

MULTIVARIATE ANALYSIS OF THE DETERMINANTS OF PUBLIC EXTERNAL DEBT IN NIGERIA

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Abstract

Available literature and published studies in Nigeria identified the role of public external debt in financing her economic development. The studies also identified the macro economic variables which were critical in public external debt management in Nigeria. Unfortunately however, the studies failed to empirically and statistically determine the variables which were central in public external debt management. Interestingly, empirically and statistically determining the impacts of selected critical macroeconomic variables on external debt in Nigeria, during the period 1970-2016, is the core of this study. Underpinned by the range of dependency theories, with preference for Andre Gunder Frank's typology and position, the study adopted the ordinary least squares analytical approach in regressing the annual data of the selected macroeconomic determinants, namely interest rate, inflation rate, exchange rate, external reserves, aggregate government capital expenditure and gross domestic product, on the dependent external debt, using the E-Views processor. The results of the hypothesis tested showed differing levels of statistical significance between public external debt and the determinants during the period. Based on the findings, it is recommended that, among others Government should conduct external borrowing with diligence and professionalism instead of the extant naive practice.

Key Words: Public External Debt, Determinants, Impact, Macroeconomic

Introduction

Irrespective of her resource endowment and internal sufficiency, no nation is so well off as to totally escape the need, however occasional, to borrow from external sources. In the case of developing countries or emerging economies, where poverty is a fundamental issue, such need remains high. Upon the attainment of independence in the 1960s, most African countries, including Nigeria, came to collision with poverty. In the hastened bid to achieve rapid economic development, the need by Nigeria to extend her financing horizon beyond her shores became urgent. Thus, the pre-independent external loan of \$3million, to complete the extension of the railway line to north-east Bornu, was followed by a cocktail of external loans, as Nigeria progressed, post independence. The Government Promissory Notes Ordinance was enacted to herald an era of the requisite legal framework for external borrowing. Furthermore, the External Loan Act, 1962 was enacted and subsequently amended in 1965. From the humble beginning, the spate of external loans increased progressively, such that by the close of 2000, Nigeria became a heavily indebted country, with the attendant implications for her survival and growth, (Bullion, 2005). From the paltry \$3million in 1960, Nigeria's total external debt stock grew to about \$4million in 1970, \$9 billion in 1980 and to a whopping estimated \$30 billion in 1988. Indeed, by 2005, when external debt became unsustainable, the amount stood at \$35.66 billion (Fashipe, 2010). By September 2014, in Naira terms, external debt level stood at ₦ 4.6 trillion ('The Punch', Monday, January 1, 2018:34) but dropped substantially to ₦ 2.09 trillion by September 2015, following the negotiation and debt forgiveness. However, by the end of 2017, the level of external debt resumed the upward movement and grew to \$18.91billion (DMO, in 'The Nation', Sunday, April 29, 2018: 4).

The risk assumed by the escalating debt profile could be better appreciated when viewed against the debt service obligation. Between January and September 2017, Nigeria paid a total of \$1.07 billion to service external debt obtained by the Federal and State Governments (DMO, in 'The Nation; Sunday, April 29, 2018). A large proportion of the payment was interest service. To be sure, the Debt Management Office (DMO, 2015) projects that debt service payment over a ten –year period, (2017-2026) to be \$11.626 billion on external debt. Without doubt, the debt situation is dangerous and worrisome. Literature is of the divergent views that the conduct of external debt by various Nigerian administrations was nothing short of naivety and recklessness. The situation was exacerbated by ignorance of key macroeconomic variables when external debt was procured. This study is instituted to examine the effects of selected key macroeconomic variables on external debt in Nigeria, with the period 1970 - 2016.

Statement of the Problem

Literature and empirical studies in Nigeria recognise the importance of external debt and efficient debt management in her development. Consequently, the desirability of external loan, particularly when the underlying need or projects are intended to generate the level of development in the areas of economic and social infrastructure; and when the loan terms are favourable is unquestionable. Impliedly therefore, projects financed with external loans should earn positive returns, with a clear capacity for loan repayment. To pass the test of viability therefore, a decision to procure public external loan must be well informed and carefully made. Such well informed and carefully made decision must demonstrate a clear understanding of the relationship between external debt and the explanatory macro economic variables. Furthermore, the decision must incorporate a sound understanding of the impact of the explanatory variables on public external debt.

Even though available literature and empirical studies recognise the importance of external debt as a major source of deficit financing in Nigeria, the studies however fail to determine the impacts of the selected variables on public external debt during the period. The central problem of this study therefore is that the impacts of the explanatory macro economic variables on public external debt in Nigeria have not been empirically determined.

Research Questions

We shall attempt to answer the following questions:

1. Which variables are significant in Nigeria's external debt?
2. What is the relationship between the explanatory variables and Nigeria's external debt?
3. What is the relative impact or significance of each of the independent variables on Nigeria's external debt?

Objectives of the Study

The objectives of the study include the following:

1. To determine the relationship between external debt and each of the explanatory variables.
2. To determine the statistical significance of each of the explanatory variables in Nigeria's external debt.
3. To offer policy options for public external debt management.

Significance of the Study

The findings of this study will be useful to the Federal Government of Nigeria, whose responsibility it is to procure external debt on behalf of the citizenry. It will also be useful to students and scholars engaged in research in public external debt management in Nigeria.

Hypotheses

The following hypotheses are tested:

1. There is no statistically significant relationship between Nigeria's external debt and exchange rate.
2. There is no statistically significant relationship between Nigeria's external debt and interest rate.
3. There is no statistically significant relationship between Nigeria's external debt and inflation rate.
4. There is no statistically significant relationship between Nigeria's external debt and Gross Domestic Product (GDP).
5. There is no statistically significant relationship between Nigeria's external debt and external reserves.
6. There is no statistically significant relationship between Nigeria's external debt and Government aggregate capital expenditure.

Theoretical Framework and Review of Previous Studies

Theoretical Framework

The worldwide economic recession in the 1980s followed by the rising interest rates and the declining prices of primary products propelled private banks with excess liquidity to eagerly increase lending to debtor countries. Thus, real interest rates in the 1980s more than tripled their levels in the 1960s, and were over six times higher in 1974-79, when Less Developed Countries (LDCs) acquired a substantial portion of their debts (World Bank, 1990).

Previous studies: Akinlo (1980), MacFadden (1983), Eichengreen and Portes (1986), Osagie and Idehai (1991), Ekpo and Egwakhide (1988), Fischer (1993), Fosu (1996) Blavy (2006), Hameed, Ashrafa, et al (2006) and Malik (2010) attempted to provide evidence of strong links between external debt in Third World Countries and some exogenous macroeconomic variables which include the level of debt service payment, percentage of export earnings and fiscal deficits, by outlining the mechanism through which external debt can be influenced by the exogenous variables. The results indicate that on a comparative basis, external debt in LDCs lag in terms of sustainability, vis-à-vis the Developed Countries (DCs), due to the differences in economic environment and debt management strategies. As a departure however, this study takes the view that the crisis of external debt in LDCs is a historical development of the capitalist system which penetrated even the most isolated sections of the LDCs over the past centuries through the instrumentality of external debt. In effect, the capitalist nations firmly established a long-run dependent relationship with the LDCs through debt 'peonage'. This study therefore aligns with Andre Gunder Frank's Dependency Theory (Frank, 1967;1968) which provides the analytical basis of the relationship between DCs and LDCs. Frank argued that there has been a development of underdevelopment outside of Western Europe, North America, and Asia as a consequence of emerging relationships among political-economic formations which were brought into being as capitalism expanded.

Literature Review

The focus is to examine the macroeconomic factors which influence public external debt. Yekini (2002) writes that borrowing is not a new phenomenon particularly because most of today's industrialised countries were at various times borrowers on their path to economic development. He therefore identified the causes of overseas indebtedness which he classified into four categories, namely savings gap (poverty induced), foreign exchange earnings gap, returns issues and the external factors.

Among reasons often canvassed for borrowing are the rising gap between national savings and domestic investment and the oil price shocks of 1973/74 and 1979/80, with the attendant world economic recession. It was during these periods that most indebted poor countries were afflicted with the high debt profiles. As their terms of trade deteriorated significantly, the poor countries experienced substantial gaps in their finances, a situation that necessitated the procurement of the needed capital from external sources. As oil prices rallied, earnings by the developed countries grew far beyond their demands. The excess money earned from the sale of oil (petrodollars) was therefore deposited in the Eurodollar markets through the various financial institutions. Expectedly, the LDCs seized the opportunity provided by the emerging credit regime to borrow, for importation of consumables and capital equipment from Europe, the United States and Asia. The desire to meet the growing import bills on refined petroleum products further increased the pressure on the demand for foreign exchange. Green (1989) identified deteriorating terms of trade, inflationary trends and huge deficits as crucial exogenous factors in the external debt of LDCs. This conclusion is supported by Ferarro and Rosser (1994). The conclusion of Schwartz was received with mixed feelings and positions by others. To Sachs and Berge (1988), in many of the indebted LDCs, borrowing in the 1970s was provoked by the irrational political decisions of leaders who preferred overseas borrowing to raising the tax rates, to avoid political risk. Other factors also acknowledged included some structural changes, as in the expansionary United States Monetary Policy in the early 1970s, the breakdown of the fixed exchange rate system and the subsequent sharp rise in global liquidity.

Yesufu (1996) analysed the effect of structural adjustment on Nigeria's external debt profile and economic growth using a descriptive framework. The study categorised the factors responsible for Nigeria's external debt problem into domestic and foreign factors. While the domestic factors included overvalued exchange rate and fiscal deficit amongst others, the foreign factors included world economic depression and interest rate adjustments by the developed countries. The study also observed that the exchange rate devaluation introduced by Government to correct the overvalued domestic currency and eliminate cost price distortions was counteractive. The study attributed this development to the inability of the exercise to gain competitiveness for the local products due to the hike in the prices of inputs caused by the exercise. McFadden (1983) devised a theoretical framework which justified the need for and amount of external loans required by developing countries. The model summarises the determinants of the Current Account (CA) balance, defining CA as the difference between transactional items which generate foreign exchange and items that require expenditure in foreign exchange. Using econometric regression model, the study found that the demand for external borrowing was an increasing function of the total debt service and change in international reserves. To the contrary, capital inflows such as foreign direct investment reduce the demand for external borrowing.

Several studies in Nigeria and overseas have been undertaken to examine the effects of some macroeconomic variables on external debt. The studies present similar arguments but differed in their emphasis on the covariates of the demand for external loans and

their methodological approaches. Ahmeds study conducted in 1984 was one of the first in the attempt. The theoretical model and its corresponding empirical counterpart were based on assumptions that the amount of a country's debt is determined by its willingness to borrow and the credit ceiling, a rise in income (measured by the standard deviation of exports) and a boost in the demand for borrowing. While a rise in the growth rate of GDP leads to higher demand for borrowing, it decreases or increases the credit ceiling, depending on the degree of risk aversion.

In a study on external borrowing and development in Nigeria, using descriptive analytical methods, Obadan (1991) observes that foreign debt can increase resources available for investment by supplementing domestic savings and augmenting foreign exchange earnings. Accordingly, a country's foreign borrowing requirements depend on its total expenditure in relation to her total domestic product. Uniamukogbo (1991) undertook an empirical analysis of Nigeria's external debt and interest payment between 1971 and 1988 using the ordinary least squares method. He expressed interest payment as a function of export of goods and services, per-capita income, change in per capita income, the magnitude of long-term public debt and long-term private external debt. He observed that Nigeria could pay interest on her debts during the study period. In terms of willingness to pay, he also observed that Nigeria was ready to service the interest on her indebtedness because of her enormous receipts from export. The estimation further revealed that change in per capita income had no significant impact on interest payment during the period of study. Arising from the findings and conclusion of empirical studies therefore, it is discernable that several factors are critical in the external debt of Nigeria.

Methodology

For clarity of presentation, this section is arranged in sub-sections as presented below: This study is a longitudinal or penal survey, relying extensively on secondary data published at different points over a long period. The method is suitable following Nnamdi (1986), Ezennia (1986) and Mahmud (1987).

Data and Description of Variables

Data employed are published year-end values of public external debt (the dependent variable) and the independent variables (or determinants) including nominal interest rate, exchange rate, inflation rate, GDP, external reserves and aggregate government capital expenditure. The data were sourced from various editions of the Statistical Bulletins of the Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS), as presented in Table 1 below:

Table 1: Public External Debt and Determinants, 1970-2016

Year	Total External Debt (N m)	EXR (1\$=N1)	Interest Rate (%)	Inflation Rate (%)	GDP (N'm)	Ext Reserves (N'm)	Aggt Capital Expenditure (N' m)
Year	TED	EXR	IR	INFR	GDP	ER	ACE
1970	175	0.7143	4.5	1.75	5,281.10	104.6	187.8
1971	214.5	0.6955	4.5	1.65	6,650.90	132.3	173.6
1972	265.6	0.6579	4.5	9.41	7,187.50	191.6	451.3
1973	276.9	0.6579	4.5	4.61	8,630.50	241	565.7
1974	322.4	0.62988	4.5	13.53	18,823.10	3,112.50	1,223.50

1975	349.9	0.61585	4.5	33.93	21,475.24	3,380.10	3,207.70
1976	374.6	0.62653	3.5	21.1	26,655.78	3,057.60	4,041.30
1977	496.9	0.64662	4	21.48	31,520.34	2,521.00	5,004.60
1978	1,265.70	0.60595	5	13.3	34,540.10	1,249.10	5,200.00
1979	1,611.50	0.59574	5	11.65	41,974.70	3,043.20	4,219.50
1980	1,866.80	0.54636	6	10	49,632.32	5,445.60	10,163.40
1981	2,331.20	0.61003	6	21.42	47,619.70	2,424.80	6,567.00
1982	8,819.40	0.67287	8	7.18	49,069.30	1,026.10	6,417.20
1983	10,577.70	0.72414	8	23.22	53,107.40	781.7	4,885.70
1984	14,808.70	0.76494	10	40.71	59,622.50	1,143.80	4,100.10
1985	17,300.60	0.89375	10	4.67	67,908.60	1,641.10	5,464.70
1986	41,452.40	2.02058	10	5.39	69,147.00	3,587.40	8,526.80
1987	100,789.10	4.01794	12.75	10.18	105,222.80	4,643.30	6,372.50
1988	133,956.30	4.53673	12.75	56.04	139,085.30	3,272.70	8,340.10
1989	240,393.70	7.39156	18.5	50.47	216,797.50	13,457.10	15,034.10
1990	298,614.40	8.03781	18.5	7.5	267,550.00	34,953.10	24,048.60
1991	328,453.80	9.90949	14.5	12.7	312,139.70	44,249.60	28,340.90
1992	544,264.10	17.2984	17.5	44.81	532,613.80	13,992.50	39,763.30
1993	633,144.40	22.0511	26	57.17	683,869.80	67,245.60	54,501.80
1994	648,813.00	21.8861	13.5	57.03	899,863.20	30,455.90	70,918.30
1995	716,865.60	21.8861	13.5	72.81	1,933,211.60	40,333.20	121,138.30
1996	617,320.00	21.8861	13.5	29.29	2,702,719.10	174,309.90	212,926.30
1997	595,931.90	21.8861	13.5	10.67	2,801,972.60	262,198.50	269,651.70
1998	633,017.00	21.8861	19.25	7.86	2,708,430.90	226,702.40	309,015.60
1999	2,577,374.40	92.6934	19.25	6.62	3,194,015.00	546,873.10	498,027.60
2000	3,097,383.90	102.105	16.25	6.94	4,582,127.30	1,090,148.00	239,450.90
2001	3,176,291.00	111.943	18.75	18.87	4,725,086.00	1,181,652.00	438,696.50
2002	3,932,884.80	120.97	19	12.89	6,912,381.30	1,013,514.00	321,378.10
2003	4,478,329.30	129.357	14	14.03	8,487,031.60	1,065,093.00	241,688.30
2004	4,890,269.60	133.5	14	15.01	11,411,066.90	2,252,644.00	351,250.00
2005	2,695,072.20	132.147	14	17.85	14,572,239.10	3,835,433.00	519,470.00
2006	451,461.70	128.652	14	8.4	18,564,594.70	5,414,158.10	552,385.80
2007	431,079.85	125.833	14	5.4	20,657,317.70	6,459,250.30	759,281.20
2008	523,254.09	118.567	17.5	11.5	24,296,329.30	6,283,722.70	960,890.10
2009	590,437.13	148.902	17.5	12.6	24,794,238.70	6,310,752.80	1,152,800.00
2010	689,837.49	150.298	18	13.8	33,984,754.10	4,857,355.40	883,870.00
2011	896,849.62	153.862	17.6	10.9	37,543,654.70	5,021,956.60	918,500.00
2012	10,076,456.00	157.499	17.3	12.2	40,544,099.94	5,222,089.10	874,800.00
2013	13,873,319.00	159.05	24.9	8.5	63,218,72173	42,847,3100	1,108,386402

2014	16,315,219.00	180.33	25.91	8	67,152.78584	34,241.5400	783.1193861
2015	21,115,307.00	196.99	26.84	9	69,023.92994	28,284.8200	818.3524689
2016	34,789,154.00	305.22	28.55	15.7	67,931.23593	26,990.5800	634.7877176

Sources: Central Bank of Nigeria and National Bureau of Statistics, Statistical Bulletins, various years.

Specification of Analytical Tools and Tests.

The key aim of this study is to analyse the relationships between public external debt and the respective explanatory variables in Nigeria. For better appreciation, this subsection is presented as follows:

Stationarity or Unit Root Tests:

The stationarity properties of the data need to be established through unit root tests, to determine that their use will not lead to spurious estimates. In this regard, to Brooks (2009), the Augmented Dickey Fuller (ADF) test is employed. The decision is to reject the null hypothesis, if the ADF test statistic is absolutely higher than the Mackinnon's Critical Values (MCV) at 1%, 5% and 10% levels of significance.

Multiple Regression Test (Ordinary Least Squares)

The multiple regression test is employed to capture the short-run estimates of the predictive regression equation. Accordingly, the significance of the resultant t-statistic of each of the explanatory variables is expected to be at least 0.05, for the null hypothesis of no significance to be rejected.

Johansens's Co-integration Test:

The Johansen's Co-integration test is utilized to ascertain the extent of long run equilibrium relationship prevailing among the set of study variables (Awe, 2012). The decision rule is based on significance at 0.05 level, of the co-integrating equation.

Error Correction Estimates (ECMs)

Brook (2009) observes that the ECMs attempt to evaluate the long run sensitivities of the dependent variable to each of the explanatory variables. Besides, it measures the speed with which the dependent variable adjusts to long run equilibrium after short run distortions in the explanatory variables.

Granger Causality

Following Brooks (2009) and Maddala (2007), the Pair-Wise-Granger causality test serves to determine the extent to which changes in a given set of explanatory variables tend to promote and/or support variations in the dependent variable. It further ascertains the extent to which the inclusion of their lagged values can improve the explanation, and vice versa. In this regard, any time series Y is said to be Granger caused by another time series X, if X assists in explaining Y in a regression framework; and if the addition of lagged or previous values of X enhances the explanation of Y. In this circumstance, it implies that the coefficients of the lagged X values are found statistically significant, and vice versa. Additionally, Maddala (2007) and Brooks (2009) formulate the following expressions for causality analysis:

$$y_t = \beta_0 + \sum_{i=k}^n \beta_i y_{t-i} + \sum_{i=k}^n \beta_{i+1} X_{t-i} + \mu_t \quad (1)$$

$$X_t = a_0 + \sum_{i=k}^n a_i y_{t-i} + \sum_{i=k}^n a_{i+1} X_{t-i} + V_t \quad (2),$$

where Y_t and X_t are the time series, being examined, while μ_t and V_t are their white noise errors. The preferred lag length is 2.

Model Specification

Given the fundamental fact of the dependent relationship, the general form of the functional relationship between the dependent and independent variables is expressed below:

$$EXTD = f(ECXR, INTR, INFR, GDP, EXTR, GCAP) \dots\dots\dots(1),$$

where EXTD = External Debt Stock

ECXR= Exchange Rate

INTR= Interest Rate

INFR= Inflation Rate

GDPR= Gross Domestic Product

EXTR= External Reserves

GCAP = Aggregate Government Capital Expenditure

Since equation (4.1) is implicit in form, the explicit expression, for estimation purposes, can be presented as follows:

$$EXTD= \beta_0 + \beta_1ECXR + \beta_2INTR + \beta_3INFR + \beta_4GDPR + \beta_5EXTR + \beta_6GCAP\dots\dots\dots(2),$$

where

β_0 = Constant Term

$\beta_1 - \beta_6$ = Coefficients of the Independent Variables

μ = Error or Stochastic Term

Apriori Expectations

External debt should respond positively or negatively to the respective explanatory variables, depending on the theoretical relationship. Accordingly, the expectations are summarised as follows:

EXR < 0, INTR > 0, INFR > 0, GDP < 0 EXTR < 0, GCAP > 0 respectively.

Presentation of Results

Presentation of Stationarity (Unit Root) Test Results

The output of the stationarity tests for all the study variables is presented in Table 2 below.

Table 2: Summary of Unit Root Test Results

Variables	ADF Test Statistic	Critical Values	Order of Integration
TED	-3.904547	-3.610453*	I(0)
EXR	-2.960782	-2.928142**	I(1)
IR	-7.018372	-3.588509*	I(1)
INFR	-3.576997	-2.926622**	I(0)
RGDP	-10.81368	-3.596616*	I(0)
ER	-2.740833	-2.609066***	I(0)
ACE	-3.353116	-3.202445***	I(1)

Notes: ***, ** and * significant at 10%, 5% and 1%, respectively

Source: Extracts from E-views-10 Output.

The results of the unit root test as presented in Table 2. show that exchange rate, interest rate and aggregate government capital expenditure were stationary at first difference. Besides, for each variable, the absolute value of the ADF test statistic is greater than the corresponding Mackinnon’s critical value at 1, 5 and 10 respective levels of significance. The variables are therefore considered to be employable in further analysis, with minimal risk of spurious effects.

Multiple Regression Test Results (OLS):

The results of the multiple regressions test (short run) for all the time series variables employed are presented in Table 3 below.

Table 3: Regression Model Result

Dependent Variable: LOG(TED)

Method: ARMA Maximum Likelihood (OPG - BHHH)

Sample: 1970 2016

Included observations: 47

Convergence achieved after 39 iterations

Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.200290	3.572763	1.735433	0.0908
LOG(IR)	0.750910	0.682919	1.099560	0.2784
LOG(INFR)	0.015344	0.188373	0.081453	0.9355
LOG(GDP)	0.183835	0.580037	0.316937	0.7530
LOG(EXR)	1.216873**	0.633141	1.921962	0.0621
LOG(ER)	-0.122249	0.189873	-0.643845	0.5235
LOG(ACE)	-0.078179	0.541981	-0.144246	0.8861
AR(1)	0.933340	0.182322	5.119171	0.0000
SIGMASQ	0.254918	0.048645	5.240360	0.0000
R-squared	0.980819	Mean dependent var		11.62790
Adjusted R-squared	0.976781	S.D. dependent var		3.684998
S.E. of regression	0.561510	Akaike info criterion		1.897635
Sum squared resid	11.98114	Schwarz criterion		2.251919
Log likelihood	-35.59443	Hannan-Quinn criter.		2.030954
F-statistic	242.8940	Durbin-Watson stat		1.586235
Prob(F-statistic)	0.000000			
Inverted AR Roots	.93			

Notes: ***, ** and * significant at 10%, 5% and 1%, respectively

Source: Extracts from E-views-10 Output.

Table 3 above shows the nature of the short run relationship between the variables of study. The results indicate that variations in the explanatory variables accounted for 98.08% of the variations in external debt. Besides, the probability (F-statistics) value is 0.0000, indicating a good line of fit. The Durbin-Watson (DW) statistic value of 1.586235 is within acceptable range of 1.5-2.5. It therefore implies no significant autocorrelation. The coefficients of all explanatory variables, except for interest rate and exchange rate, were not significant at 0.05 level, in the short run.

Presentation of the Results of Johansen's Co-integration Test.

Table 4: below present the results of Co-integration test for the variables.

Table 4. Results of Johansen's Co-integration Test

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.903651	246.2798	125.6154	0.0000
At most 1 *	0.691539	140.9898	95.75366	0.0000
At most 2 *	0.650463	88.06266	69.81889	0.0009
At most 3	0.414657	40.76110	47.85613	0.1964
At most 4	0.174747	16.66104	29.79707	0.6650
At most 5	0.162112	8.018102	15.49471	0.4635
At most 6	0.001308	0.058912	3.841466	0.8082

Trace test indicates 3 co-integrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Dependent Variable: LOG(TED)

Method: Least Squares

Sample: 1970 2016

Included observations: 47

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.507735	2.038572	1.720682	0.0930
LOG(IR)	3.048892	0.489025	6.234631	0.0000
LOG(INFR)	0.214703	0.162405	1.322025	0.1937
LOG(GDP)	-0.296588	0.344705	-0.860411	0.3947
LOG(EXR)	1.052511	0.263150	3.999661	0.0003
LOG(ER)	-0.209120	0.200449	-1.043258	0.3031
LOG(ACE)	0.356560	0.299281	1.191386	0.2405
R-squared	0.956274	Mean dependent var		11.62790
Adjusted R-squared	0.949716	S.D. dependent var		3.684998
S.E. of regression	0.826331	Akaike info criterion		2.592961
Sum squared resid	27.31291	Schwarz criterion		2.868515
Log likelihood	-53.93459	Hannan-Quinn criter.		2.696654
F-statistic	145.7993	Durbin-Watson stat		0.942885
Prob(F-statistic)	0.000000			

Source: Extracts from E-views-10 Output.

The trace and Maximum Eigenvalues show the existence of 3 co-integrating equations as proof of the existence of significant long run relationship among the study variables. This provides compelling evidence to assert that there prevailed a significant long run relationship among external debt and the set of explanatory variables in Nigeria.

4.4 Presentation of Error Correction Model (ECM) Estimates

The output of the Error Correction Model (ECM) estimates is presented in table 5 below;

Results of Error Correction Model (ECM)**Table 5: ARDL (4, 4, 3, 4, 4, 2) Error Correction Regression****Dependent Variable: D(TED)**

Variable	Coefficient	t-Statistic	Prob.
D(TED(-1))	-0.21317	-7.09478	0.0000
D(TED(-2))	-1.58879	-40.9878	0.0000
D(TED(-3))	-1.37832	-63.7747	0.0000
D(ACE)	-3.2689	-10.6952	0.0000
D(ACE(-1))	1.035208	4.07069	0.0018
D(ACE(-2))	6.38332	19.08144	0.0000
D(ACE(-3))	1.024586	5.094329	0.0003
D(ER)	0.950699	13.92036	0.0000
D(ER(-1))	0.901294	30.64723	0.0000
D(ER(-2))	-2.97891	-68.4724	0.0000
D(EXR)	24760.41	39.15455	0.0000
D(EXR(-1))	-35724.6	-10.8503	0.0000
D(EXR(-2))	37017.5	14.71701	0.0000
D(EXR(-3))	89171.16	57.6445	0.0000
D(GDP)	-0.30919	-91.1722	0.0000
D(GDP(-1))	-0.77268	-59.8191	0.0000
D(GDP(-2))	-0.51307	-56.0703	0.0000
D(GDP(-3))	-0.71325	-118.301	0.0000
D(INFR)	-236.661	-0.71166	0.4915
D(INFR(-1))	-1526.61	-4.63459	0.0007
D(INFR(-2))	-420.324	-1.14944	0.2748
D(INFR(-3))	-1250.31	-3.02806	0.0115
D(IR)	13099.46	6.822248	0.0000
D(IR(-1))	-5087.33	-2.5999	0.0247
CointEq(-1)*	-0.7135	-159.697	0.0000
R-squared	0.999957		
Adjusted R-squared	0.999901		
Durbin-Watson stat	1.603537		
F-Bounds Test	1948.147		

Source: Extracts from E-views-10 Output.

As expected, the lagged error correction term is negative, less than unity and statistically significant at 1 percent. The coefficient reveals that once there is disequilibrium in the system, it takes an average (annual) speed of 71.35 percent to restore the long-run relationship between the external debts, interest rates, exchange rates, external reserve, and aggregate capital expenditure.

Adjusted R-square (R^2)

The adjusted coefficient of determination (R-bar-square), which is used to measure the goodness of fit of the estimated model, indicates that the model is reasonably fit in the prediction. The coefficient shows that 99.9 percent changes in total external debt were collectively due to explanatory variables; while 2 percent unaccounted variations were captured by the white noise error term. In effect, the explanatory variables had a strong significant impact on total external debt within the period under study.

Statistical Test of Hypothesis

The six hypotheses formulated were tested using Wald- test and p -value at 5 percent level of significance, for a two-tailed test. The test is employed to indicate whether

each of the explanatory variables has a significant influence on the dependent variable as hypothesised.

The decision rule for accepting or rejecting the null hypothesis is based on the probability value (PV). If PV is less than 5 percent; or 0.05 (i.e., $pV < 0.05$), it implies that the particular explanatory variable is statistically significant at the level of significance.

H01: Exchange Rate has no significant relationship with total External Debt in Nigeria

Table 1: Wald Test Results for Exchange Rate and total External Debt

Test Statistic	Value	Df	Probability
F-statistic	111.6832	(4, 11)	0.000
Chi-square	446.7328	4	0.000

Source: Extracts from E-views-10 Output.

The Wald-test results in Table 1 indicate that the F-value of exchange rate was 111.68, while the corresponding probability value was 0.000. Since the probability value is less than 0.05, the null hypothesis is rejected. It is therefore concluded that exchange rate had a significant relationship with total external debt.

H02: Interest Rate has no significant relationship with total External Debt in Nigeria

Table 2: Wald Test Results for Interest Rate and total External Debt

Test Statistic	Value	Df	Probability
F-statistic	15.48468	(2, 11)	0.0006
Chi-square	30.96936	2	0.0000

Source: Extracts from E-views-10 Output.

The results of the test as shown in Table 2 above indicate the respective values of 15.48 and 0.0006 for F-statistic and p-value; hence the null hypothesis is rejected and it is concluded that interest rate had a significant relationship with external debt in Nigeria during the study period.

H03: Inflation rate has no significant relationship with total External Debt in Nigeria

Table 3: Wald Test Results for Inflation rates and total External Debt

Test Statistic	Value	Df	Probability
F-statistic	177.5066	(4, 11)	0.000
Chi-square	710.0266	4	0.000

Source: Extracts from E-views-10 Output.

Table 3 above indicates that the calculated F-value of inflation rate was 177.50, while the associated p-value was 0.0000. Since the p-value is less than 0.05 level of significance, we reject the null hypothesis and accept the alternative hypothesis and conclude that inflation rate had a significant relationship with total external debt.

H04: GDP has no significant relationship with total External Debt in Nigeria

Table 4: Wald Test Results for GDP and total External Debt

Test Statistic	Value	Df	Probability
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F-statistic	37.67931	(4, 11)	0.000
Chi-square	150.7172	4	0.000

Source: Extracts from E-views-10 Output.

From Table 4 above, the computed F-value for GDP was 37.67, while the p-value was 0.0000. Since the p-value is less than the specified 0.05 level of significance, we reject the null hypothesis and conclude that GDP had a significant relationship with total external debt.

H05: Aggregate Capital Expenditure has no significant relationship with total External Debt

Table 5: Wald Test Result for Aggregate Capital Expenditure and total External Debt

Test Statistic	Value	Df	Probability
F-statistic	9.282371	(4, 11)	0.0016
Chi-square	37.12948	4	0

Source: Extracts from E-views-10 Output.

The results at Table 5 above indicate that the F-value of aggregate capital expenditure is 9.28, with a corresponding probability value of 0.0016. Since the probability value is less than 0.05, it falls in the rejection region; hence the null hypothesis is rejected. The result indicates that aggregate capital expenditure had a significant relationship with total external debt.

Discussion Conclusion and Recommendations

The results of the study corroborate the nature of the relationship between public external debt and each of the explanatory variables. While the analysis shows that in the short run only interest rate and exchange rate had significant relationships with external debt, the results of the long run hypothesis testing confirmed significant relationships. The results provide significant insights into an understanding of how Government borrowing decisions failed to relate significantly and efficiently with the key macroeconomic variables during the study period. This aligns with Aluko (2010)'s view that external debt had no significant effect on economic growth of Nigeria, because the loans were largely diverted for uses other than capital project execution. Aluko's observation supports the views of Sachs and Berge (1988) that most of the borrowing, particularly in the 1970s, was provoked by the irrational political decisions of leaders who preferred overseas borrowing to raising the tax rates. In corroborating Aluko's position, Anyanwu (1997) also writes that until the debt quagmire, most Nigerian leaders assumed, even though erroneously, that external loans were either aids or grants, and were therefore not repayable. Furthermore, following the oil boom and economic prosperity, inflation, GDP and foreign reserves may have been less impactful on the behaviour or relative sensitivity of external debt during the period.

Conclusion

Irrespective of the observed and rather diminished effects of many of the explanatory variables, the results of the hypothesis testing largely indicate that the variables accounted significantly for the variations in total external debt during the period. It is concluded therefore that the explanatory variables are key determinants of external debt in Nigeria. Furthermore, there was a significant relationship between external debt and each of the explanatory variables; while in the short run, the explanatory variables largely explained the variations in external debt.

Recommendations

Arising from the findings, the following policy recommendations are made:

1. The Federal Government of Nigeria, whose prerogative it is to contract external loans, should consider the official sources only, for cost minimization, except where other sources offer the same condition. Evidence shows that borrowing from other sources compounded Nigeria's external debt crisis in the 1980's, particularly between 1983 and 1988.
2. Nigeria's economy is mono-product, with large dependence on oil. Government should give serious consideration to the exchange rate regime and the economics, when contemplating external borrowing, to minimise the negative impact and further aggravation of debt burden.
3. Government should borrow largely to finance capital projects, with positive internal rates of return, reasonable pay back periods and with positive impact on development, for the long term survival and growth of the country.
4. Government should strengthen the institutional framework for debt management, for higher efficiency and effective performance, in order to avoid a repeat of the ugly experience of external debt crisis which for long, ravaged the economy, up to 2005.

Reference

- Ahmed, A. (1984). *“Short and Medium Term Approaches to Solving African Debt Problems”*, Central Bank Nigeria Bullion.
- Aluko, F. & Arowolo, D. (2010). *Foreign Aid, the Third World's Debt Crisis and the Implication for Economic Development: The Nigerian Experience*. African Journal of Political Science and international Relations.
- Andre Gunder Frank. (1972). *“The Development of Underdevelopment”*, in James, D. Cockcroft, Andre Gunder Frank, & Dale Johnson, (eds). *dependence and underdevelopment*. Garden City, New York: Anchor Books.
- Anyanwu, J. C. (1997). *The Structure of the Nigerian Economy (1960-1997)*: Onitsha, Joanee Educational Publishers.
- Awe, OO (2012). *Pair-wise Granger Casualty Modelling and Econometric Analysis of Selected Economic Indicators*. Interest St Journals. Net/YEAR/2012/articles/208002. Pdf.
- Brooks, C. (2009). *Introductory Econometrics for Finance*. Cambridge: Cambridge University Press, 312-313; 318-375.
- Creditworthiness of Developing Countries”, in Smith, G.W.; Cuddington, J.T. *“International Debt and the Developing Countries”*. Washington, A World Bank Symposium, pp. 179-209.
- Ejigayehu, D.A. (2013). *“The Effect of External Debt in Economic Growth”*. Journal of the Department of Economics Sodertorn University.
- Ezennia PA (1986). *A Regression Analysis of Profit of Selected Multinational Companies in Nigeria*. Unpublished MBA (Accounting) thesis, University of Port-Harcourt.

- Ferraro, V. & Rosser, M. (1994). "Global Debt and Third World Development", in Klare, M., Thomas, eds. world survey: challenges for a new century New York: St. Martin's Press.
- Fischer, S. (1993). *The Role of Macroeconomic Factors in Growth*. J. Monetary Econ., 32: 485-512.
- Fosu, A.K.(2007).*The External Debt-Servicing Constraints and Public Expenditure Composition:evidence from African countries*. UNU-WIDER Research Paper No. 2007/36.
- Greene, J. (1989). *The External Debt Problems of Sub-Saharan Africa*. IMF Staff Papers. 36(4), 836-74.
- Hameed A.; Ashraf, H. & Chaudhary, M.A. (2008), *External Debt and its Impact on Economic and Business Growth in Pakistan*. International Research Journal of Finance and Economics. Issue 20.
- Maddala, GS (2007). *Introduction to Econometrics*, New Delli, John Willey.
- McFadden, D. (1983). "Is there Life after Debt? An Econometric Analysis of the
- McKinnon. R (1973). *Money and Capital in Economic Development*, Washington DC., Brookings Institution.
- Mahmud, U (1987). *A Multivariate Analysis of the Structure of Commercial Bank Deposit in Nigeria*. Unpublished MBA (Finance) thesis, University of Port-Harcourt.
- Malik, S, Hayat, M.K. & Hayat, M.U. (2010). "External Debt and Economic Growth: Empirical Evidence from Pakistan". International Research Journal of Finance and Economics. Issue 44, 88-97.
- Nnamdi, IS (1986). *A Regression Analysis of Profits of Selected Commercial Banks in Nigeria*. Unpublished MBA (Finance) thesis, University of Port-Harcourt.
- Obadan, M.I. (2000). "External Sector Policies 2000". Bullion A Publication of the CBN Vol. 24 No. 2.
- Sachs, J.D. (2002). "Resolving the Debt Crisis of Low Income Counties". Brooking Papers on Economic Activity.
- Yekini, T.K. (2002). "External Debt Burden and Macroeconomic Performance in Nigeria (1970-1999)" NISER Monograph Series, No. 12.
- Yesufu, T.M. (1996). *The Nigerian Economy: "Growth without Development"* Benin Social Series for Africa. University of Benin, Benin City.