the investigation. The analyses revealed that expanding foreign debt stock slows Nigeria's economic growth by increasing the cost of payment above the debt sustainability threshold, whereas servicing foreign debt did not hinder the growth of the economy. Furthermore, it was discovered that the amount of foreign debt rises quickly due to accruing compound interest, and loans were acquired for scrupulous projects.

Abdullahi et al. [27] conducted an examination of concepts of the links between international debt and capital formation in order to properly evaluate and comprehend the situations of Sub-Saharan African (SSA) nations with credit from abroad. The study concluded that debt, particularly external debt, is an inevitable evil that all economies must deal with. The analysis found that across the five decades of foreign debt experiences in SSA, all indices showed negative connections among and amongst all variables of interest in these nations. The most significant adverse impacts are those caused by debt overhang and it's crowding out implications, as well as the ensuing impact on economies.

Mbah et al. [28] evaluated the effect of borrowing from abroad on Nigeria's GDP growth. Using the technique of ARDL bound testing to cointegration and error correction models from 1970 to 2013, we evaluate the presence of a long-run equilibrium relationship between the variables. The Granger causality test was also used to determine the course of causation between variables. The study's findings show a long-term association between the variables, as well as evidence that external debt has an adverse and substantial impact on output. The findings also revealed a one-way causal relationship between external debt and economic development.

Oluwapelumi et al. [29] used the Vector Error Correction model to investigate the influence of international debt on Nigerian economic growth between 1980 and 2014. The study's empirical findings, obtained by impulse response analysis and variance decomposition, revealed that foreign debt service payment had significant adverse effects on real per capita GDP growth in Nigeria, indicating the presence of a debt overhang on economic growth. Furthermore, the Granger Causality/Wald test demonstrated a one-way causal relationship between real GDP and foreign debt stock, as well as between external debt service payments and real GDP.

In order to determine the influence of international debt on Nigerian economic growth, Nwannebuike et al. [30] used an ex-post facto methodology. The data were analysed using the OLS approach and the error correction model (ECM). The study found that Foreign Debt is favourably associated to GDP in the short run but has an adverse correlation in the long run. Also, an adverse connection was found between servicing debt stock and GDP, although the exchange rate had a beneficial correlation with GDP.

Ugochukwu et al. [31] examined the impact of international indebtedness and foreign financial aid (foreign grant) in the form of official development assistance (ODA) on Nigerian economic growth over a 34-year period spanning 1980 to 2013. The study used an OLS multivariate regression model to determine the causal relationship between the variables under investigation. The study's findings demonstrate that, while borrowing from abroad has a beneficial and noteworthy impact on economic growth, foreign aid, as expected, has a beneficial relationship to GDP but insignificant in statistical terms.

Dong [32] conducted research to assess the consequences of global financial openness on public debt in 37 developing economies. The study determined that emerging countries' internal financial openness diminishes both their external and overall debt profiles. This is due to the substitution effect of the nation's available external funding choices and its external public debt. However, because of the substitution effect between external and domestic public indebtedness, financial

openness in foreign economies is expected to exacerbate external public indebtedness in developing countries.

Furthermore, Baba [33] shown in the research they conducted that foreign debt servicing has a large and negative impact on economic growth in Kenya. Muhammad and Abdullahi [34] also employed the ARDL approach to evaluate the influence of foreign debt servicing on Nigerian economic growth. According to the report, servicing external debt has a negative long-term impact on Nigeria's economic success. Also, Didia and Ayokunle [35] applied the VECM technique and showed that domestic debt has a domestic borrowing is significantly and positively related with the economic prosperity of Nigeria. Similarly, Jacobs et al. [36] with the aid of panel VAR technique, demonstrated that there is no causal nexus between public debt and economic growth for EU and OECD economies.

Dey and Tareque [37] examined how foreign indebtedness affects the economy of Bangladesh. By applying the ARDL methodology, the research affirmed the substantial inverse effect of external borrowing on GDP growth for the country. Bandiera and Tsiropoulos [38] showed for Belt and Road Initiative (BRI) economies that in the medium term, debt financing of recipient countries could hinder infrastructure growth. Thus, BRI countries are prone to become debt vulnerable. Also, Edo et al. [39] employed the ARDL technique and found that there is an insignificant positive impact of foreign debt on the economic prosperity of SSA economies. Similarly, Hassan and Meyer [40] applied the generalised method of moment (GMM) method and demonstrated that there is a non-linear relationship between foreign indebtedness and economic prosperity in SSA countries. Law et al. [41] applied panel quantile regression in their research and reported that public borrowing has a significant and adverse effect on the economic prosperity of developing nations.

Also, Makun [42] used the ARDL method and confirmed the substantial negative effect of international borrowing on the growth of Fiji's economy. In a similar study, Aladejare [2] demonstrated using the ARDL technique that, while macroeconomic imbalances had an impact on foreign borrowing in the long run, the short-term effects from economic volatility sources were particularly substantial for Nigeria. Additionally, the study found a bidirectional relationship between macroeconomic imbalances and foreign debt. Other variables determined to have increased the country's external debts were political instability, unanticipated disease outbreaks, and economic recession. Likewise, Yusuf and Mohd [43] examined the effect of public borrowing on the economic growth of Nigeria by using the ARDL technique. Empirically, the study demonstrated that while government debt posed significant long-run hindrance to economic growth, its short run result was growth accelerating.

The study by Mohsin et al. [44] applied the panel OLS, quantile regression, and fixed effect procedures in their study. Findings from the study showed that international debt exerts an inverse effect, and conversely, foreign debt stock has a beneficial effect on the growth of countries in the South Asian region. Furthermore, Kassouri et al. [45] applied the fixed and dynamic effects (FE and DE) in their study, and showed that there is an inverted U-shaped association between economic growth and debt in 62 developing and emerging economies. Manasseh et al. [46] employed the dynamic generalised method of moments (DGMM) and found that international debt and its fluctuation are significantly and adversely related with the economic

progression of SSA economies.

Akanbi et al. [47] used the ARDL approach to investigate the influence of foreign debt servicing on Nigeria's growth in economy. The study indicated that foreign borrowing servicing had an insignificant inverse influence on the long-term economic growth. However, debt sustainability has a major and beneficial effect on Nigeria's economic growth. Similarly, Aiyedogbon et al. [48] used the ARDL method and showed that the Nigerian economy responds adversely to foreign borrowing and debt servicing; in contrast to the beneficial effect of domestic debt in Nigeria.

Also, Kpalukwu and Ezekwe [49] employed the ECM to demonstrate that multilateral debt service has a large and negative impact on Nigerian economic growth. Heimberger [50] used a meta-regression to show that public debt is detrimental to the economic advancement of 47 countries. Asravor et al. [51] conducted their study with the application of the ARDL method and found that public debt is growth-accelerating for Ghana.

Shohruhxon and Khurshid [52] assessed the impact of foreign debt on the Uzbekistan's economy. Their findings support the adverse effect of the former on the latter, while advocating more government policies to ensure debt sustainability and long-term economic prosperity. A country study by Iqbal et al. [53] expressed with the aid of the ARDL methodology that escalating debt servicing cost has been impeding the economic growth of Pakistan.

In a different study, Aladejare [54] used the pooled mean group (PMG) method to show that for west African economies, trade and economic integration variables accelerated the rise of foreign borrowing in the short term, while macroeconomic policy variables had no significant impact, but in the long term, trade and economic integration variables showed a decelerating effect on sovereign foreign indebtedness, while macroeconomic policy variables were shown to have weak significance. Another panel study by Alsamara et al. [55] showed variation in the public debt-economic growth nexus for oil and non-oil MENA economies. The study submitted that the implication of foreign debt on economic prosperity are more beneficial for non-oil MENA nations, irrespective of the defined debt levels when compared to the threshold. Also, Dawood et al. [56] engaged the GMM and dynamic common correlated estimate (DCCE) methodology and demonstrated that a significant non-linear effect from foreign borrowing to economic growth exist in 32 Asian developing economies. Furthermore, they submitted that the debt-overhang and crowding-out hypothesis significantly captures external debt's adverseness on economic growth in the examined countries.

2.3. Empirical gap

The above literature reviews have proven that extensive studies had been conducted in examining the role foreign debt plays in the growth and in some instance; the development of developing economies. However, little or no research has been conducted to simultaneously analyse the implications of servicing external debt obligations and sustainability on economic growth in developing economies, and particularly, on Nigeria's economic prosperity. Hence, this research fills this void in the literature.

3. Data and methodology

3.1. Data

This study's applied time series data that comes from the World Bank Development Indicators (WDI), which span 1980 to 2022. Nigeria's foreign debt profile witnessed significant rise within this period due to various government development policies and capital intervention programmes. Also, the volatility in oil revenue, a dominant source of funding the yearly budget encouraged the upward trend in external debt for the country. A conventional indicator for economic growth has always been the gross domestic product, which is the quantum of all goods and services produced within an economy. Thus, this study indicated for economic growth by deploying the real GDP measure, known to account for the effects of inflation in determining the value of economic productivity.

Furthermore, it is essential to underline that debt sustainability as captured in this study connotes the capacity of a government or country to offset its current and future debt responsibilities without needing to renege on or having to renegotiate, or restructure, or enact implausible relevant policy modifications [57,58]. Consequently, this study employed the external debt-to-export ratio to indicate for debt sustainability. Also, annual external debt servicing data, representing aggregate foreign debt service in sum of principal repayments and accrued interest were examined on economic growth. Control variables include foreign interest repayments on foreign borrowing and the nominal exchange rate. Both variables were employed as intermediaries because increasing variability in their values would exacerbate an increase in government expenditure, given that the nation's public spending profile is one of the fastest growing in Africa [59].

This research applied the autoregressive distributed lag (ARDL) estimation procedure established by Pesaran et al. [60]. The rationale for choosing this technique depends on the ARDL model's advantages in concurrently investigating the existence of short and long run linkages. Furthermore, the rate of short-run distortions can be calculated, as can the time required to restore long-run equilibrium. This effect is quantified using the ARDL model's cointegrating term. Also, the model is well suited to dataset with different stationarity conditions, nevertheless, while the response variable is strictly required to be integrated at $I(1)$, the regressors can be stationarity at $I(0)$ and $I(1)$, or both.

3.2. Model specification

The simple functional form of the study model can be expressed as:

$$RGDP = f(DSUS, XDS, FINT, EXCH) \quad (1)$$

Where:

RGDP = Real Gross Domestic Product used to proxy for economic growth

DSUS = Debt Sustainability ($\frac{External\ Debt}{Value\ of\ Export}$)

XDS = External Debt Servicing

FINT = Foreign Interest payment on External Debt

EXCH = Nominal Exchange Rate

The functional transformation of Equation (1) is given as:

$$lRGDP_t = \alpha_0 + \alpha_1 DSUS_t + \alpha_2 lXDS_t + \alpha_3 lFINT_t + \alpha_4 lEXCH_t + \varepsilon_t \quad (2)$$

where: l = log transformation, $\alpha_0 = Constant,\ \alpha_1\ to\ \alpha_4$ are variable parameters, ε_t = white noise error term.

Specifically, the study objectives will be tested by using the following ARDL model of analysis.

$$\begin{aligned}\Delta lRGDP_i = {} & \alpha_0 + \sum_{i=1}^{p} \varphi_i \Delta lRGDP_{t-i} + \sum_{i=1}^{p} \pi_i \Delta lXDBGDP_{t-i} + \sum_{i=1}^{p} \forall_i \Delta DSUS_{t-i} + \sum_{i=1}^{p} \rho_i \Delta lXDS_{t-i} \\ & + \sum_{i=1}^{p} \sigma_i \Delta FINT_{t-i} + \sum_{i=1}^{p} \theta_i \Delta lEXCH_{t-i} + \gamma_1 lXDBGDP_{t-1} + \gamma_2 DSUS_{t-1} + \gamma_3 lXDS_{t-1} \\ & + \gamma_4 FINT_{t-1} + \gamma_5 lEXCH_{t-1} + \omega ecm_{1t-1} + \varepsilon_t\end{aligned} \quad (3)$$

It should be noted that terms with summation signs represents the error correction nexus. Furthermore, the second part of the equation with γ coefficients relate the long run effect of the explanatory variables to the dependent variable. The symbol Δ indicates short run or difference factor, and ω captures the coefficient used to show the short run speed of adjustment, evaluating return to long run equilibrium after a short run distortion, which can be due to policy effect.

4. Empirical results and discussions

4.1. Unit root tests

Table 1. PP Stationarity test on study variables.

Variable	Level			First difference		
	With Intercept	With Intercept and Trend	Without Intercept and Trend	With Intercept	With Intercept and Trend	Without Intercept and Trend
Log (RGDP)	−2.5882	−2.4969	0.7841	−4.6579***	−4.5706***	−4.6795***–
DSUS	−2.7427*	−3.4175*	−0.1296	−6.2130***	−6.1036***	−6.2939***
Log (XDS)	−1.8530	−0.9885	1.1285	−5.0293***	−5.4667***	−4.1431***
FINT	−0.6694	−2.7685	−0.5244	−4.7434***	−5.1557***	−4.7860***
Log (EXCH)	−1.4999	−2.8717	−0.1426	−4.5285***	−4.4064***	−4.5988***

Note: *, and *** significant at 10%, and 1% level.
Source: authors' estimated result.

Before estimating the models in Equation (3), it is critical to identify the type of data to be investigated. This is because a prior determination of the stationary behaviour of economic time series is critical for empirical inferences; standard econometric methodologies are based on the premise of stationarity in time series, despite the fact that they are non-stationary [61,62]. As a result, traditional statistical procedures tend to be inefficient, and econometric results are likely to be misleading and erroneous [62]. For example, OLS estimate of regressions in the event of non-

stationary variables produces misleading regressions if the variables are not cointegrated [63].

As a result, **Table 1** includes the Philip-Perron (PP) unit root test, which demonstrates that all variables become stable at the first difference level. However, the debt sustainability variable is the only one that has reached stationarity in level from. The mixing of level and difference stationarity of variables is consistent with the use of the ARDL technique in this study.

4.2. Bounds cointegration determination

After determining the variables' stationarity state, the next step is to identify their long-run connection. This requires the application of the bound's technique. **Table 2** demonstrates the long-term relationship between the factors.

Table 2. ARDL estimated output.

Regressors	**Coefficient**	**Std. error**	**Prob.**
Constant	20.940	0.311	0.000***
$DSUS$	0.011	0.010	0.262
$lXDS$	−0.180	0.028	0.000***
$FINT$	−0.418	0.147	0.010**
$lEXCH$	0.838	0.172	0.000***
$\Delta lRGDP(-1)$	−2.529	22.808	0.065*
$\Delta lXDS$	−0.282	0.075	0.002***
$\Delta FINT$	−0.226	0.074	0.008**
$\Delta lEXCH$	−0.065	0.040	0.124
$ecm(-1)$	−0.733−	0.107	0.000***
Residual test			
Normality	0.737		0.692
Serial correlation	5.523		0.137
Heteroskedasticity	0.701		0.704

Note: *, **, *** represents significance at 10%, 5% and 1% respectively.
Source: authors' estimated result.

Table 3. Bounds tests result for cointegration.

***F*-bounds test**		**Null hypothesis: no levels relationship**		
Test statistic	**Value**	**Sign if.**	**I (0)**	**I (1)**
F-statistic	5.162731	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Note: *K* = number of variables.
Source: authors' estimated result.

The *F*-statistic from the limits test was juxtaposed to the upper bounds critical values *I*(1) to reject the null hypothesis of no cointegration/levels connection. Conventionally, if the *F*-statistic value exceeds the bounds *I*(1) value, then long-run

association or cointegration is present. On the contrary, if the value falls below the bounds *I*(0) level, then cointegration does not exist. While if it lies in-between the *I*(0) and *I*(1) values; then the result is inconclusive. **Table 3** shows the *F*-statistic value as being above the *I*(1) bound value at all levels of significance and suggesting long-run association between the regressors.

4.3. Estimated ARDL results

The following step is to present the estimated long- and short-run implications of the studied variables on economic growth. The empirical data in **Table 2** show that, while the debt sustainability coefficient is positive in the long run, it is not significantly connected to growth in the economy. In contrast, servicing foreign debt has a significant negative impact on economic growth in both the long and short run. Similarly, it has been established that interest obligations on foreign borrowing have a large and negative impact on economic output in both the long and short term. On the flip hand, whereas exchange rates have a considerable positive effect on economic success in the long run, they have a minor negative effect in the short term.

Lastly, the ECM is correctly signed (−0.73) and substantial. The coefficient of the ECM factor indicates that the rate of adjustment from short-run disequilibrium to long-run equilibrium is sufficient. The coefficient indicates that in the event of a short-run disequilibrium, long-run equilibrium will be established around sixteen months (i.e., sixteen months) later.

Three major diagnostic tests on the coefficient estimations were performed. They include the normality, serial correlation, and heteroscedasticity tests shown in the bottom half of **Table 2**. The findings indicate that the parameter estimates utilised in the study model are normally distributed, free of serial correlation, and homoscedastic in character. These selections were made following the acceptance of the null hypothesis because the probability values for the three tests above the 5% significance level. As a result, the conclusions obtained from the model's estimated coefficients are validated.

4.4. Discussion of findings

Evidence from **Table 2** reveals that in the long-run, external debt sustainability has an insignificant positive effect on the growth of the economy. However, it contradicts the positive effect of external borrowing servicing on economic growth in Nigeria by Akanbi et al. [47]. The implication of this result is that debt sustainability measures have not been adequately harnessed to yield significant benefits for the economy. Stated differently, although debt sustainability measures could aid long-term economic growth, Nigeria is not currently leveraging this potential. For instance, the last decade has witnessed foreign borrowing balloon from US $9.7 billion in 2014 to US $42.67 billion in 2023 [64,65]. In contrast, generated federally collected revenue declined from US $58.7 billion to US $12.3 billion between 2014 and 2023 [66]. Evidently, the borrowed funds have not been able to generate additional revenues to aid current and future debt repayments, hence, sovereign debts as this cannot significantly be beneficial for long-term economic prosperity. This awkward disparity between foreign borrowing and revenue suggests the presence of a sovereign Ponzi

finance in Nigeria's debt management. Developing nations are often guilty of running a sovereign Ponzi finance—a phenomenon where the government issue debt instruments to augment for current outlays in anticipation of rolling over that debt with fresh debt instruments in the future, instead of generating sufficient receipts or shedding parts of its expenditure to offset the debt.

The Nigerian government sovereign debt challenge began to pile after the relief that came the nation's way in the debt forgiveness bargain of 2004–2005. However, the country seemed to have embarked on a sovereign Ponzi finance debt management approach from 2015 when its debt spiked upwards by 22% between 2014 and 2015, and by 240% in 2022 [67]. Consequently, this scenario encourages government's debt obligation to skyrocket unrestrained, eventually becoming unsustainable.

In contrast, external debt servicing exerts a significant adverse effect on the economy. This outcome aligns with findings in Kpalukwu and Ezekwe [49] and Muhammed and Abdullahi [34] and contradicts the insignificant submission in Akanbi et al. [47] for Nigeria. Servicing cost of sovereign external borrowing are known to crowd-out funds meant for infrastructure development that could aid growth. Nigeria has benefited adversely from the rise in this cost through weak human capital development indicators including inadequate health and educational facilities, and low-income levels [68]. Inadequate infrastructure and human capital, arising from the crowding-out effect of external indebtedness servicing will adversely impact economic productivity, and by extension economic growth of the country. Furthermore, high foreign borrowing cost inhibits public investment in the industrialisation process through weak modernisation of economic technologies, thus, retarding output growth for the country [69].

Similarly, foreign interest payments also show a significant negative effect on the economy. The results confirm that the payment of interest on foreign loans as well as monies for debt servicing obligations, crowd-out scarce funds that could have been used to provide infrastructure for the purpose of growing the economy. Also, it is not unlikely that such interest repayment obligations might be consuming significant fractions of external debt in a sovereign Ponzi finance manner. Exchange rate in the long-run is revealed to have a significant positive effect on the growth of the economy. Which could translate to mean, improvement in the currency (i.e., Naira appreciation) can aid the improvement of the economy, through cheaper input cost. The ripple effect of lower input cost is increase in domestic output, reduction in unemployment, and higher income [70].

Overall, the effects of foreign debt servicing and sustainability on the economy shows that Nigeria might have falling into a debt-overhang trap. This submission stands on the fact that while Nigeria's debt is pacing forward at an astronomical rate, the country's revenue is substantially retrogressing, hence, the tendency to default on current and future sovereign debt obligations might be significant.

4.5. Granger causality output

Table 4 captures the significant Granger causality results as observed from the causality test conducted. The Granger causality result reveals that economic growth Granger causes foreign interest rate without any reverse causality. This shows that

improvement of the economy, is important for the country to be able to pay the supposed interest on foreign loans. Thus, the more attractive the Nigerian economy is to domestic and foreign investors, the higher the guaranty of investments needed to boost economic growth [71]. Higher economic prosperity will translate to more revenue for the government through tax, permits and rents. Hence, the ability of the government to payoff interest on its foreign loans is enhanced [72]. Similarly, exchange rate Granger causes economic growth, implying that changes in the exchange rate can significantly impact the performance of the economy. However, debt sustainability and servicing, do not significantly Granger cause the performance of the Nigerian economy.

Table 4. Granger causality result.

Null hypothesis	Obs.	*F*-statistic	Prob.
Log (RGDP) does not Granger cause (DSUS)	42	1.146	0.197
(DSUS) does not Granger cause log (RGDP)		1.723	0.332
Log (RGDP) does not Granger cause log (XDS)	42	0.501	0.611
Log (XDS) does not Granger cause log (RGDP)		0.918	0.411
Log (RGDP) does not Granger cause FINT	42	3.127	0.059*
FINT does not Granger cause log (DSUS)		0.474	0.627
Log (RGDP) does not Granger cause log (EXCH)	42	1.830	0.179
Log (EXCH) does not Granger cause log (RGDP)		4.637	0.012**

Source: authors' estimated result.

5. Conclusions and recommendations

This research analysed the influence of servicing foreign debts and sustainability on Nigeria's economic growth from 1980 to 2022. The ARDL model was used to assess the impact of the research model's explanatory factors on the dependent variable, RGDP. The Granger causality result was utilised to determine the direction of causation among the variables. Thus, the study concluded that the influence of debt sustainability on the economy was minimal, despite its long-term beneficial outcomes. Thus, the result indicates the validity of a sovereign Ponzi finance in Nigeria's debt management. However, the effects of servicing international debt and foreign payment of interest on foreign debt were large and detrimental for the economy in both the short and long term. The implication of these findings indicates the validation of the debt-overhang theory. Furthermore, the upshot of this is that resources spent to service the nation's debt crowd out those that could have been used to stimulate economic growth. In contrast, the exchange rate had a large and positive impact on the economy in both the short and long run, implying that an increase in the value of the Naira would be indicative of an improvement in the economy.

As a result, the report suggests that policymakers work to properly manage the country's international borrowings. External debt should not be used for recurring spending, but rather to progress the country's infrastructure. Furthermore, the country's fiscal authorities should implement efficient external debt management measures such as the debt-for-equity swap plan. This would serve to reduce the country's debt service load, as repayment of both principal and interest on debts would be re-invested back into the local economy, resulting in a chain-investment effect.

It is also critical that the government, in addition to sustaining a stable political environment, ensure the presence of effective institutions that promote the more effective utilisation of free financial resources, as these constitute some of the parameters employed by governments that provide assistance when disbursing foreign aid. The Fiscal Responsibility Act of 2007, which limits government expenditure to no more than 3% of GDP, should be closely followed in order to properly track the increase of external debt.

Nevertheless, the constrain of this study is its inability to access sub-national data for a robust analysis of the impact of external borrowing servicing and sustainability on sub-national economic growth. Consequently, future studies can explore this limitation for a more comprehensive analysis of the subject matter.

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