

## Effect of Debt Service on Infrastructural Development in Nigeria

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### Abstract

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The study examines the effect of debt services on infrastructural development in Nigeria. The increase in debt services has been worrisome; recently Nigeria's debt service has astronomically increased without interruption. This uninterrupted increase of debt service has resulted to decrease in infrastructure, consequently, decreasing private investment and aggregate demand, thus, increasing unemployment in the country. The study employed an econometric model to test a long run relationship between debt services and infrastructural development and found a long run relationship. The study also found a negative and statistically significant relationship between debt services and infrastructure in Nigeria. Based on the findings, the study recommended that government should look for alternative means of raising fund rather than borrowing.

**Keywords:** *Debt Service, Infrastructure, Development and Effects*

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### **Background to the Study**

The habit of borrowing is inevitably becoming a standard in Nigeria fiscal system without any restriction, mounting unwarranted pressure on the limited revenue driven by higher level of debt servicing. Developing nations are usually confronted with limited fund to finance major infrastructural project in their domain, they mitigate this by borrowing fund either external or internal (Aladejana, Okeowo, Oluwalana & Alabi, 2021). Borrowing results to debt and debt attracts cost to service it, which technically serve as an obstacle to infrastructural development. According to Aladejana et al, (2021) “Infrastructural development consist of the provision, construction, improvement and rehabilitation of capital and productive projects like roads, airports, hospitals, education and research institutes, power development, human resources development etc in consonance with international standards”.

Abdulkarim and Saidatulakmal (2021), argued that the cost of servicing massive public debts could swallow up a substantial part of government limited revenue which serves as a barrier in achieving growth and development of countries. Reputable institutions such as the international monetary fund (IMF) have warned Nigerian government on the implication of her unquenched desire for debt borrowing, Ari Aisen, the resident representative of IMF for Nigerian, representing the Sub- Sahara African regional economic outlook on 30<sup>th</sup> May, 2022 in Abuja warned that if adequate measures are not taking to improve revenue generation in Nigeria, debt servicing may gulp government's revenue up to 100 percent by 2026 (Punch Newspaper 31<sup>st</sup> May, 2022). Also the President of African development bank (AFDB) Akinwumi Adesina expressed displeasure over the rising debt service ratio to revenue in Nigeria which is as high as 73% as cited in Amadi, Agya, Eli and Yunisa (2022).

In the same token, the Nigerian minister of finance, while presenting breakdown of the highlight of the 2023 appropriation Act, revealed that between January and November 2022, the Nigerian's federal government spent about N5.24 trillion on debt servicing compared to the capital expenditure of NI.88 trillion gulping thrice its infrastructure spending within the period under review (Business Day 4<sup>th</sup> Jan, 2023). The harmful part of debt servicing in Nigeria is the sustainability problem that has now confronted the current administration, where almost 100 percent of her revenue is now used to service her debt. Nigeria's debt service to revenue ratio is reported as 80.7% according to the information contained in the 2023 budget appropriation Act (Business Day 4<sup>th</sup> Jan, 2023). The ratio currently has been on the rise as a result of dwindling government revenue accompanied by increase government expenditure. Between 2016 and 2022, the Nigerian government has faced revenue deficit due to falling oil price and uncontrolled oil theft in the Niger Delta region (Amadi, et al, 2022). For instance in 2021, the government aimed at generating revenue of N8.1trillion but was unable and generated only N6.2 trillion leaving revenue deficit of about N2.0 trillion. Government is therefore forced to look elsewhere to raise revenue in other to meet her obligations which attracts some interest and undue burden to future generations.

Debt service is the cost incurred in other to upset or settle the repayment of interest and principal on a debt for a particular year. For the past years, debt services have astronomically increased without interruption. This uninterrupted increase of debt service has resulted to

decrease in infrastructural development, consequently, decreasing aggregate demand and private investment, thus, increasing unemployment in the country. In 2020 the Nigerian government used about N1.85 trillion to service her debt and in 2022 about N5.2 trillion was used indicating about 188.8 percent increase between 2020 and 2022. According to Coccia (2017) the chunk of resources that would have been used or available to invest in capital infrastructure that sustain growth and development will be channel to service huge public debt. This act if not mitigated or checked will perpetually frustrate the development of infrastructure in the country. Infrastructure is very important and has been a top priority in the developmental process of any economy mostly the developing nations. Improved infrastructure is synonymous with poverty reduction, the need for infrastructural development is very fundamental for economic growth but the challenges facing this infrastructural development is lack of fund which propel government to dive into borrowing either internally or externally in other to fund infrastructural deficit. Experience has shown that most of the borrowed funds were channeled into personal pockets depriving the nation to meet its infrastructural need (Amadi, Adi & paabu, 2020). Infrastructure contributes to economic development by increasing productivity as well as employment which enhance quality of life (Onwuka, 2022).

The origin of Nigeria's external debts dates back to 1958 when a sum of US \$28 million was contracted for railway construction (Amadi, et al, 2022). Between 1958 and 1977, the level of foreign debt was minimal, as debt contracted during the period were the confessionals debts from bilateral and multilateral sources with longer repayment periods and lower interest rates (Adesola, 2009). It is worth mentioning that both present and past governments in Nigeria have spent enormous amount of fund to service both internal debt and external debt taken (Alfredo & Franciso, 2005).

Amadi, et al, (2020) observed that “misappropriation and misallocation of borrowed fund to projects incapable of creating wealth are factors responsible for increase in debt service ratio to revenue in Nigeria. Corruption in the system cannot be ruled out where politician directs the borrowed fund to their private pocket or site projects based on tribal consideration instead of merit. Compounding the problem is where debt incurred were channels to social investment in expense of capital investment that is capable of raising the level of aggregate demand which bring additional income and employment in the economy”. This study is intended to empirically examine the effect of debt service on infrastructural development in Nigeria. The study tests the hypothesis that: There is no significant relationship between infrastructural development and debt service in Nigeria.

### **Literature Review**

The study anchored its theory from the dual gap model developed by Chenery and Strout in 1996. According to Chenery and Strout "Investment is a function of savings, and domestic savings are insufficient to guarantee domestic investment that will enhance economic growth and development". They argued that most developing nations witness lack of domestic savings to fund the needed investment. It was pointed that to meet the domestic savings deficit,

foreign aid or foreign investment was essential to help developing countries to achieve the desired rate of economic development (infrastructural development). The dual model shows the need for financial resources from external sources to complement available limited domestic financial resources especially in developing countries.

The study by Onwuka (2022), examines the effect of external debt burden on infrastructure development using the ARDL approach to analyze the work. The empirical finding observed that external/foreign debt, domestic debt and rate of inflation have adverse effect on infrastructural development, while exchange rate recorded positive result on infrastructure. And recommend that government should reduce her borrowing and borrowed fund should be invested in projects that are capable of generating enough returns off set the debt.

For Awa and Alo (2022), while using multiple regressions anchored on ordinary least square (OLS) techniques to determine the impact of public debt on infrastructural development in Nigeria. Findings revealed that debt servicing cost has negative significant effect on federal capital expenditure (infrastructure), but trade debt has no significant effect on federal government capital expenditure and recommended that external debt should not be diverted but should be used for the sole aim for which it was borrowed for basically on infrastructure that have the capacity to improve business environment and economic output that will ease and facilitate repayment. More specifically, the empirical analysis by Ogunjimi (2019) using ordinary least square (OLS) techniques in studying the impact of public debt on investment in Nigeria. The outcome of the result revealed a negative significant impact of public debt on investment in Nigeria. Also Saungwene, Odihiambo and Camarero (2019), explored the causal relationship between government debt servicing and economic growth in Zambia for the period 1979-2017 adopting dynamic multivariate approach. The empirical results indicated unidirectional causal relationship from economic growth to public debt in Zambia.

The foregoing is in agreement with Amaefule and Umeaka (2016), who studied the effects of government's borrowing on infrastructural development in Nigeria. The study embraced the simple OLS to determine the relationship of the variables. "Findings from the analysis show a short-term relationship among the variable that revealed a positive relationship between federal government capital expenditure and domestic debt, while no significant relationship between capital expenditure and external debt". The study suggested that external debt has not significantly contributed in the development of Nigerian's infrastructure.

Karogol (2002), studied the short-run and long-run relationships between economic growth and external debt service in Turkey from 1956 – 1996. The study embraced a standard production function model employing techniques rooted in multivariate co-integration. The Vector Autoregression results revealed co-integration equations. The study also revealed that debt service is negatively related to economic growth in the long-run. The causality test shows a unidirectional causality between debt service and economic growth in Turkey within the period under review.

Efuntade, Oladipo and Efuntade (2021), while probing the impact of debt service in stimulating economic growth in Nigeria: mediating on the role of debt service on public sector financial management and found that debt servicing has significant impact on economic growth due to its positive relationship with gross domestic product. They “recommends among others that government should ensure that any debt both internal and external debt should be one that will open Nigeria to greater trade and investment that can stimulate the economic growth of the country”.

Conversely, Amadi et al (2020), examined the effect of external debts on economic growth in Nigeria covering the period of 1984 to 2019, the study employed an econometrics techniques rooted in bound test to analyze the long run relationship between external debts and economic growth. Their study established a long run relationship between external debts and economic growth. The result also revealed that external debt has a negative and significant effect on economic growth in Nigeria.

In the study conducted by Kalu (2016), ordinary least square regression method and the Granger causality test was employed to analysis the impact of debt service payment on economic growth in Nigeria from 1981 to 2013. The study showed that debt service payment has a positive and significant relationship with economic growth in Nigeria and also observed a bidirectional causality running for debt service payment to economic growth.

Isaac and Rosa (2016) technically examined the relationship between public debt as well as government investments on growth of Mexican economy spanning from 1993-2012 employing dynamic form of panel in connection with the generalized approach of moments in the analysis. The empirical result revealed that government debt has a positive effect on public investment and economic growth in Mexican economy.

Tamunonimim (2014), empirically investigated the relationship between domestic debt and poverty in Nigeria from 1986-2012. The study adopted ordinary least square (OLS), vector autoregressive (VAR), Granger causality approach and Johansen cointegration techniques to analysis the work. Empirical results exposed that there is a long run association between poverty (calculated by real GDP, per capital GDP and primary/secondary school enrolment) and Nigeria domestic debt.

Malik, Hayat and Hayat, (2010), investigated the relationship between external debt and economic growth in Pakistan over the period 1972 to 2005 using time series econometric technique. Empirical result exposed that foreign debt has a positive and statistically significant association with economic growth in Pakistan. The outcome suggests that rise in foreign debt would eventually lead to increase in economic growth.

Adesola (2009) examined the effect of external debt service payment practices on sustainable economic growth and development in Nigerian between 1981 and 2004. The study adopted the Ordinary Least Square method of data analysis. Findings showed that debt service payment to external creditors exhibited positive impact on economic growth and development of Nigeria.



Butts (2009) empirically examined the effect of external debt service payment practices on the economic growth of Nigeria. The popular ordinary least square technique was adopted to examine the relationship between debt payment to multilateral financial creditors to gross domestic product (GDP). Results show a negative effect. Hameed, Ashraf and Chaudhary (2008) investigated the dynamic effect of external debt servicing, capital stock and labor force on the economic growth for Pakistan for a period of 1970-2003. The study discovered a negative effect of external debt servicing on labor and capital productivity which invariably hamper economic growth. Also Adepoju, Salawu and Obayelu, (2007) evaluates the effects of debt service management on the economic growth of Nigeria between 1962 and 2006 using time-series data rooted in econometric technique. The work observed that debt service had a positive impact on economic growth of Nigeria.

**Methodology**

The study employed the Autoregressive Distribution Lag (ARDL) model developed by Pesaran, Shin and Smith in 2001 and Granger causality method to analysis the work. Augmented Dickey-Fuller (ADF) unit root test was applied to test for stationarity of the data. Also the bounds test and Granger causality test were utilized to determine the presence of long-run relationship and the direction of causality among the variables respectively.

**Mode Specification**

For straightforwardness the study settled in a model used by Awa and Alo (2022) and little modification was made to suit the objectives of the study.

**CEP= f(DSS, DMD, FOD, EXR) ..... (1)**

Econometrically, the model in equation (1) can be re-organized as follows:

**CEP = β<sub>0</sub> + β<sub>1</sub>DSS + β<sub>2</sub>DMD + β<sub>3</sub>FOD + β<sub>4</sub>EXR + ε<sub>t</sub>..... (2)**

In reference to equation (2) the long run ARDL model is specified as:

**ΔlnCEPt = β<sub>0</sub> + β<sub>1</sub>ΔlnDSS<sub>t-1</sub> + β<sub>2</sub>ΔlnDMD<sub>t-1</sub> + β<sub>3</sub>ΔlnFOD<sub>t-1</sub> + β<sub>4</sub>ΔEXR<sub>t-1</sub> + ε<sub>t</sub> ..... (3)**

The short run dynamic model is presented as thus:

**ΔlnCEPt = β<sub>0</sub> + β<sub>1</sub>ΔlnDSS<sub>t-1</sub> + β<sub>2</sub>ΔlnDMD<sub>t-1</sub> + β<sub>3</sub>ΔlnFOD<sub>t-1</sub> + β<sub>4</sub>ΔEXR<sub>t-1</sub> + β<sub>5</sub>ΔECT<sub>t-1</sub> + ε<sub>t</sub> .....(4)**

Where:

- CEP = Capital expenditure proxy infrastructure
- DSS = Debt Services
- DMD = Domestic Debt
- FOD = Foreign Debt
- EXR = Exchange Rate

While,  $\varepsilon$  = Error term,  $\beta_0$  is the constant and  $\beta_1 - \beta_4$  are estimated coefficients.

The Granger causality equation is specified as follows:

$$Y_t = \alpha_i + \sum \alpha_i A_{t-i} + \sum \beta_j B_{t-j} + U_{1t} \dots\dots\dots (5)$$

$$X_t = \beta_i + \sum \lambda_i A_{t-i} + \sum \delta_j B_{j-1} + U_{2t} \dots\dots\dots (6)$$

Where B and A represents debt services and infrastructure respectively. It was assumed that the disturbances  $U_{1t}$  and  $U_{2t}$  are uncorrelated. The Granger causality normally produces three outcomes. Firstly, is bidirectional which happen when we reject both null hypotheses, which shows that debt service and infrastructure coefficients are statistically significant. Second is the unidirectional causality which occurs when we accept one of the null hypotheses and reject other, showing that either the causality runs from debt service to infrastructure or from infrastructure to debt service. Thirdly occurs when we accept both null hypotheses, it means that there is independence. This revealed that the coefficient of the set of the independent and dependent are not statistically significant in both regressions (Gujarati, 1995).

**Data Sources, Measurement and A priori Expectation**

The study exploited the annual time series data from 1986 to 2022 fiscal year. The data were sourced from the National Bureau of Statistics and Central Bank of Nigeria Statistical Bulletin. Capital expenditure was proxy as infrastructural indicator. Huge debt service is assumed to reduce infrastructural development while domestic and foreign debts are expected to increase infrastructural development. However, the expected signs of the coefficient of the variables are negative, positive and positive for debt service, domestic debt and foreign debt respectively.

**Results and Discussion**

Trend Analysis

**Stationarity Test**

The study employed Augmented Dickey- Fuller (ADF) unit root test to test for the stationarity of the data. The results are displayed below

**Table 1: Stationarity Results**

Variables	At Levels		At 1 <sup>st</sup> Difference		Order of integration	Decision
	ADF statistics	Critical value at 5%	ADF statistics	Critical value at 5 %		
CEP	-1.683	-2.865	-9.213	-2.765	1(1)	Stationary
DSS	-3.643	-2.965	-	-	1(0)	Stationary
DMD	-1.443	-2.912	-5.754	-2.954	1(1)	Stationary
FOD	-1.563	-2.965	-4.402	-2.874	1(1)	Stationary
EXR	-4.743	-2.961	-	-	1(0)	Stationary

**Source:** Author's computation (2023)

The unit root result indicates that CEP, DMD and FOD were stationary at first difference 1(1), while DSS and EXR were stationary at level 1(0). The mixed order of integration by the variables supported the use of Autoregressive Distributed Lag (ARDL) model.

#### **ARDL Bounds Test for Co-integration**

To test for long run relationship among the variables, the study employed bounds test.

**Table 2: Bounds Test Co-integration Results**

Test Statistics	Value	Sign Level	I(0)	I(1)
F-statistics	3.49254	10%	2.08	3.0
K	5	5%	2.40	3.37
		2.5%	2.69	3.74
		1%	3.05	4.25

**Source:** Author's computation (2023)

Table 2 shows the results of the bound test for co-integration and the results revealed that the calculated F- statistic is 3.49254 which is greater than the 5 percent upper bounds critical value of 3.37. This discloses that there is a long run relationship among the variables under review.



**Table 3:** Estimated Long-run Co-efficient  
Dependent variable: CEP

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
C	321.9932	59.10555	5.447764	0.0000
DSS	-0.04206	0.05257	-0.800015	0.0450
DMD	2.702446	2.043425	1.301257	0.0300
FOD	-1.084653	0.466495	-2.325110	0.0327
EXR	-2.614077	13.41046	0.194928	0.8470
R-squared	0.722167	F-statistic	8.119560	
Adjusted R-squared	0.671376	prob(F-statistic)	0.00000	
Durbin-Watson Stat	1.709762			

**Source:** Computed by the Author (2023)

The estimated long run result in Table 3 indicates that debt service has a negative and significant effect on infrastructure. The coefficients of domestic and foreign debt were found to be positive and negative respectively and statistically significant at 5% level. This result implies that one percent increase in debt services would decrease infrastructure by approximately 0.04 percent. The finding of this is in line with the study by Awa and Alo (2022).

Domestic debt (DMD) was discovered to have a positive and significant effect. This positive effect of domestic debt on infrastructure could be due to the huge domestic debt profile in the country. This is in agreement with results obtained by Amaefule and Umeaka (2016). While foreign debt (FOD) has a negative effect on infrastructure. This result is amazing even with huge foreign debt in Nigeria. This could be attributed to corruptions and diverting of foreign debt foreign from the original purpose of acquiring the loan.

Furthermore, the estimated coefficient of exchange rate showed a negative and insignificant association with capital expenditure (infrastructure).

The value of R-square is 0.722, indicating that about 72% variations in the dependent variable capital expenditure (infrastructure) is accounted for by changes in explanatory variables. The results still remain robust after adjusting for degree of freedom as shown by the value of adjusted coefficient which is 0.67. This indicates a good fit. F-statistic of about 8.119 indicates that all the variables are jointly statistically significant. The Durbin-Watson statistic of 1.7 indicates complete absence of autocorrelation.

**Table 4: Short-Run Estimated Results**

Dependent variable: CEP

Variable	coefficient	Std.Error	t-Statistic	Prob.*
D(DSS(-1))	-0.759953	0.163321	-4.653112	0.0009
D(DMD(-1))	75.16256	15.04906	4.994502	0.0005
D(FOD(-1))	-0.034533	0.014746	-2.341867	0.0302
D(EXR(-))	-0.615252	0.326275	-1.885686	0.0765
C	327.29120	58.25461	5.618288	0.0000
ECM(-1)	-0.461482	0.213160	-2.141499	0.0389
R-squared	0.87.0223	F-statistic	28.65035	
Adjusted R-squared	0.839459	Prob(F-statistic)	0.000000	
Durbin-Watson Stat	1.714370			

**Source:** Computed by the Author (2023)

Results in Table 4 indicate that the lagged value of debt service (DSS) is negatively associated with capital expenditure. The coefficient of debt service is -0.7599 meaning debt service decrease capital expenditure (infrastructural development) by approximately 0.75 percentage point. These suggest that for every one percent increase in debt service, infrastructure will reduce by about 0.75 percent. This is in collaboration with study by Awa and Alo (2022).

The result also indicates that the impact of domestic debt on infrastructure is positive. Meaning that, one percent increases in domestic debt increases infrastructure by about 75.16 percent. Similarly, foreign debt was discovered to have a negative and significant effect on infrastructural development in Nigeria which is contrary with the a priori expectation. The reason for the negative result could be attributed to huge corruption in the system where borrowed fund were directed to private pockets or projects were sited based on tribal consideration instead of merit. Another reason is misallocation of borrowed fund to projects incapable of creating wealth or debt incurred were channels to social investment in expense of capital investment. The coefficient of ECM is negative and significant implying that about 46 percent of the disequilibrium would be restored within the period under investigation.

**Table 5: Diagnostic Tests**

Tests	F-statistics	Probability
Serial Correlation	0.732456	0.76543
Heteroscedasticity	1.245622	0.12450
Normality Test	5.352671	0.07543
Ramsey Test	0.047823	0.83333

**Source:** Author's computation (2023)

The result of diagnostic test in Table 5 above point out that the model passes serial correlation, heteroskedasticity, Ramsey and normality test. The F-statistic and corresponding P-values

appear greater than 5 percent showing that the model is free from heteroskedascity, autocorrelation and misspecification bias.

**Table 6:** Granger causality Test

Tests	obs	F-statistic	Prob.
CEP does not Granger Cause DSS	36	2.02546	0.0882
DSS does not Granger Cause CEP		7.01901	0.0200
DMD does not Granger Cause DSS	36	2.57010	0.0798
DSS does not Granger Cause DMD		2.21892	0.1121
FOD does not Granger Cause DSS	36	5.92745	0.0021
DSS does not Granger Cause FOD		4.76721	0.0045
EXR does not Granger Cause DSS	36	4.02412	0.0034
DSS does not Granger Cause EXR		2.31043	0.0832

**Source:** Author's Computation (2023)

The results of Granger Causality indicate that a unidirectional causality runs from CEP to DSS and is significant at 5% level as shown by the low P-value of 0.0200, meaning that debt service causes infrastructural development to shrink. This finding suggest that debt service reduces the amount budgeted for capital expenditure. Similarly, the result of hypothesis two and three indicates evidence of independent causality running from DMD to DSS and FOD and DSS. This finding implies that both domestic and foreign debts do not affect debt services and debt service does not affect them either. Further evidence of unidirectional causation was found between.

foreign debt (EXR) and debt service (DSS) showing that exchange rate help to determine the size of debt service in Nigeria.

### Conclusion

The study examined the effect of debt service payment on infrastructural development of Nigeria. Econometric techniques were employed to determine the relationship. The literature shows various arguments that were put forward on the effect of debt service on infrastructural development. Some researchers believe the relationship is positive while others argued that it is negative.

Based on the results, the study found that debt service has a negative effect on infrastructural development suggesting that debts service reduces the amount budgeted for capital expenditure (Infrastructure). The study affirms that domestic debt has contributed positively in the development of infrastructure in Nigeria. In the same token, the study confirmed that foreign debt has not contributed positively to the development of infrastructure in the country. Thus, the huge foreign debt profile is not properly utilized and in the long run are adverse to infrastructural development which is occasioned by huge debt service cost.

Thus the study concludes that debt service is not infrastructural development enhancing. Therefore, caution should be exercised with respect to rate at which loan are taking from outside the sore of this country.

### **Recommendations**

In line with the findings and conclusion, the study recommends the following to the government.

1. Foreign loan generally should be discarded except for uncontrollably cases where foreign borrowing becomes the last resort.
2. Government should diversify and look for alternative means of raising fund to finance her project instead of depending heavily on borrowing.
3. Borrowed fund should be channeled and invested in projects capable of servicing the debt on it own instead of borrowing for social service of welfare.
4. Government should expand her tax base so as to raise more revenue.
5. Government should strengthen and overhaul institutions saddled with responsibility to manage and monitor public debt.

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