EXAMINATION OF THE IMPACT OF PUBLIC DEBT ON REAL SECTOR OUTPUT IN NIGERIA

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Abstract

This study examined the impact of public debt on the real sector output in Nigeria using the Auto Regressive Distributed Lag (ARDL) technique on annual time series data obtained from the Central Bank of Nigeria Statistical Bulletin from 1981 to 2023. Evidence from the results of the estimated ARDL short and long run results revealed that external debt affected both the manufacturing and agricultural outputs in Nigeria negatively while domestic debt had direct and significant impact on the real sector output in Nigeria. Also, external debt servicing had negative and insignificant impact on the real sector output in Nigeria. Finally, the error correction term ect(-) of 2.4 and 15.6 per cent showed a low adjustment process to long run equilibrium whenever disequilibrium occurs in the short run. The study therefore recommended that government should implement policy on external debt reduction to circumvent the accumulation of such debt overtime while strengthening policy on domestic debt, since domestic debt boost real sector output significantly in Nigeria.

Keywords: Public debt, Debt Servicing, Exchange Rate and the Real Sector Output

1. Introduction

Over the years, most developing countries including Nigeria are challenged with low domestic savings combined with a high current account payment deficit, low capital accumulation and lack of resources to meet increasing public expenditure. So, Nigeria as a country incurs debts, either from the international community or internally. This is necessary in order to boost domestic investment and hence accelerate economic growth and development (Aluko & Arowolo, 2018; Ogwuma, *et al.,* 2018). Public debt is also known as government debt or national debt. This is the total money owed by government or total debt of all governmental units including state and local governments. Government borrows from domestic or external sources to bridge both short and long-term resource gaps and stimulate growth in their real sector when revenue falls short of government expenditure. Thus, External debt is a crucial tool the government might uses to successfully finance capital formation, sustain public expenditures, and spur growth in the real sectors of the economy, especially in situations where

it is challenging to increase taxes and reduce public spending. In the event of an unanticipated and transient catastrophe, external debt can also be used as a safety net to reduce the need to rapidly raise taxes to finance higher spending (Bongumusa, *et al.,* 2022). The issue of growth sustainability in the real sectors of the economy is central to international concerns, particularly for developing countries like Nigeria whose economies rely on natural resources and the environment.

Successive government in Nigeria has contracted a number of debt obligations from external sources, the pick of which are Paris Club of Creditors, London Club of Creditors, Multilateral Creditors, Promissory Note Creditors, which are the refinanced uninsured trade arrears, Bilateral and Private Sector Creditors. The advent of the nation's rising external debt can be traced back to the oil crisis of the 1970s (Central Bank of Nigeria [CBN] 2019). The oil price shocks and excessive import reliance of that period instigated a rather unhealthy and chronic debt habit for the economy. Since then, Nigeria has experienced rapidly rising levels of government external debt over the years. High levels of government external debt have a severe and long-term impact on the economic prospects of many emerging and developing economies, owing to manifestations such as debt overhang and debt trap. Furthermore, debt repayment is costly because it depletes already scarce financial resources. As a result, the emphasis shifts from growth opportunities to debt repayment (Komlan & Essosinam, 2022). Despite the accumulated debt and debt relief that was granted around 2005 and 2006, basic infrastructure remains in poor state while poverty remained at an average of 65% of the citizen which questions the need for public borrowing and subsequent benefits for the growth of the Nigerian real sector out. It is against this backdrop that the researchers carried out an examination on the impact of public debt on the real sector output in Nigeria from 1981 to 2023.

2. Literature Review

2.1 Conceptual Literature Review

2.1.1 Public Debt

Public debt is also known as government debt, government borrowing or national debt. Public debt is the aggregate debts owed by a certain country to individuals, corporations and countries within the country or abroad. Government debts typify all forms of government borrowings at all levels of government. Public debt forms part of the finance approach adopted by governments all over the world, although this approach is often resorted to when all measures have been exhausted, in fact the measure is considered favorable relative to other measures which includes the creation of money and the sale of national assets. Public or national debt can be classified into different categories based on their sources, period of repayment, their uses, etc. Public debt includes internal or domestic debt, external or international debt, bilateral debt, multilateral debt, short-term debt, long-term debt, reproductive debt and dead-weight debt.

2.1.2 External Debt

External debt is an essential source of finance mainly used to augments the local sources of funds for supporting development and other needs of a country. Usually external debt is incurred by a country which suffers from shortages of domestic savings and foreign exchange needed to achieve its developmental and other national objectives. However, if the external debt is not profitably and productively used, the effort of a debtor country in paying the debt becomes a critical concern as such may result to bad debt. External debt therefore refers to the mobilization of fund and resources generated elsewhere outside the home country (Mamudu, 2021). Sources of external debts incurred by the Nigerian government include: a) Multilateral; b) Paris Club; c) London Club; d) Promissory Notes and e) Bilateral.

2.1.3 Domestic Debt

Domestic debt refers to the total amount of money that a government borrows from internal sources within its own country, usually through the issuance of government bonds, treasury bills, and other debt instruments. Domestic debt is typically seen as a means to finance budget deficits and public projects without relying on foreign loans. However, excessive domestic debt can lead to higher interest rates, inflation, and crowding out of private investment, ultimately limiting economic growth (Adepoju & Salawu, 2020; Okonjo & Amadi, 2021). Domestic debt in Nigeria is usually acquired through debt instruments such as treasury bills, treasury certificates, treasury bonds, development stocks, FGN bonds, Promissory notes. The other debt instruments introduced in Nigeria with effect from 2017 include FGN Sukuk, FGN Green Bond and FGN Savings Bond (Mamudu, 2021; CBN, 2022; DMO, 2023).

2.1.4 Debt Servicing

Debt servicing is the process of managing and paying off a debt obligation. CBN (2021) noted that public debt servicing refers to the process of managing and paying off a government's debt obligations including interest payments, principal repayment, fees and charges. Interest payment is the regular payments made to creditors as compensation for borrowing while, principal repayment is the act of repaying the amount borrowed, fees and charges includes additional costs associated with debt management. Public debt servicing includes: a) domestic debt payments to local creditors; b) external debt payments to international creditors; c) short-term debt payments for short-term loans and d) long-term debt payments for long-term loans. Public debt servicing has so many implications. One of the implications of this increasing public debt in Nigeria is that it has led to a division of the nation's scarce resources towards servicing of debt on a yearly basis which further encourages disinvestment in the economy and as a result, a fall in the domestic savings and the overall rate of growth on the real sector output.

2.1.5 Exchange Rate

Exchange rate is the rate at which a nation's currency is exchanged with another country's currency. If a nation's exchange rate is higher than another one, it affects the purchasing power of the lower exchange rate of a particular country. For example, if the naira rate is lower in comparison to American dollar an American will have a higher purchasing power than a Nigerian. Exchange rate of currency is the link between domestic and foreign prices of goods and services. The exchange rate is among the most watched, analyzed and government manipulated economic indicators. Thus public sectors, foreign investor and private individual pay a lot of attention to the exchange rate variation (Fabozzi & Peterson; 2003; Oniore, *et al*., 2016). In Nigeria, it is the value of Naira in relation to other currencies such as United States Dollar, Japanese Yen, and British Pounds and so on. Exchange rates play a significant role in the dynamics of public debt, especially in developing economies like Nigeria. Public debt, particularly external debt, can be heavily influenced by fluctuations in exchange rates. Since external debt is often denominated in foreign currencies, any depreciation of the domestic currency can increase the burden of debt repayment. When the naira depreciates against foreign currencies, the cost of servicing external debt rises, this has inverse effect on investments and the productive sectors, such as manufacturing and agriculture (Adeola & Adedeji, 2020).

2.1.6 Real Sector

The real sector of the Nigerian economy refers to the part of the economy that is concerned with the production of goods and services. The real sector includes industries like manufacturing, agriculture, construction, and services that contribute directly to economic output, employment, and income generation. It plays a critical role in driving economic growth, providing the foundation for sustainable development and improving living standards (Blanchard, 2021). In Nigeria, the real sector, particularly agriculture and manufacturing, is a vital component of the country's economic structure. Agricultural sector in Nigeria is a

significant contributor to the country's economy, accounting for approximately 25 percent of GDP, 40 percent of employment and 30 percent of export earnings. The sub-sectors include crop production (cassava, maize, rice, yam, sugarcane, cocoa, cashews, cotton, groundnuts, etc.); livestock (cattle, poultry, sheep, goats, etc.); fisheries (freshwater and marine) and forestry. The manufacturing sector is dominated by production of food, beverages and tobacco, with sugar and bread products generating the greatest value of output. The key sub-sector of manufacturing include: Food and Beverages (sugar, bread, and other processed foods); textiles (garments, leather and footwear); chemicals (pharmaceutical, paints and other chemical products); cement with local production meeting over 60 percent of national demand (CBN, 2023).

2.2 Review of Theoretical Literature

2.2.1 The Ricardo Theory of Public Debt

This theory of public debt was propounded by David Ricardo in 1819. In his Principles, Ricardo developed the theory of public debts by stating that the ordinary and extraordinary spending of government were mainly payments made to sustain unproductive laborers. Therefore, any saving from the government expenses would be included in the income if not to the capital of the contributors. Ricardo in a letter written to McCulloch in 1816 believed that public expenditure was wasteful venture undertaken by the state. Ricardo's theory of public debts was then, based on the fact that the primary burden to the community was derived from the wasteful nature of public expenditure itself rather than from the methods adopted to finance such expenditure (Precious, 2015). The theory postulated that financing public expenditure should be focused on drawing the funds from the liquid resources of the community. This is because to focus on the economy, does not make any significant difference whether the funds were raised by loans or taxes. Accordingly, Ricardo argument about payments of interest on public debt deals with a transfer of wealth from one pocket to another within the society. Thus, when

countries borrow, it is uncertain whether the loan would be used productively or unproductively. If the loan is used productively, it leads to growth, but it is used unproductively, it deters economic growth in the economy (Okoye, *et al.*, 2013).

2.2. The Debt Overhang Theory

This theory is established on the principle that if the level of debt exceeds the country's capacity to refund with some imminent likelihood, expected debt service is anticipated to be an increasing function of the country's economic growth level (Panizza & Presbitero, 2012). Debt overhang is the condition where an entity debt burden is so large that it cannot take on additional debt to finance future projects. The burden is so large that all earnings pay off existing debt rather than fund new investment projects making the potential for defaulting higher (Broner, 2013).

2.3 Empirical Literature

The current study reviews some empirical literature like Yusuf and Mohd (2023) on asymmetric impact of public debt on economic growth in Nigeria from 1980 to 2020 using the Nonlinear Autoregressive Distributed Lag method. Empirical evidence indicated that external debt have a significant positive and symmetric impact on economic growth in the long and short run, while debt service payment supporting the debt overhang hypothesis activated a symmetric effect that stifle growth. Domestic debt retarded growth asymmetrically in the short term and linearly over the long term. Foreign reserve holding, on the other hand, had an asymmetric long-run influence and a symmetric short-run impact on growth motivation. To mitigate the negative effects of unsustainable public debt, the study advocated for fiscal reforms that effectively reduce deficit financing to keep the level of government debt low and be able to respond robustly to an economic shock, improve domestic revenue generation and infrastructure spending, and strengthen governance practices and institutions.

Ekperiware, *et al* (2022) study was centered on the effect of public debt on economic growth in Nigeria. Given the impact of debt burden on economic growth and other macro-economic parameters, total debt was disaggregated into domestic, external and debt servicing cost. The data was obtained from the Debt Management Office and Federal Office of Statistics. For ease of analysis, the study employed Vector Error Correction Model (VECM) due to the presence of long run relationship identified during data diagnosis. The findings confirmed that domestic debt in the short run is inversely related to growth but positively related in the long run provided it is done with moderation where the total domestic debt did not outweigh 30% of the total domestic bank deposits against crowding out effects. The impact of external debts was both negatively related to economic growth at both short run and long run period due to possible wrong application of loans to project types. It was also important to note that debt servicing posits a major evil plaguing the economy of the country. Policy recommendation from the study is that government should only borrow on items that can repay what the loan was collected for, in the first place.

Akanbi, *et al* (2022) investigated the relationship between external debt service and economic growth in Nigeria from 1981 to 2020. A quantitative research approach was adopted for this study. The method for estimation was the Auto-Regressive Distributed Lags (ARDL) model. The ARDL bound test results showed there was co-integration. The speed of change between the short-run and long-run of the co-integrating equations was 88.86%. The study used debt overhang theory, the neo-classical theory and endogenous theory as the theoretical framework. The study provided evidence of a negative relationship between external debt service and economic growth although this is not statistically significant. The result shows resource depletion effect of external debt services on growth. External debt stock has a positive but not significant relationship with growth. There is a positive but not significant relationship between external reserves to external debt ratio with growth. Debt service to export ratio has a positive

relationship with growth. The study recommends that policy makers in Nigeria should develop a methodology to compare the return on external debt to be incurred with the cost of debt so that gains that may eventually offset the cost of debt service. This methodology should be a policy or legislation. Finally, Omodero (2021) empirical examination on public debt and manufacturing sector output in Nigeria revealed that the crowding-out effect of public debt is more prominent in Nigeria's manufacturing sector as capital that could be invested in industries is diverted towards servicing debt. This reduces the potential for expansion and modernization in the sector, leading to stagnant or declining output.

3. Research Method

3.1 Model Specifications

The model Adapted for this study is that of Ekong and Effiong (2021) on the effect of public debt and the real sector of the Nigerian economy. Their model was specified as follows:

$$GDP = \beta_0+\beta_1LAB+\beta_2GCF+\beta_3DMD+\beta_4EXD+\beta_5BMS+\beta_6INF+\beta_7EXR+\beta_8TRP+\beta_9INT \quad (3.1)$$

Where GDP = Gross Domestic Product; LAB = labour force, GCF = Gross Fixed Capital Formation, DMD = domestic debt; EXD = external debt; BMS = broad money supply; INF = inflation rate; EXR = exchange rate; TRP = trade openness; INT= interest rate; and μ = random error term. The model of Ekong and Effiong (2021) was modified to empirically capture the impact of public debt on real sector output in Nigerian. The functional forms of the two real sector models are presented as equations (3.2) and (3.4) respectively.

Model I: Manufacturing Sector Model

$$MAU = (EXB,EXS\ DTB,\ EXC,\ EXR,\ TRO) \quad (3.2)$$

The econometric form of equation (3.2) is presented as equation (3.3)

$MAU_t = \beta_0 + \beta_1 EXB_t + \beta_2 EXS_t + \beta_3 DTB_t + \beta_4 EXC_t + \beta_5 EXR_t + \beta_6 TRO_t + u_t$

(3.3)

$\beta_1, \beta_3, \beta_5$ and $\beta_6 > 0$ while $\beta_2, \beta_4 < 0$

Model II: Agricultural Sector Model

$AGO_t = (EXB_t, EXS_t, DTB_t, EXC_t, EXR_t, TRO_t)$

(3.4)

The econometric form of equation (3.4) is presented as equation (3.5)

$AGO_t = \alpha_0 + \alpha_1 EXB_t + \alpha_2 EXS_t + \alpha_3 DTB_t + \alpha_4 EXC_t + \alpha_5 EXR_t + \beta_6 TRO_t + \varepsilon_t$

(3.5)

$\alpha_1, \alpha_3, \alpha_5$ and, $\alpha_6 > 0$ *while* α_2 and $\alpha_4 < 0$

Where: MAU_t = Manufacturing Sector Output for a period of time, AGO_t = Agricultural Sector Output for a period of time, EXB_t = External Debt for a period of time, EXS_t = External Debt Servicing for a period of time, DTB_t = Domestic Debt for a period of time, EXC_t = Exchange Rate for a period of time, EXR_t = External Reserve for a period of time and TRO_t = Trade Openness for a period of time, β_0 and α_0 = intercepts, $\beta_1 - \beta_6$ and $\alpha_1 - \alpha_6$ = Coefficients of the independent variables, u_t *and* ε_t = Error term.

3.2 Method of Data Analysis

This study employs the Auto Regressive Distributed Lag technique developed by Pesaran et al., (2001) to estimate the parameters in the model. The ARDL model has been proved to perform better on variables that are either *I*(1) or *I*(0) or combination of the two and the approach yields unbiased estimates and its t-statistics are efficient. Thus, we specified reduced form of the ARDL model in equation (3.6)

$$Y_t = \gamma_{0i} + \sum_{i=1}^{p} \delta_i Y_{t-i} + \sum_{i=0}^{q} \beta_i' X_{t-1} + \varepsilon_t$$

(3.6)

Where Y_t is a vector of the dependent variables, X_{t-1} is a vector of the lag values of the independent variables which are expected to be purely I(0) or I(1) or combination of both and also co-integrated. **δ**and β are coefficients, γ is the intercept, i=1,…,k, p and q are optimal lag orders. ε_t is a vector of the error terms– unobserved zero mean white noise vector process (serially uncorrelated or independent). Given that the independent variables are expected to be co-integrated, we specify both the long-run and short-run ARDL model for the real sector output.

ARDL model for Manufacturing Sector is specified as:

$$\Delta\ln MAU_t = \beta_0 + \beta_1 \ln MAU_{t-1} \beta_2 \ln EXB_{t-1} + \beta_3 \ln EXS_{t-1} + \beta_4 DTB_{t-1} + \beta_5 \ln EXC_{t-1} + \beta_6 \ln EXR_{t-1} + \beta_7 \ln TRO_{t-1} \sum_{i=0}^{n} \theta_{1i} \Delta\ln EXB_{t-1} + \sum_{i=0}^{n} \theta_{2i} \Delta\ln EXS_{t-i} + \sum_{i=0}^{n} \theta_{3i} \Delta\ln DTB_{t-i} + \sum_{i=0}^{n} \theta_{4i} \Delta\ln EXC_{t-i} + \sum_{i=0}^{n} \theta_{5i} \Delta\ln EXR_{t-i} + \sum_{i=0}^{n} \theta_{6i} \Delta\ln TRO_{t-i}$$

(3.7)

ARDL model for Agricultural Sector is specified as:

$$\Delta\ln AGO_t = \alpha_0 + \alpha_1 \ln AGO_{t-1} \alpha_2 \ln EXB_{t-1} + \alpha_3 \ln EXS_{t-1} + \alpha_4 DTD_{t-1} + \alpha_5 \ln EXCH_{t-1} + \alpha_6 \ln EXR_{t-1} + \alpha_7 \ln TRO_{t-1} \sum_{i=0}^{n} \theta_{1i} \Delta\ln EXB_{t-1} + \sum_{i=0}^{n} \theta_{2i} \Delta\ln EXS_{t-i} + \sum_{i=0}^{n} \theta_{3i} \Delta\ln DMD_{t-i} + \sum_{i=0}^{n} \theta_{4i} \Delta\ln EXC_{t-i} + \sum_{i=0}^{n} \theta_{5i} \Delta\ln EXR_{t-i} + \sum_{i=0}^{n} \theta_{6i} \Delta\ln TRO_{t-i}$$

(3.8)

Whereβ_1 to $\beta_7$and α_1 to α_7 are long-run coefficients of the ARDL model, β_0 and α_0 are the constant, θs are short-run coefficients of the ARDL model.

4. Result and Discussion

Data analysis and discussion of regression results started with the unit root test results.

4.1. Unit Root Test Results

The results of the unit root test statistics for the selected variables are presented in Table 1.

Table 1: Unit Root Test Result for the Variables

Series	ADF Statistics	Critical Values			Order of Integration
		1%	5%	10%	
lnMAU	-3.906461	-4.262735	-3.552973	-3.209642	*I*(1)
LnAGO	-4.284884	-4.252879	-3.54849	-3.207094	*I*(1)
LnEXB	-4.278614	-4.243644	-3.544284	-3.204699	*I*(1)
lnEXS	-6.067418	-4.243644	-3.544284	-3.204699	*I*(1)
lnDTD	-4.819452	-4.243644	-3.544284	-3.204699	*I*(1)
EXC	-5.004019	-4.243644	-3.544284	-3.204699	*I*(1)
lnEXR	-3.676817	-4.273277	-3.557759	-3.212361	*I*(1)
TRO	-3.761573	-3.626784	-2.945842	-2.611531	*I*(0)

Source: Researchers' computation using E-views 12

From Table 1, the results of the ADF statistics reveals that MAU, AGO, EXB, EXS, DTB, EXC and EXR were stationary at first difference i.e integrated at order one *I*(1), while TRO was stationary at levels *I*(0). Hence, the null hypothesis of no unit root exist was rejected for all the series. This result gives the researcher enough justification to move forward with further estimation using the Johansen co-integration test for testing the long-run co-integrating relationship among the series and Auto-regressive Distributed Lag Modeling, since the order of integration of the series are in mixed order.

4.2. Lag Order Selection Criteria Results

The lag order selection criteria results for model one and two are presented in Tables 2 and 3.

Table 2: Lag Order Selection Results for Manufacturing Output Model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-430.1909	NA	166.8848	24.98233	25.29340	25.08972
1	-213.2970	334.6363	0.012044	15.38840	17.87696*	16.24745
2	-128.7761	96.59528*	0.002260*	13.35863*	18.02468	14.96935*

Source: Researchers' computation using E-views 12

The results in Tables 2 and 3 revealed that the coefficient of Sequential Modified LR test statistic (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC),Schwarz information criterion (SC) and Hannan-Quinn information criterion (HIQ). The Akaike Information Criterion (AIC) indicated that an optimum lag length of 2 is Satisfactory for equation estimation for both models. Therefore, lag length of 2 was thereby selected as the optimum lag length for the analysis. Also, the Johansen cointegration test results for model I revealed that Trace and Maximum Eigenvalue statistic had at least 2 and 1 cointegrating equations among the variables at 5% level of significance. For model II. the Maximum Trace and Eigenvalue statistic revealed that there are 2 cointegrating equations among the variables at the 0.05 level of significance. Hence, there exists a long-run relationship among the variables in the models as implied by the Trace statistic and Maximum Eigenvalue statistic result.

Table 3: Lag Order Selection Results for Agricultural Output Model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-443.7248	NA	361.6486	25.75570	26.06677	25.86308
1	-223.7508	339.3885	0.021888	15.98576	18.47432*	16.84481
2	-159.1910	73.78261*	0.012849*	15.09663*	19.76267	16.70735*

Source: Researchers' computation using E-views 12

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion and SC: Schwarz information criterion

4.5 ARDL Regression Results

Since the model is found to be co-integrated, the parameters of the ARDL models were estimated and the results are presented in Tables 4 and 5 respectively. The results in Tables 4 and 5 show the long-run and short-run ARDL estimation of the real sector output models. It is clearly seen that the coefficient of external debt has a negative value of (-0.141019) and significant impact on manufacturing sector output but a positive value of (0.064345) and insignificant impact on agricultural output in Nigeria in the long-run and short-run at 5% significance level of significances. The negative impact of external debt on manufacturing output indicates that higher levels of external debt may constrain manufacturing output, possibly due to the debt burden or misallocation of borrowed resources while the positive and insignificant impact of external debt on agricultural sector output indicates that external debt does not significantly impact agricultural sector output in Nigeria.

Table 4: Estimated ARDL Long-Run Results on the Real Sector Output

ARDL Estimates: Manufacturing Sector Model			**ARDL Estimates: Agricultural Sector Model**		
Regressors	Coefficients	P.value	Regressors	Coefficients	P.value
LnMAU(-1)	0.431845	0.0000	LnAGO(-1)	0.815614	0.0007
LnEXB	-0.141019	0.0070	LnEXB	0.064345	0.3885
LnEXS	0.054914	0.0623	LnEXS	-0.052235	0.6234
LnDTB	-0.233259	0.0467	LnDTB	-0.037479	0.8455
EXC	0.000215	0.7493	EXC	-0.001325	0.0627
LnEXR	-0.244721	0.0011	LnEXR	0.106614	0.4217
LnTRO	-0.018083	0.0034	LnTRO	0.000307	0.9721
C	3.347268	0.0000	C	-1.432103	0.1969
R-Square	0.999444		R-Square	0.998273	

Adj. R-Square	0.998818		Adj. R-Square	0.996738	
F-Statistic	1596.959	0000	F-Statistic	650.3360	0.0000
D.W	2.450537		D.W	1.826481	

Source: Researchers' computation using E-views 12

The coefficient of external debt servicing is positive (0.054914) but insignificant (P = 0.0623). This implies that external debt servicing has a positive but insignificant impact on manufacturing sector output in Nigeria. While external debt servicing might seem to have a positive impact on manufacturing sector output, the insignificance indicates that its influence is not strong enough to affect the sector meaningfully. The impact of external debt servicing on agricultural output is negative (-0.052235) and insignificant (P = 0.6234), suggesting that external debt servicing has no significant impact on agricultural output in Nigeria. In the Short-run, external debt servicing has positive (0.054914) and significant impact on manufacturing sector output in Nigeria, suggesting that effective management of debt servicing could support manufacturing output in the short-run. However, in the agricultural sector, external debt servicing exhibits a negative (-0.052235) and insignificant impact, indicating no significant short-run impact of external debt servicing on agricultural output.

Domestic debt has negative and significant impact on manufacturing sector output in Nigeria in the long-run and short-run. This reflect the crowding-out effect of domestic debt where high domestic borrowing could reduce funds available for private sector investment. The impact of Domestic debt on agricultural sector is negative and insignificant in the long-run and short-run, showing that domestic debt has no significant effect on the agricultural sector output in Nigeria. The coefficient of exchange rate is positive (0.000215) but insignificant (P = 0.7493) in the short-run and long-run, implying that exchange rate variations have a positive but insignificant impact on manufacturing sector output in Nigeria. However, exchange rate has a negative (-

0.001325) but insignificant impact (P = 0.0627) on agricultural output in Nigeria in the long-run and short-run.

External reserve has negative (-0.244721) but significant impact (P = 0.0011) on manufacturing sector output in Nigeria in the long-run and short-run. This implies that higher external reserves might negatively affect the manufacturing sector, possibly due to inefficiencies in utilizing reserves for productive activities. The coefficient of external reserve is positive (0.106614) but insignificant (P = 0.4217), showing that external reserves do not significantly influence agricultural output in the short-run and long-run. The coefficient of trade openness is negative (-0.018083) and significant (P = 0.0034), implying that greater trade openness might have hindered the growth of the manufacturing sector in the long-run and short-run, potentially due to increased competition from foreign products. However, trade openness has positive (0.000307) but insignificant (P = 0.9721) on agricultural output in Nigeria, suggesting that trade openness has no significant impact on agricultural sector.

Table 5: Estimated ARDL Short-Run Results on the Real Sector Output

ARDL Estimates: Manufacturing Sector Model			**ARDL Estimates: Agricultural Sector Model**		
Regressors	Coefficients	P.value	Regressors	Coefficients	P.value
LnEXB	-0.141019	0.0002	LnEXB	0.064345	0.3718
LnEXS	0.054914	0.0045	LnEXS	-0.052235	0.7584
LnDTB	-0.233259	0.0053	LnDTB	-0.037479	0.0843
EXC	0.000215	0.6217	EXC	-0.001325	0.0627
LnEXR	-0.244721	0.0000	LnEXR	0.106614	0.4217
LnTRO	-0.018083	0.0000	LnTRO	0.000307	0.9520
ECT	-0.568155	0.0000	ECT	-0.485753	0.0000
R-Square	0.895749		R-Square	0.739053	
Adj. R-Square	0.845890		Adj. R-Square	0.645112	
D.W	2.450537		D.W	1.826481	

Test Statistic	Value	Signif.	I(0)	I(1)	Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	20.73910	10%	1.99	2.94	F-statistic	3.373552	10%	1.99	2.94
K	6	5%	2.27	3.28	k	6	5%	2.27	3.28
		2.5%	2.55	3.61			2.5%	2.55	3.61
		1%	2.88	3.99			1%	2.88	3.99

Source: Researchers' computation using E-views 12

The result indicates that the Error Correction Term (ECT) of -0.024449 and -0.152269 for both the manufacturing model and the agricultural model respectively are correctly signed and statistically significant at 0.05 1evel of significance given that their Prob. values are less than 0.005 (i.e P.value < 0.005). This showed that in the event of a disequilibrium resulting from a shock or disturbance, the system will restore itself back to equilibrium by an adjustment speed of approximately 2.4 percent and 15.6 percent respectively. That is if there is disequilibrium in MAU and AGO and the related components; there will be a speed of adjustment from short-run to long-run of about 2.4 percent for mode 1 and 15.6 percent for model 2. The high R-Square (0.999444) and significant F-statistic (P = 0.0000) for model 1 confirm that the independent variables jointly explain almost all the variations in manufacturing output, and the model has strong explanatory power. For model 2, the R-Square (0.998273) and significant F-statistic (P = 0.0000) implies that the explanatory variables explains 99% of the total variation in agricultural output, with strong explanatory power. The Durbin Watson (DW) statistic of the model 1 is 2.450537, while that of model 2 is 1.826481. Since this values are approximately 2, it implies that there is the absence of serial correlation among the successive values of the error term.

The F-Bound test for the manufacturing sector model shows an F-statistics of 20.73910, which is significant as it exceeds the upper bound critical values at all levels of significance (1%, 2.5%, 5%, and 10%). This confirms the presence of a long-run relationship among the variables

in the model, indicating that the explanatory variables jointly explain a significant portion of the variations in manufacturing output in Nigeria. For the agricultural sector model, the F-statistic is 3.373552, which lies between the lower bound I(0) and the upper bound I(1) critical values at the 10% level. This indicates inconclusive evidence of cointegration, suggesting that the explanatory variables may not consistently explain the total variation in agricultural output in the long run. The Durbin-Watson (DW) statistic for the manufacturing sector model is 2.450537, while that of the agricultural sector model is 1.826481. Since these values are approximately 2, they suggest the absence of serial correlation among the successive values of the error term in both models, ensuring the reliability of the results.

4.6 Stability Test

Stability test was conducted using cumulative sum (CUSUM) and cumulative sum of squares (CUSUM Q) of recursive residuals as shown in figure 1 and 2 for the models. The existence of parameter instability is established if the CUSUM and the CUSUM Q of the residuals goes outside the area between the critical (straight bounded upper and lower) lines. From figure 1 and 2, it was observed that the model at 5 per cent level of significance, CUSUM and CUSUM Q were stable over time because the observed bound lied between the upper and lower limits. In conclusion, at 5 per cent critical value CUSUM and CUSUM Q are positive, which means that CUSUM and CUSUM Q are good enough to explain the stability of the model overtime.



Figure 1: Cumulative Sum and Cumulative Sum of Squares of Recursive Residual for Model 1

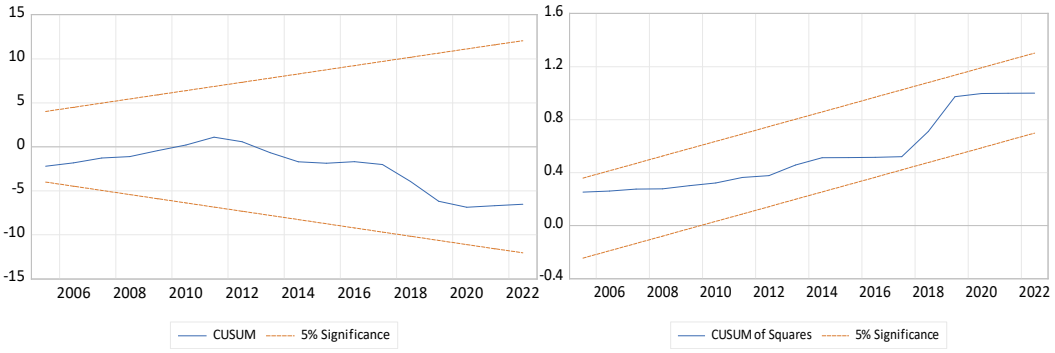


Figure 2: Cumulative Sum and Cumulative Sum of Squares of Recursive Residual for Model II

5. Conclusion and Recommendations

5.1 Conclusion

This study empirically examined the impact of public debt on real sector output in Nigeria using time series data for the period 1981-2023. The study employed the ARDL model in estimating the parameters of the models. The study takes into account the unit root test and the co-integration analysis. The study revealed that for Nigeria to achieve a self-sustaining economic growth and development, the government must be committed to developing the real

sector particularly, the manufacturing and agricultural sector through proper management of external debt, exchange rate and even domestic debt. The result concluded based on the ARDL model results in both short and long run, that government borrowing and exchange rate management have not translated into meaningful growth of the real sector of the Nigerian economy.

5.2 Recommendations

Base on the empirical findings, the following recommendations were made:

a) Federal government should ensure policy implementation on proper utilizationation of external debt for the purposes for which they were acquired, as this will help to solving both short and longrun problems in the real sector of the economy.

b) Government should strengthen policy on domestic debt, since domestic debt contributes significantly to both the manufacturing and agricultural sectors output in Nigeria

c) Nigeria government should pay serious attention to her external debt service, so that debt serving will not erode all the resources of the country at the very longrun.

d) Stability in the exchange rate should be pursued vigorously by the Nigeria government and depreciation in the Naira should be avoided as this will aid the real sector out in Nigeria.

e) Lastly, macroeconomic policies should be gear towards proper utilization of public debt on the real sector of the economy as this will boost external reserves and maintain a stable exchange rate.

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