
EXTERNAL DEBT AND THE NIGERIAN ECONOMIC GROWTH

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ABSTRACT

Nigeria is about the richest on the continent of Africa, yet due to the numerous macro-economic problems, mounting external debts and debt service payments have collectively reduced economic performance, growth and development. This study explored the impact of external debt on Nigeria economic growth. The study employed Unit Root test, Error Correction Estimates and Autoregressive Distributed lags model to examine the impact of debt services on Nigerian economy from 1981 to 2019. The study made use of two explanatory variables which included external debt (ED) and debt servicing (DS) to establish its impact on the economy. The study revealed the following major findings: ED, external debt has no significant impact on economic growth of Nigeria within the study period (1981-2019) at 5% based on t-statistics. This finding was not consistent with A priori expectation but consistent with Mbah (2016), Ayadi & Ayadi (2008) and Obademi (2013). DS, debt servicing has no significant impact on economic growth of Nigeria within the study period (1981-2019) at 5% based on t-statistics. This finding was consistent with A priori expectation. The study recommends the following: That policy makers should intensify efforts towards ensuring that external debt obtained are judiciously and effectively utilized.; The government through the Debt Management office and Federal Ministry of Finance and National Planning should formulate and implement institutional strengthening.

Keywords: External Debt, Economic Growth, Economic Development, National Plan, Debt Financing, Foreign Exchange, Domestic Debt, Economy.

SECTION ONE

BACKGROUND TO THE STUDY

Nigeria was passionate about pursuing the development of its socio-economic infrastructures since independence in 1960. This was done using domestic and foreign incomes from primary goods. Although, the foreign exchange earned from such exports was reasonable (considering the level of development of many of the new countries), such earnings were not enough to meet the “grand” developmental visions of these emerging countries. Consequently, many countries including Nigeria resorted to other sources (for example, external borrowings) to finance their grand developmental plans. The bilateral creditor nations included the United Kingdom, the United States, Italy, France, Germany, the Netherlands, Denmark, Japan, Canada, etc.

Soludo (2003) opined that, countries borrow for two broad categories; macroeconomic reasons to either finance higher investment or higher consumption and to circumvent hard budget constraint. This implies that an economy borrows to boost economic growth and alleviate poverty. He argued that when debt reaches a certain level, it becomes to have adverse effect, debt servicing becomes a huge burden and countries find themselves on the wrong side of the debt-laffer curve, with debt crowding out investment and growth. Researchers seem to have mixed thoughts on funding domestic investment through external borrowing. Some are of the position that it is inadequate while others embrace its adequacy. They assert that only if the external borrowing is used effectively in productive activities, will it facilitate reduction of imports.

STATEMENT OF THE PROBLEM

Increasing fiscal deficits driven by the higher level of external debt servicing is a major threat to growth of the nation. The resultant effect of large accumulation of debt exposes the nation to high debt burden. Nigeria is about the richest on the continent of Africa, yet due to the numerous macro-economic problems, such as inflation, unemployment, sole dependency on crude oil as a major source of revenue, corruption and mounting external debt and debt service payment, majority of her citizens fall below the poverty line.

OBJECTIVES OF THE STUDY

The major objective of this study is to empirically study the impact of external debt on the Nigerian Economic growth. Specifically to:

1. Determine whether external debt influences the economic growth in Nigeria.
2. Determine whether external debt servicing influences the economic growth in Nigeria

RESEARCH QUESTIONS

1. To what extent has external debt affected the economic growth in Nigeria?
2. To what extent has external debt servicing influenced the economic growth in Nigeria?

STATEMENT OF HYPOTHESES

H₀: There is no significant influence of external debt on the economic growth in Nigeria

H₁: There is no significant influence of external debt servicing on the economic growth in Nigeria.

SIGNIFICANCE OF THE STUDY

1. The significance of this study; External debt and the Nigerian economic growth; is

timely and has the following relevance:

2. The study provides an econometric basis upon which the impact of external debt is examined on Nigerian economic growth.
3. The research will give an insight that will clear the perception as to whether external debt has significant influence on the Nigerian economic growth or not;
4. The research will also enable policy makers and relevant stakeholders in nation building such as Government, the Debt Management Office (DMO) and Central Bank of Nigeria (CBN) in making policies that will guide against adverse effect on the economic growth of the country resulting from public debt;
5. The research will add value to both the academics and the professionals in making contributions to the Government based on empirical findings related to external debt and economic growth.

SCOPE OF THE STUDY

This study concentrates only on External debt for the period of thirty nine (39) years (1981 to 2019). The period is suitable for this research because, statistically, sample size of 39 years is adjudged to be a large sample.

LIMITATIONS OF THE STUDY

This study is limited to a time series data of 39 years (1981-2019) and to the most current related literature. In addition, the scope of the study was limited to External debt and the economic growth between the periods of 1981-2019 that affect the research study.

SECTION TWO

LITERATURE REVIEW

Nigeria took the jumbo loan in 1978 which was used productively for needed infrastructures like the Dam, etc but recent debts have not been put to seemingly adequate productive use in the country. Hence, strengthening the position of some researchers who have thus questioned the need for debt contraction and accumulation. They say it creates the inter-generational and intra-generational inequity since it benefits then present but burdens the future generations who have to clear the debt. This section reviews few current related literatures that includes empirical and theoretical literatures.

Conceptual Issues

The study conducted by Olasode and Babatunde (2016); models some economic theories which explained the causal relationship between accumulated funds/ loans from external sources (external debts) and economic growth with a more focus on Nigerian economy, as it is a usually trend for debts of third world and developing countries debts profile to be high, and this case is also the same with Nigeria as the country debts profile is on the increase once more after the debt cancellation of 2005 by the Paris Club of creditors. Also, in the innovation by this study is the used of the Autoregressive Distributed Lag (ADL) model to capture the effect of externals debts on viability and growth Nigerian economy from 1984-2012. The preliminary and normality tests show that the variables are positively skewed but are not normally distributed, while the econometric tests of Stationarity (Unit Root Test) and Co-integration Tests conform that all the variables exhibit Stationarity at first differenced and the existence of long-run relationship between the variables was also confirmed by the Johansen Cointegration test carried out. The result from the ordinary least squares method used confirms the existence of a dual behavior as the lag 1 of external debts has positive while external debts of present year posed a negative effect on the performance of the economy. The recommendations are Nigeria government should ensure that debts incurred

are channelled towards productive uses and Debt Management Office of the government should strengthen its plans and foster appropriate use of loans in the critical area the need for is identified.

According to Clements, B. et al (2005), high levels of debt can depress economic growth in low-income countries, external debt slows growth only after its face value reaches a threshold level estimated to be about 50 percent of GDP (or, in net present value terms, 20-25 percent of GDP). Debt overhang depresses growth by increasing private investor's uncertainty about governmental action taken to meet the debt service obligations. These include increase in money supply that causes inflation, distortion of future tax policies (Clements et al, 2005). Therefore the debt overhang problem is linked to the transfer of resources from capital scarce to capital surplus countries.

SECTION THREE

METHODOLOGY, DATA PRESENTATION, ANALYSIS AND DISCUSSION

This Section shall describe the methodology employed in this study. The Methodology shall consist of the procedures to be used for collecting data, summarizing and analyzing the data gathered in order to answer the research questions. For the purpose of this study, this section shall cover data collection. One of the substantial problems in the developing countries is Economic growth. There are many models to analyze the impact of external debt on the Nigeria economic growth.

Research Design

The research approach used in this study is Ex-post Facto research design which involves dependent and explanatory variables and hence, seeking to explain a phenomenon that has already taken place but does not have control of the possible causes. This approach is meant to collect, verify, synthesize evidence to establish the facts that defend or refute the stipulated hypothesis. Secondary data were sourced from their various government offices and custodians. Data collected were all considered authentic and valid for analysis.

Method of Data Collection

The method of Data collection is secondary.

Sources of Data Collection

The secondary data was collected from different sources e.g. Debt Management Office (DMO), National Bureau of Statistics (NBS) and Central Bank of Nigeria (CBN) Statistical Bulletins. The secondary data shall comprise Real Gross Domestic Product (RGDP), External debt (ED) and Debt Servicing (DS) from 1981 to 2019.

Techniques of Data Analysis

The data analysis shall be carried out using the following analytical techniques: Unit Root Test, cointegration, Vector Correction Model (ECM), and Autoregressive Distributed lag Model.

The classical assumptions regression model requires that both dependent and independent variables be stationary and that errors have a zero mean and constant variance. In the presence of non-stationary variables, there might be what (Granger & Newbold, 1974) called a spurious regression, whereby the results obtained suggest that there are statistically significant relationships between the variables in the regression model when in fact all that is obtained is evidence of contemporaneous correlation rather than meaningful causal relations.

Thus the statistical properties (Unit root and Cointegration test) of the series were tested using appropriate softwares such as E-Views 9.0 and Stata 14 software among others.

Unit Root Test

In statistics, a unit root test tests whether a times series variable is non-stationary and possess a unit root. The null hypothesis is generally defined as the presence of a unit root and the alternative hypothesis is either stationarity, trends stationarity depending on the test used.

The unit root test is conducted first before actual model estimation. The unit root test is carried out in order to ascertain the underlying properties of the time series variables in the model. The importance of unit root test is that it enables us to avoid the problem of spurious regression output (Gujarati & Porter, 2009). In this study, the Augmented Dickey-Fuller (1981) unit root test method will be utilized. The Augmented Dickey-Fuller (ADF) unit root test equation to be estimated is specified as follows:

$$\Delta y_t = \omega + \delta y_{(t-1)} + \sum_{i=1}^m \theta_i \Delta y_{(t-i)} + \mu_t$$

Where Δ is the first difference operator; y_t is a time series variable at current time (t); ω is the drift term; $y_{(t-1)}$ is the one period lagged value of y_t ; δ is the coefficient of $y_{(t-1)}$; $\Delta y_{(t-i)}$ is the lagged valued of the first difference of y_t ; m is the maximum lag length; θ_i is the coefficients of $\Delta y_{(t-i)}$; and μ_t is the white noise error term. The null hypothesis is such that the time series contains a unit root which implies that $\delta=0$. The null hypothesis is rejected if δ is negative and statistically significant. The ADF unit root test is based on t-statistic test.

Hypothesis:

H_0 : $\delta=0$ (Variable has unit root i.e.; time series is non-stationary)

H_1 : $\delta<0$ (Variable do not have unit root i.e.; time series is stationary)

Decision Rule:

(i) If $t^* >$ ADF critical value in absolute terms, reject the null hypothesis

(i) If $t^* <$ ADF critical value in absolute terms, do not reject the null hypothesis

Note: t^* is the calculated value of the ADF unit root test

Model Specification

To empirically examine the impact of external debt on economic growth in Nigeria, this study adopted the model of Udofia and Akpanah (2016). The models are specified as follows:

$$R \text{ [GDP]}_t = \beta_0 + \beta_1 \text{ [ED]}_t + \beta_2 \text{ [DS]}_t + \mu_t \dots\dots(3.1)$$

$$RGDP = f(ED, DS)$$

$$RGDP_t = \beta_0 + \beta_1 ED_{t-1} + \beta_2 DS_{t-1} \dots\dots Ut$$

$$RGDP_t = \beta_0 + \beta_1 \sum_{i=0}^p \text{ [ED}_{t-i}] + \epsilon_t$$

Where:

RGDP= Real Gross Domestic Product (Proxy for Economic Growth)

ED= External debt

DS= Debt Servicing

β_0 = Intercept

$\beta_1, \beta_2,$ = Slope Parameters

μ =Error Term

t= Time

A Priori Expectations

A priori expectation defines the theoretical expectations about the sign or size of the parameters of the specified model. A priori expectations are determined by the principles of economic theory guiding the relationship between the variables under study. For equation (3.1), in line with economic theory, External Debts is expected to have a positive relationship with the RGDP while Debt Servicing is expected to have a negative relationship with RGDP. The a priori expectations are mathematically expressed as follows:

$$\beta_1 > 0$$
$$\beta_2 < 0$$

Data Presentation

Figure 4.1 (original sourced data found in Appendix 1 shows the line graph on the distribution of the Nigerian RGDP from the year 1981 to 2019. The line graph indicates a fall in GDP from 1981 to 1983 then a slow rise in GDP from 1983 to 2001. Shortly after the year 2001 there was a sharp increase in GDP from 2002 to 2015 then a fall in GDP was experienced in the year 2016 followed by a slow increase in GDP from 2017 to 2019 respectively.

Figure 4.2 (original sourced data found in Appendix 1 shows the distribution of Nigeria's External Debt (Billion Naira) from 1981 – 2019. There was a stable external debt in Nigeria from the year 1981 to 1988 then a slow increase was recorded from the year 1988 to 1993 followed by a stability (in external debt) recorded from 1993 to 1998. A rapid increase was also recorded from the year 1998 to 2000 followed by a fall in the year 2000 to 2001. A rapid increase was also recorded from 2001 to 2004 followed by a fall in external debt in the year 2004 to 2006 then a slow increase from 2006 to 2015 accompanied with a rapid increase from 2015 to 2019 respectively

Figure 4.3 (original sourced data found in Appendix 1 shows the line graph on the Debt services of Nigeria for the year 1981 to 2019. This shows a slow increase in debt services from the year 1981 to 2008 then followed by a sharp increase from the year 2008 to 2019 with a slow increase recorded in the year 2017 to 2018 respectively.

Augmented Dickey-Fuller (ADF) Unit Root Test

Since the seminal work of Granger and Newbold (1974) on possible spurious regression among non-stationary variables, testing for the unit root test has been greatly developed in the time series approach data series. The unit root testing result is shown on the table 4.2.2 (see appendix 11).

The results of unit root test shown on table 4.2.2 revealed that all the absolute values of ADF test statistics are greater than their critical values at 5% as well as probability values of probability benchmark are stationary at 5% and implying that RGDP, ED and DS, are stationary at 5%. It is integrated of first level and first lags that is, I(1). The results also showed that all the variables are stationary at 5% since their absolute value of ADF statistics are respectively greater than their critical values at 5% as well as probability benchmark values less than probability values calculated.

The VEC estimates on table 4.3 indicated that there is correlation between real Gross Domestic Product and the two independent variables. The implication is that there is an existence of a long-run economic relationship between the dependent variable (RGDP) and the explanatory variables (ED and DS). The R-square of 0.243855 (24%) indicates that 24.29 percent of the result is accounted for by the inclusion of explanatory variables meaning that the regression is spurious, and the VEC F-Test of 1.289988 which is less than critical 5% of

value (2.07). This means that the stability condition required to conduct this type of investigation is satisfied. Thus, the VEC is significant, fractional and negative which justifies the above claims. The estimated coefficient value of VEC (4.186094) has a priori (negative) sign. This is in line with the expectation, and is an indication of the fact that any short-run fluctuations between the dependent variable and the independent -4.186094 also means that the speed of adjustment is 4.17%. This is a fast speed of adjustment.

Discussion of Results

The result on table 4.4 revealed the following:

The equation shows that $\alpha = 0.298$ which is the intercept. This is the base level of prediction for the dependent variable when all the independent variables are equal to zero. The coefficients of the independent variables measure how a percentage change in independent variables affect the dependent variable.

1% increase in external debt leads to about -0.0103% decrease in RGDP. It was found that coefficient of external debt in Nigeria during the 1981-2019, is negatively sign (-0.0103), indicating negative relationship between external debt and RGDP in Nigeria during the 1981-2019, and this is not in line with a priori expectation because the external debt acquired within this period of study were not efficiently and effectively utilized for the purpose it was meant for; either Job creation, Infrastructural development, increase per capital income etc. or the funds were miss appropriated. This result is statistically insignificant at 5% with p-value of 0.2313. The standard error measures the statistical reliability of the coefficient estimates- the larger the error, the more statistical noise in the estimates. The standard error is 0.008418% which is small or insignificant and thus shows that external debt is statistically reliable to predict increase real Gross Domestic Product (RGDP) in Nigeria.

Those who argue that external debt has positive effect on the economy do that from the stand point that external debt will increase capital inflow and when used for productive ventures, accelerates the pace of economic growth. The capital inflow may be associated with managerial know-how, technology, technical expertise as well as access to foreign market. The above is in agreement with the views of the Keynesian Theory of capital accumulation as a catalyst for economic growth. However, external debt may have negative impact on investment through debt overhang and credit-rationing problem (Eduardo, 1989).

Debt overhang phenomenon is where substantial resources are used for debt servicing such that it stifles economic growth. It becomes a tax on domestic production such that the amount spent hampers meaningful economic growth activities as it reduces resources available to government to implement growth oriented economic policies.

1% increase in debt services leads to about -0.0324% decrease in RGDP. It was found that coefficient of debt services in Nigeria during the 1981-2019, is negatively sign (-0.0324), indicating negative relationship between debt services and RGDP in Nigeria during the 1981-2019, and this is in line with a priori expectation. This result is statistically insignificant at 5% with the p-value of 0.5340. The standard error measures the statistical reliability of the coefficient estimates- the larger the error, the more statistical noise in the estimates. The standard error is 0.051512% which is small or insignificant and thus shows that DS is statistically reliable to predict real Gross Domestic Product (RGDP) in Nigeria.

R-square (R²) is the fraction of the variance of the dependent variable explained by the independent variable. In this result, the R² is about 96% meaning that about 96% of the Real

Gross Domestic Product (RGDP) in Nigeria is explained by the independent variables put together. If more regressors are added, the R2 never decreases; Adjusted R2 penalizes the R2 for the repressors which do not contribute to the explanatory power of the model and in this case is close R2. Sum of squared residual is a measure of error in using the estimated regression equation values of the RGDP, ED and DS. From the result, it shows that EXD and DS have significantly impacted on real Gross Domestic Product (RGDP) proxies' economic growth in Nigeria over the period 1981-2019.

Test of Hypotheses and Decision

In accepting or rejecting the stated Research Null Hypotheses; Table 4.5 shows the Regression result table; which further indicates the calculated probability values of the variable test results. Therefore, the decision rule for Rejection of the stated Null hypotheses is as follows;

Decision Rule

P-Value > Alpha = (Fail to reject H0)

P-Value < or equal to Alpha = (Reject H0)

Where Alpha is the Level of Significance

Hypothesis 1:

The Null Hypothesis (H0); There is no significant influence of external debt on the economic growth in Nigeria is ACCEPTED on the condition that the P-Value (0.2313) is greater than the P-bench mark value at 5% level of significant (0.05).

Hypothesis 2:

The Null Hypothesis; H0: : There is no significant influence of external debt servicing on the economy in Nigeria is ACCEPTED on the condition that the P-Value (0.5340) is greater than the P-bench mark value at 5% level of significant (0.05).

SECTION FOUR

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

SUMMARY

This study employed Unit Root test, Error Correction Estimates and Autoregressive Distributed lags model to examine the impact of debt services on Nigerian economy from 1981 to 2019. The study made use of two explanatory variables which included external debt (ED) and debt servicing (DS) to establish its impact on the economy.

The study revealed the following major findings:

- i. ED, external debt has no significant impact on economic growth of Nigeria within the study period (1981-2019) at 5% based on t-statistics. This finding was not consistent with A priori expectation but consistent with Mbah (2016), Ayadi & Ayadi (2008) and Obademi (2013).
- ii. DS, debt servicing has no significant impact on economic growth of Nigeria within the study period (1981-2019) at 5% based on t-statistics. This finding was consistent with A priori expectation.

CONCLUSION

This research work was conducted to find out the impact of External Debt on economic growth in Nigeria. This study was necessitated by the fact that the economy is often said to be

hindered for growing in terms of (debt services) as a result of debt services payment. However, such growth is insufficient in the real sense of it, as proportion of the debt services contribution to Nigeria's real Gross Domestic Product (RGDP). Therefore, this study employed the autoregressive distributed lags model method, stationarity test and other diagnostic tests to investigate whether or not External debt has impact on the economic growth in Nigeria.

RECOMMENDATIONS

1. It was obvious from the study that external debt (ED) and debt servicing (DS) has impact on the Nigerian economic growth but not statistically significant (individually as well as collectively). Therefore, this study recommends the following:
2. In order to solve the problems associated with mismanagement of external debt on the economic growth of Nigeria; policy makers should intensify efforts towards ensuring that external debt obtained are judiciously and effectively utilized as well as provide the economic growth enablers that will enhance national development.
3. In order for debt services to have a favourable impact on the economic growth of Nigeria; The government through the Debt Management office and Federal Ministry of Finance and National Planning should formulate and implement institutional strengthening policies in the areas of effective debt management as well as provision of lower interest rate to the real sectors of the economic that have direct effects on the citizenry

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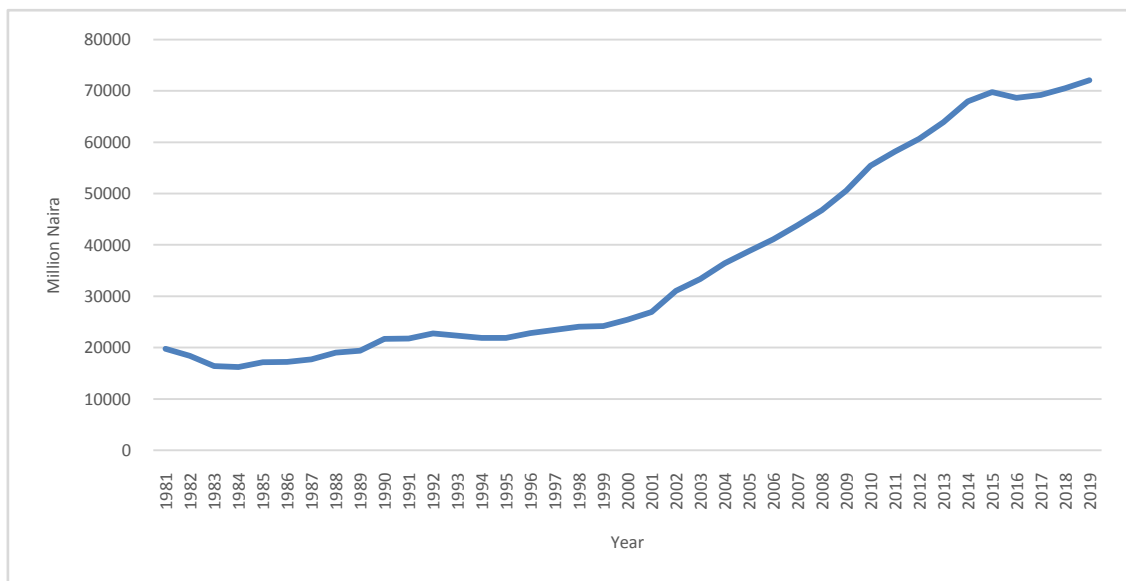
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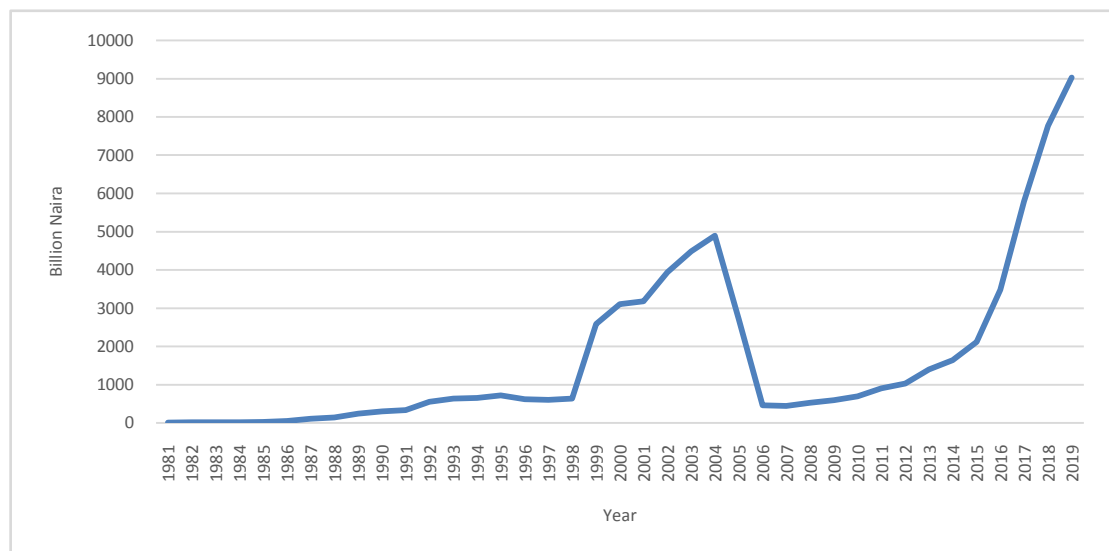
APPENDIX 1 – FIGURES

Figure 4.1: A Line chart showing distribution of Nigeria’s Real Gross Domestic Product (RGDP) (Million Naira) from 1981– 2019



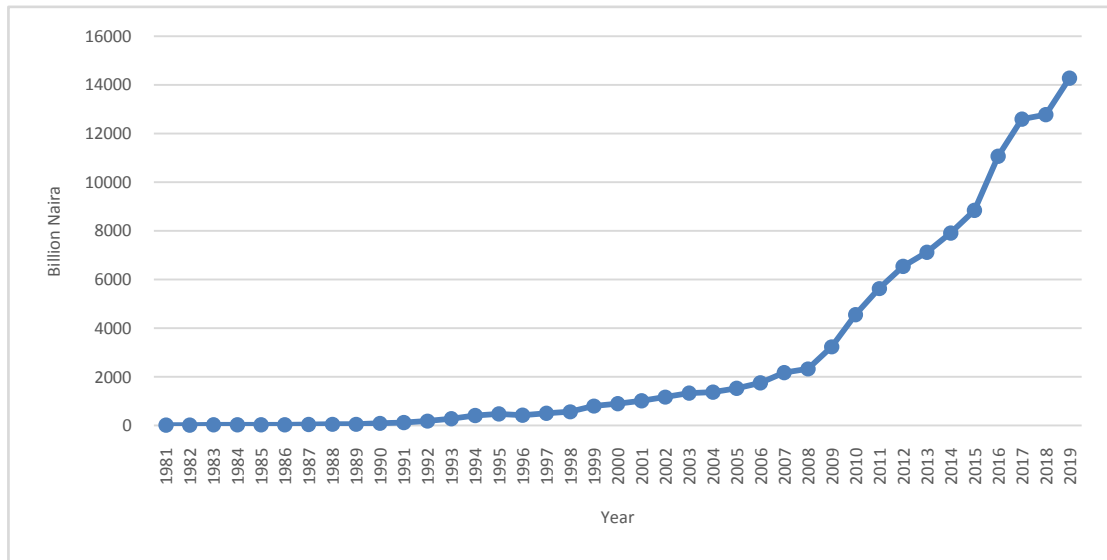
Source: Researcher’s own computation using Microsoft Excel Output, 2021.

Figure 4.2: A Line chart showing distribution of Nigeria’s External Debt (Billion Naira) from 1981 – 2019



Source: Researcher’s own computation using Microsoft Excel Output, 2021.

Figure 4.3: A Line chart showing distribution of Nigeria’s Debt Services (Billion Naira) from 1981 – 2019



Source: Researcher’s own computation using Microsoft Excel Output, 2021.

APPENDIX 11 = TABLES

Table 4.2.1: Summary of the description of variables and their corresponding unit and sources

Variable	Description	Unit	Source
RGDP	Real gross domestic product	Billions Naira	NBS
ED	External Debt	Billions Naira	DMO/CBN
DS	Debt Services	Billion Naira	DMO/CBN

Source: Researcher’s own computation

Table 4.2.2: Augmented Dickey-Fuller (ADF) Unit Root Test

Series	ADF Test Statistics	5% Critical Value	Prob Value	Order of Co-integration
RGDP	-4.337603	-2.945842	0.0015	1(1)
ED	-4.754616	-2.943427	0.0005	1(1)
DS	-4.515840	-2.943427	0.0009	1(1)

Source: *E-views output, version 9.0*

Table 4.3: Vector Error Correction Estimates

Vector Error Correction Estimates

Date: 05/16/21 Time: 11:29

Sample (adjusted): 1984 2019

Included observations: 36 after adjustments

Standard errors in () & t-statistics in []

Cointegrating Eq:	CointEq1		
RGDP(-1)	1.000000		
EXD(-1)	0.287011 (0.06798) [4.22174]		
DS(-1)	-0.394039 (0.05427) [-7.26038]		
C	-4.186094		
Error Correction:	D(RGDP)	D(EXD)	D(DS)
CointEq1	-0.013561 (0.03570) [-0.37985]	-1.082623 (0.41884) [-2.58483]	-0.009133 (0.13624) [-0.06704]
D(RGDP(-1))	0.101357 (0.17081) [0.59339]	0.877387 (2.00385) [0.43785]	-0.717785 (0.65182) [-1.10120]
D(RGDP(-2))	0.270344 (0.16801) [1.60913]	1.630782 (1.97095) [0.82741]	1.284822 (0.64112) [2.00402]
D(EXD(-1))	-0.000170 (0.01483) [-0.01146]	0.450005 (0.17401) [2.58609]	-0.001216 (0.05660) [-0.02147]
D(EXD(-2))	0.003639 (0.01539) [0.23644]	0.107821 (0.18055) [0.59717]	0.022667 (0.05873) [0.38595]
D(DS(-1))	-0.060775 (0.04564) [-1.33151]	-0.186591 (0.53546) [-0.34847]	0.292664 (0.17418) [1.68025]
D(DS(-2))	-0.018717 (0.04842) [-0.38653]	0.132393 (0.56808) [0.23305]	0.012247 (0.18479) [0.06628]

C	0.018293 (0.00720) [2.54245]	0.000136 (0.08441) [0.00161]	0.043177 (0.02746) [1.57256]
R-squared	0.243855	0.307999	0.211826
Adj. R-squared	0.054818	0.134999	0.014783
Sum sq. resids	0.007427	1.022155	0.108155
S.E. equation	0.016287	0.191064	0.062150
F-statistic	1.289988	1.780339	1.075024
Log likelihood	101.6689	13.02712	53.45698
Akaike AIC	-5.203827	-0.279285	-2.525388
Schwarz SC	-4.851934	0.072608	-2.173495
Mean dependent	0.017778	0.081667	0.077778
S.D. dependent	0.016752	0.205433	0.062615
Determinant resid covariance (dof adj.)		3.130812	
Determinant resid covariance		1.470832	
Log likelihood		171.3874	
Akaike information criterion		-8.021521	
Schwarz criterion		-6.833882	

Source: *output of E-views version 9.0, 2021*

Table 4.4 Autoregressive Distributive Lag Model: The Regression Result

$$RGDP_t = \beta_0 + \beta_1 ED_{t-1} + \beta_2 DS_{t-1} + U_t$$

Dependent Variable: RGDP

Method: ARDL

Date: 05/16/21 Time: 11:33

Sample (adjusted): 1984 2019

Included observations: 36 after adjustments

Maximum dependent lags: 4 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (4 lags, automatic): ED DS

Fixed regressors: C

Number of models evaluated: 100

Selected Model: ARDL(3, 0, 2)

Note: final equation sample is larger than selection sample

Variable	Coefficien			
	t	Std. Error	t-Statistic	Prob.*
RGDP(-1)	1.083208	0.154547	7.008907	0.0000
RGDP(-2)	0.120147	0.263610	0.455774	0.6521
RGDP(-3)	-0.272526	0.164217	-1.659551	0.1082
ED	-0.010301	0.008418	-1.223720	0.2313
DS	-0.032436	0.051512	-0.629676	0.5340
DS(-1)	-0.089181	0.075349	-1.183580	0.2465
DS(-2)	0.077296	0.044316	1.744222	0.0921
C	0.297626	0.190849	1.559479	0.1301

R-squared	0.996034	Mean dependent var	4.519167
Adjusted R-squared	0.995042	S.D. dependent var	0.221235
			-
S.E. of regression	0.015577	Akaike info criterion	5.292870
			-
Sum squared resid	0.006794	Schwarz criterion	4.940977
		Hannan-Quinn	-
Log likelihood	103.2717	crit.	5.170050
F-statistic	1004.538	Durbin-Watson stat	1.910761
Prob(F-statistic)	0.000000		

Table 4.5 Probability values of Variables and Decisions on Hypotheses

VARIABLE	P-VALUE	ALPHA	DECISION ON NULL HYPOTHESIS
ED	0.2313	0.05	Accepted
DS	0.5340	0.05	Accepted

Original Sourced Data

Year	Real GDP (=N=billion)	External Debt (=N=billion)	Debt Servicing (=N=billion)
1981	19,748.53	2.33	11.19
1982	18,404.96	8.82	15.01
1983	16,394.39	10.58	22.22
1984	16,211.49	14.81	25.67
1985	17,170.08	17.3	27.95
1986	17,007.77	41.45	28.44
1987	17,552.10	100.79	36.79
1988	18,839.55	133.96	47.03
1989	19,201.16	240.39	47.05
1990	21,462.73	298.61	84.09
1991	21,539.61	328.45	116.2
1992	22,537.10	544.26	177.96
1993	22,078.07	633.14	273.84
1994	21,676.85	648.81	407.58
1995	21,660.49	716.87	477.73
1996	22,568.87	617.32	419.98
1997	23,231.12	595.93	501.75
1998	23,829.76	633.02	560.83
1999	23,967.59	2,577.37	794.81
2000	25,169.54	3,097.38	898.25
2001	26,658.62	3,176.29	1,016.97
2002	30,745.19	3,932.88	1,166.00
2003	33,004.80	4,478.33	1,329.68
2004	36,057.74	4,890.27	1,370.33
2005	38,378.80	2,695.07	1,525.91
2006	40,703.68	451.46	1,753.26
2007	43,385.88	438.89	2,169.64

2008	46,320.01	523.25	2,320.31
2009	50,042.36	590.44	3,228.03
2010	54,612.26	689.84	4,551.82
2011	57,511.04	896.85	5,622.84
2012	59,929.89	1,026.90	6,537.54
2013	63,218.72	1,387.33	7,118.98
2014	67,152.79	1,631.50	7,904.03
2015	69,023.93	2,111.51	8,837.00
2016	67,931.24	3,478.91	11,058.20
2017	68,490.98	5,787.51	12,589.49
2018	69,799.94	7,759.20	12,774.40
2019	71,387.83	9,022.42	14,272.64

Source: National Bureau of Statistics, Debt Management Office and Central Bank of Nigeria

Transformed Data

Year	RGDP	ED	DS
1981	4.30	0.37	1.05
1982	4.26	0.95	1.18
1983	4.21	1.02	1.35
1984	4.21	1.17	1.41
1985	4.23	1.24	1.45
1986	4.23	1.62	1.45
1987	4.24	2.00	1.57
1988	4.28	2.13	1.67
1989	4.28	2.38	1.67
1990	4.33	2.48	1.92
1991	4.33	2.52	2.07
1992	4.35	2.74	2.25
1993	4.34	2.80	2.44
1994	4.34	2.81	2.61
1995	4.34	2.86	2.68
1996	4.35	2.79	2.62
1997	4.37	2.78	2.70
1998	4.38	2.80	2.75
1999	4.38	3.41	2.90
2000	4.40	3.49	2.95
2001	4.43	3.50	3.01
2002	4.49	3.59	3.07
2003	4.52	3.65	3.12
2004	4.56	3.69	3.14
2005	4.58	3.43	3.18
2006	4.61	2.65	3.24
2007	4.64	2.64	3.34
2008	4.67	2.72	3.37
2009	4.70	2.77	3.51
2010	4.74	2.84	3.66

2011	4.76	2.95	3.75
2012	4.78	3.01	3.82
2013	4.80	3.14	3.85
2014	4.83	3.21	3.90
2015	4.84	3.32	3.95
2016	4.83	3.54	4.04
2017	4.84	3.76	4.10
2018	4.84	3.89	4.11
2019	4.85	3.96	4.15

Source: Researcher's own computation

RGDP

Null Hypothesis: D(RGDP) has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.337603	0.0015
Test critical values: 1% level	-3.626784	
5% level	-2.945842	
10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RGDP,2)

Method: Least Squares

Date: 08/02/20 Time: 20:31

Sample (adjusted): 1984 2019

Included observations: 36 after adjustments

Variable	Coefficien	t	Std. Error	t-Statistic	Prob.
D(RGDP(-1))	-0.603251	0.139075	-4.337603	0.0001	
D(RGDP(-1),2)	-0.251904	0.132348	-1.903353	0.0657	
C	0.011903	0.003293	3.614849	0.0010	
R-squared	0.518086	Mean dependent var	0.001667		
Adjusted R-squared	0.488879	S.D. dependent var	0.020494		
S.E. of regression	0.014652	Akaike info criterion	5.528872		
Sum squared resid	0.007084	Schwarz criterion	5.396912		
Log likelihood	102.5197	Hannan-Quinn	-		
F-statistic	17.73845	crit.	5.482814		
Prob(F-statistic)	0.000006	Durbin-Watson stat	1.778233		

External Debt (ED)

Null Hypothesis: D(ED) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob. *
Augmented Dickey-Fuller test statistic	-4.754616	0.0005
Test critical values: 1% level	-3.621023	
5% level	-2.943427	
10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(ED,2)

Method: Least Squares

Date: 08/02/20 Time: 20:38

Sample (adjusted): 1983 2019

Included observations: 37 after adjustments

Variable	Coefficien t	Std. Error	t-Statistic	Prob.
D(ED(-1))	-0.706850	0.148666	-4.754616	0.0000
C	0.053463	0.035024	1.526442	0.1359

R-squared	0.392428	Mean dependent var	0.013784
Adjusted R-squared	0.375069	S.D. dependent var	0.246547
S.E. of regression	0.194902	Akaike info criterion	0.380106
Sum squared resid	1.329531	Schwarz criterion	0.293030
Log likelihood	9.031970	Hannan-Quinn criter.	0.349408
F-statistic	22.60637	Durbin-Watson stat	1.859159
Prob(F-statistic)	0.000034		

Debt Services (DS)

Null Hypothesis: D(DS) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob. *
Augmented Dickey-Fuller test statistic	-4.518460	0.0009
Test critical values: 1% level	-3.621023	

5% level	-2.943427
10% level	-2.610263

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(DS,2)

Method: Least Squares

Date: 08/02/20 Time: 20:43

Sample (adjusted): 1983 2019

Included observations: 37 after adjustments

Variable	Coefficien t	Std. Error	t-Statistic	Prob.
D(DS(-1))	-0.734667	0.162592	-4.518460	0.0001
C	0.058327	0.016889	3.453596	0.0015

R-squared	0.368419	Mean dependent var	0.002432
Adjusted R-squared	0.350374	S.D. dependent var	0.077115
S.E. of regression	0.062154	Akaike info criterion	2.665862
Sum squared resid	0.135210	Schwarz criterion	2.578785
Log likelihood	51.31845	Hannan-Quinn	2.635164
F-statistic	20.41648	Durbin-Watson stat	2.037456
Prob(F-statistic)	0.000068		
