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EXTERNAL DEBT AND ECONOMIC GROWTH IN NIGERIA: A VECTOR AUTO-REGRESSION (VAR) APPROACH

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Abstract: **This research investigates the impact of external debt on economic growth in Nigeria from 1980-2014 using the Vector Error Correction model. The empirical findings through the impulse response analysis and variance decomposition have revealed that external debt service payment negatively impacts real GDP per capital growth in Nigeria significantly, signaling the existence of the debt overhang impact on economic growth. Furthermore, the Granger Causality/Wald test revealed a unidirectional causation from real GDP to external debt stock and from external debt service payment to real GDP. It is recommended that external debt should be discouraged for it cannot be relied on by government for the promotion of economic growth because of its retarding influence on growth. Other sources of revenue, such as taxation, and exports promotion should be strengthened and focused on in order to generate the needed funds for the Nigeria's indispensable expenditures to bring about the desired growth.**

Keywords: **External Debt, Economic Growth, Impulse Response, Variance Decomposition, Wald Causality test.**

1. INTRODUCTION

No economy in the world is self-sufficient. Most governments result to borrow so as to bridge their deficits gaps in the proposed expenditure and expected revenue in a fiscal period which comes many times as a result of inadequacy and insufficiency in resources. Governments borrow to finance public goods so as to aid improvement in welfare and promote economic growth. Ibi and Aganyi (2014) stated that if government taxation capability is limited and the government does not want to compromise its macroeconomic stability by printing more currency, then debt option only becomes feasible that the government can explore to provide social overhead capital for its citizens.

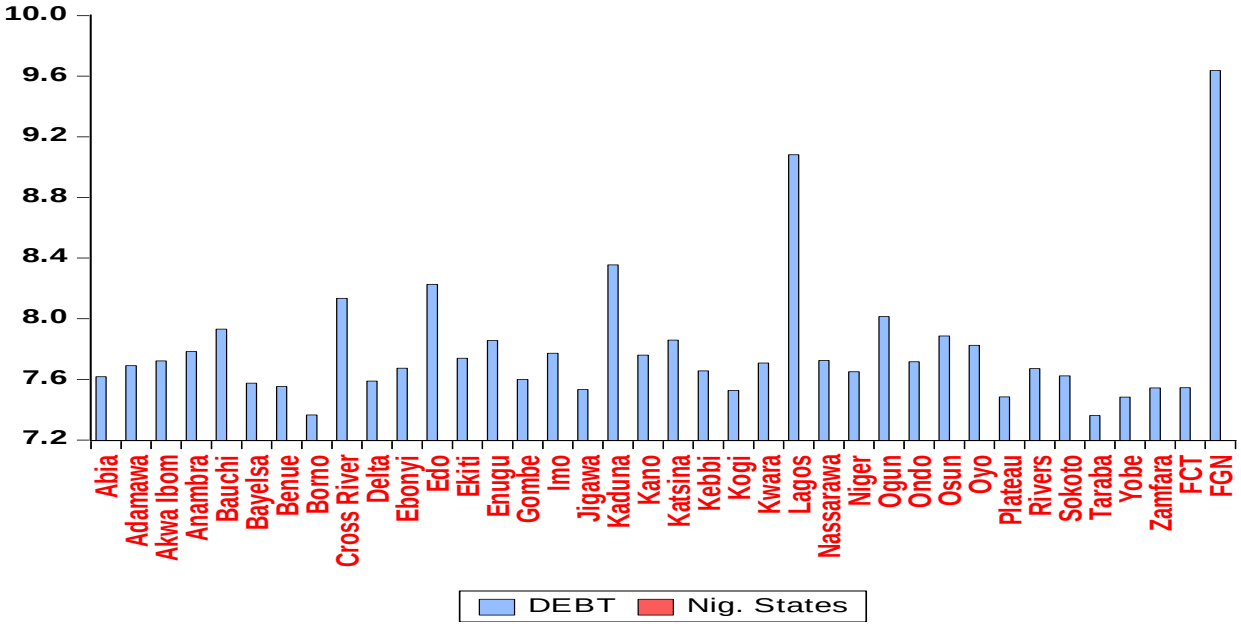
It is extensively known that excessive foreign indebtedness which is characterized in most developing countries is a major blow to their economic growth and stability. This is evident in the case of Nigeria which has often contracted a large amount of external debts that have contributed to the swelling of trade debt at highly concessional interest rates. (Audu, 2004) as cited by (Utomi, 2014) opined that the inability of the Nigerian economy to meet its debt payment obligations has resulted in a debt service burden that has been a hindrance to achieving consistent growth and development over the years.

Genesis of Nigeria external debt can be traced back to 1958 when it first subscribes to external borrowing, about 28 million dollars was borrowed from the World Bank for the purpose of railway construction, (Ibi and Aganyi, 2014). The Debt Management Office (DMO) reported that the debts incurred before 1978 were mainly long-term loans and were not much of a burden on the economy due to the fact that the loans were obtained on soft terms. Furthermore, the country possessed profuse revenue generated from the proceeds of flourishing oil sector.

But from 1978 upward, it became necessary to borrow so as to finance projects and to correct balance of payment difficulties which were created by the fall in oil prices. The 1977/1978 drastic drop in world oil prices hugely affected

government revenue and expenditure negatively and therefore forced the country to raise the first jumbo loan of more than $1.0 billion from the global capital market. The debt, which had a grace period of three years, was used to finance various medium and long-term infrastructure projects, but unfortunately did not directly yield returns for its amortization. Since then, the Nigerian government has embarked on continuous and incessant borrowing so much that Nigeria's total debt rose to ₦12.60 trillion or $65.42 billion as at December 2015, up from ₦11.2 trillion naira in 2014, an increase of 12.5 per cent. (Debt Management Office, DMO, 2016). Total domestic debt of the Federal government at the end of 2015 assumed N8.836 trillion of $44.85 billion with bonds accounting for 65 per cent of the debt. Debt stock from bonds accounted for N5.818 trillion while government Treasury Bills debt stock stood at N2.77 trillion at the end of 2015. Federal government total external debt was $7.348 billion representing 68.5 per cent of the grand total external debt while the external debt stock of the 36 States and the Federal Capital Territory (FCT) estimated to be $3.369 billion, (Bukola, 2016).

An overview of the Nigeria's States', Federal Capital Territory's (FCT) and Federal government of Nigeria's (FGN) external debt stock as at the end of 2015 is shown in the figure 1 below:



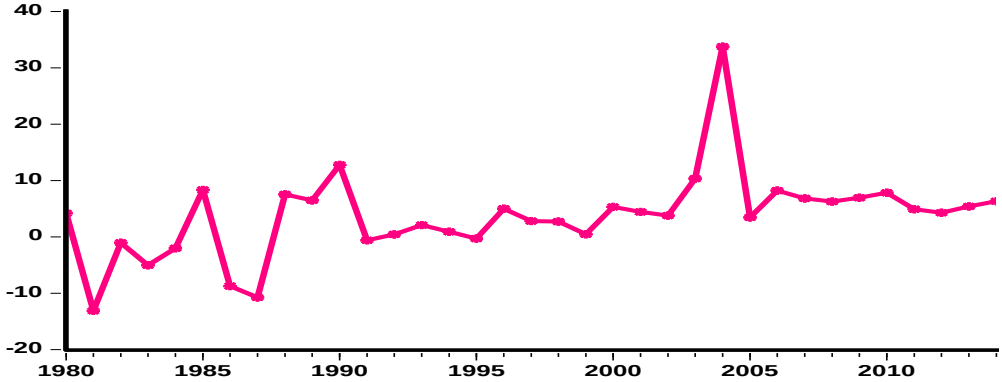
Source: Authors' Plotting using data from Debt Management Office, DMO, 2016

Fig. 1: States and Federal Governments' External Debt Stock as at 31st December, 2015

From figure 1 above, it could be observed that the Federal Government of Nigeria (FGN) has the highest external debt followed by Lagos State while Taraba State's is the lowest as demonstrated in the figure.

Whereas, the Nigeria's economic growth which is described as annual percentage growth rate of GDP at market prices based on constant local currency has been oscillating between negative and positive trends over the period under study as depicted in figure 2 shown below:

Fig. 2: Economic Growth of Nigeria (1980-2014)



Source: Authors' plotting using data from World Bank, 2016

As it could be seen in figure 2 that the Nigeria's economic growth was negative during the period of 1981 to 1984 but was positive in 1985 after which it assumed negative values in 1986 and 1987. However, it became positive from 1988 to 2014. During the period under review, the growth reached its lowest in 1981 and climaxed in 2004 as displayed in the figure.

Indeed, it is evidential from many studies that, sizeable amount of Nigeria's revenue has been sinking into external debt servicing which has been one of the hindrances of her attaining desired economic growth in the last few decades. Despite the government continuous efforts in trying to reduce the external debt burden by adopting several mechanisms such as debt equity, debt rescheduling, debt conversion, debt forgiveness and cancellation, these have not yielded much fruits in the decline of the debt encumbrance in Nigeria rather it surges year in, year out.

Based on the foregoing, this study focuses on investigating into issues that circumscribe external debt in the country and adopting alternate measures to checkmate its (debt's) management glitches. Hence, it empirically examines the impact of external debt servicing on Nigeria's economic growth and also studies the causal relationship between external debt and economic

2. LITERATURE REVIEW

Most theoretical literatures on the relationship between external debt and economic growth showed the existence of inverse linkages between the duos, most especially for developing countries. Krugman (1988) as cited by Checherita and Rother (2010) attributed the slow economic growth experienced in heavily indebted countries to debt overhang, a situation in which a country's expected repayment's ability on external debt falls below the contractual value of debt, and expected debt-service cost discourages further domestic and foreign investment which in turn harms growth (Olanrewaju et al, 2015).

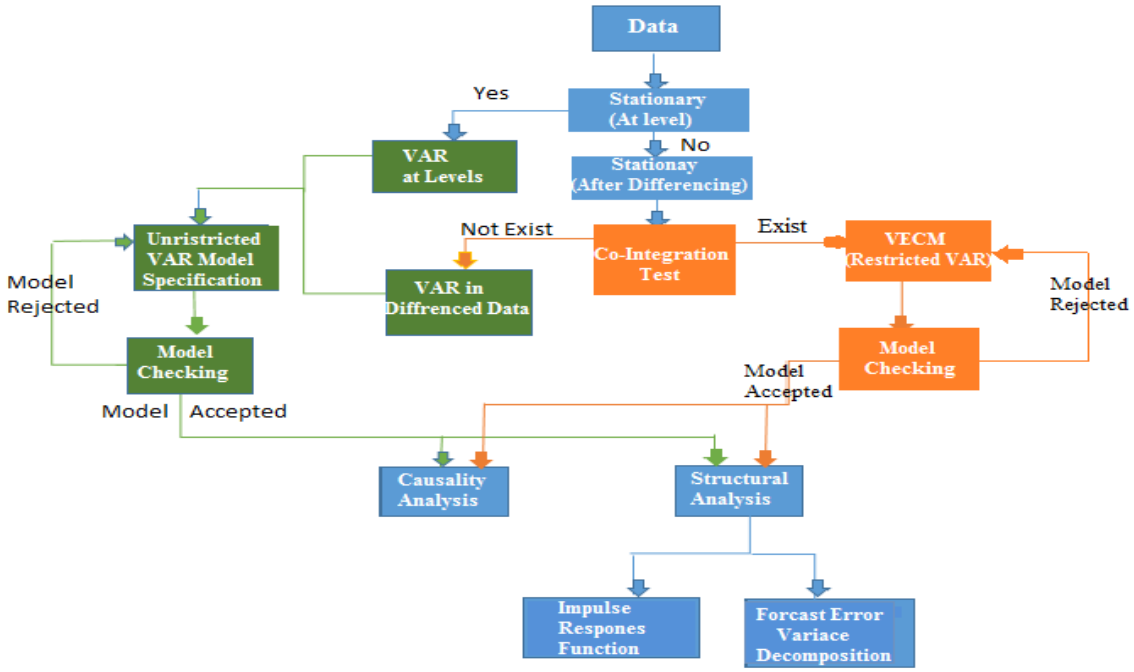
Empirical studies on the relationship between external debt and economic growth has revealed indications of debt overhang in Nigeria. Ajayi, and Oke (2012) demonstrate that external debt burden has an adversative effect on the nation's gross domestic products (GDP) per capita. They affirmed that high level of external debt led to devaluation of the nation's currency, increase in retrenchment of workers, incessant industrial strike and poor educational system which has consequently steered the Nigeria's economy into a state of economic depression. Obademi (2012) also showed that the joint impact of debt on economic growth is deleteriously negative and quite significant in the long-run. He posits that in the short-run, the impact of borrowed funds on the Nigeria's economy was positive, the effect of incurred debt in the long-run depressed economic growth as a result of bungling debt management. Izedome and Ilaboya (2012) furthermore revealed confirmations of a significant negative link between public debt burden and economic growth. The ratio of debt service to export was found to have negative and significant effect on economic growth. However, some studies have argued in contradiction of the debt overhang manifestation in Nigeria, (Egbetunde 2012) showed that there are evidences of positive relationship between economic growth and external debt though he pointed out further that the rate at which borrowings contribute to economic growth in Nigeria is infinitesimal. Ijeoma, (2013) in a similar research found that Nigeria's external debt stock has a significant effect on her economic growth. She revealed that there is a significant relationship between Nigeria's debt service obligations and her gross fixed capital formation. Utomi (2014) also confirmed a bi-directional relationship between economic growth and external debt in Nigeria but with an insignificant long run association. Mbanasor and Okere's (2012) result as well depicts the existence of a microscopic positive nexus between external debt stock and GDP and concluded that external debt will positively affect economic growth in the proximate future if well managed.

In cross-country studies, lyoha's (1999) investigation into the impact of external debt on economic growth in sub-Saharan African countries reveals a significant of debt overhang in the investment equation, thereby suggesting that mounting external debt dampens investment by means of a "crowding out" effect and a "disincentive" effect. His results demonstrated that debt forgiveness could contribute a much required impetus to investment recovery and economic growth in sub-Saharan Africa. In the same vein, there is a positive significant correlation between Gross Domestic Products and External Debt in Bangladesh, (Mohamed et al 2012). The empirical results suggest the presence of long-run relationship and a bi-directional causation between external debt and gross domestic product (GDP). In a similar research on 36 low income countries. Goher et al (2009) revealed that external debt service and foreign direct investment, indicated positive impact on growth and later displayed negative, hence, it was concluded that low income countries should go for the option of debt forgiveness and must invite foreign direct investment (FDI) but not much as their

overcrowding may hurt the economy. On the other hand, Checherita and Rother (2010) in their survey on average impact of government debt on per-capita GDP growth in 12 Euro zone nations, found a nonlinear impact of debt on growth with a turning point beyond which the government debt/GDP ratio has a negative effect on long-run growth at about 90-100% of GDP.

3. METHODOLOGY

The methodology adopted for this study is the Vector Autoregressive (VAR) analysis. The VAR model provides a multivariate framework in which changes in the variables under consideration are related to changes in their own lags, (Adeniran, 2016). Although they are natural tools for forecasting, they are also used for economic analysis, due to the fact they describe the joint generation mechanism of the variables involved, (Lutkepohl, 2011).



Source: Adapted from Adeniran 2016

Fig. 3: VAR Framework

The framwork of VAR model is presented in fig. 3, the first stage in the VAR modelling is the stationary test also known as the Unit root test. If after conducting unit root test, and series data are found to be stationary at levels, it can be estimated directly by modeling an unrestricted VAR, otherwise, the first difference will be taken to make them stationary and then we fit an Unrestricted VAR model, this is known as VAR in first difference. In both cases, the models are estimated equations by using the principles of least squares. The other possibility is that the series data may be non-stationary but they are integrated, this implies that there exists a linear combination of them which is stationary. In this case, the VAR model is estimated using a Vector Error Correction Model (VECM), otherwise known as the restricted VAR model. To ensure the efficiency of the VAR model, model checking is required via diagnostic tests which ensure VAR models are consistent with white noise assumption and the structural stability of the model over time. The Causality analysis are used to find the causality or direction of relationship among the variables in the model. The Impulse Response Function (IRF) captures the responsiveness of endogenous variables to a shock in each of the series adopted in the VAR, furthermore, the Variance Decomposition determines how much of the movements in one variable that can be explained by its own shocks and exogenous shocks to the other variables.

The Augmented Dickey Fuller (ADF) and the Phillips-Perron unit root tests were conducted to test for stationarity. The Johansson test was adopted to test for cointegration. Both the Impulse response function (IRF) and forecast error variance decomposition (FEVD) were employed to examine the behavioral relationship among the variables and for the impact analysis respectively, while the Granger/Wald casualty test was also used to examine the causal connectedness between external debt and economic growth. The availed data covered 1980-2014 and were obtained from World Bank data bank.

3.1 Model Specification

Based on the Akaike Information Criteria (AIC) and Schwartz Information Criteria (SIC), one lag was selected. Furthermore, using the Cholesky method of ordering, the following variables are considered for the VAR model, external debt stock, exchange rate, Real GDP, external debt stock and exchange rate. Both external debt and the real GDP are included because the main objective of this research is to investigate the impact of the former on the latter, External debt comprises the total external debt stock in Nigeria, the real GDP variable is the real gross domestic product. External debt service and exchange rate are included in the model because they are important transmission through which external debts impact the economy. To avoid the glitch of heteroscedasticity in the result, variables of large magnitude such as external debt stock, real gdp and external debt stocks are expressed in logarithm while exchange rate is expressed in levels. The VAR models are specified as follows:

$$\log EXTD_t = a_{10} + a_{11}\log EXTD_{t-1} + a_{12}\log RGDP_{t-1} + a_{13}\log EDS_{t-1} + a_{14}EXRT_{t-1} + \varepsilon_{1t} \quad \text{Eqn.1}$$

$$\log RGDP_t = a_{20} + a_{21}\log EXTD_{t-1} + a_{22}\log RGDP_{t-1} + a_{23}\log EDS_{t-1} + a_{24}EXRT_{t-1} + \varepsilon_{2t} \quad \text{Eqn.2}$$

$$\log EDS_t = a_{30} + a_{31}\log EXTD_{t-1} + a_{32}\log RGDP_{t-1} + a_{33}\log EDS_{t-1} + a_{34}EXRT_{t-1} + \varepsilon_{3t} \quad \text{Eqn.3}$$

$$EXRT_t = a_{40} + a_{41}\log EXTD_{t-1} + a_{42}\log RGDP_{t-1} + a_{43}\log EDS_{t-1} + a_{44}EXRT_{t-1} + \varepsilon_{4t} \quad \text{Eqn.4}$$

Where:

EXTD = External Debt Stock GDP = Gross Domestic Product ESD = External Debt Service

EXCHRT = Exchange Rate ε = Error term

4. PRESENTATION OF RESULTS

4.1 Unit Root Tests

The unit root tests in our analysis include both the Augmented Dickey-Fuller (ADF) and the Phillips-Perron tests to check for the presence of stationarity/ non-stationarity of a variable. The tests were conducted using E-views 9 software package and the results are tabulated below:

Table 1: Augmented Dickey Fuller and Phillip-Perron Unit Root Test

AT LEVELS			At 1st Difference		
Variables	**T-stat prob.**	**Remarks**	**T-stat prob.**	**Remarks**	**Order of Integration**
Augmented Dickey Fuller					
LEXTD	0.6438	Non-Stationary	0.0000	Stationary	1(1)
LRGDP	0.9480	Non-Stationary	0.0000	Stationary	1(1)
LEDS	0.0713	Non-Stationary	0.0000	Stationary	1(1)
EXCHRT	0.9780	Non-Stationary	0.0000	Stationary	1(1)
Phillip Perron					
LEXTD	0.8163	Non-Stationary	0.0000	Stationary	1(1)
LRGDP	0.8794	Non-Stationary	0.0000	Stationary	1(1)
LEDS	0.1748	Non-Stationary	0.0000	Stationary	1(1)
EXCHRT	0.9765	Non-Stationary	0.0000	Stationary	1(1)

Source: Authors' Computation, 2016 using Eviews 9.0

From table 1 above, both the ADF and Phillips-Perron test shows that all the variables are non-stationary at levels (the absolute value of their respective t-statistics probability are greater than 5% critical) but after taking their first difference, they were found to be stationary. This implies that all the series are integrated of order 1, thus there is necessity for co-integration test to check the long-term relationship.

4.2 Co-integration test

The Johansson Cointegration test was employed to check for long run relationship among the equations in the model. The procedure for cointegration check begins with the null hypothesis that there are no cointegration among the variables of equations in the VAR model. A rejection of this hypothesis implies the existence of cointegration among some or all the variables in the equations.

Table 2. Johansen Co-integration test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesis	Eigenvalue	Trace	0.05 Critical Value	Probability Value **
None *	0.405200	54.56338	47.85613	0.0103
At most 1 *	0.384348	32.22359	29.79707	0.0258
At most 2	0.203879	11.36546	15.49471	0.1900
At most 3	0.035658	1.561286	3.841466	0.2115
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesis	Eigenvalue	λ - Max	0.05 Critical Value	Probability Value**
None	0.405200	22.33979	27.58434	0.2034
At most 1	0.384348	20.85813	21.13162	0.0545
At most 2	0.203879	9.804173	14.26460	0.2251
At most 3	0.035658	1.561286	3.841466	0.2115

Source: Authors' Computation, 2016 using Eviews 9.0

Table 2 presents the result for both the Trace statistics and Max-Eigen co-integration rank tests. The trace statistics presented in the first part of the table 4 depicts 2 co-integrating equations, this connotes the rejection of the null hypothesis, meaning that existence of long run relationship among two of the variables is guaranteed. Also, the Maximum Eigen test presented in the second part of the table 4 indicates no co-integrating equation. The implication of this is that there is no long run relationship or cointegration among the variables.

4.3. Model Checking

Table 3. LM Test for Serial Correlation

Lags	LM-Stat	Prob
1	22.30176	0.1337
2	23.80248	0.0939

Source: Authors' Computation, 2016 using Eviews 9.0

To check for serial correlation and ensure our models are on the same page with the white noise assumption, residual based LM test for autocorrelation was used to ascertain whether the null hypothesis should be accepted or rejected. To accept the null hypothesis that no autocorrelation exists in the residuals, the corresponding probability of the observed LM-statistics must be greater than 5%. As can be seen in table 3 above, the result depicts an acceptance of the null hypothesis for all the lags, implying the inexistence of serial correlation in the stochastic terms of our VAR models.

4.4. Causality Analysis

Table 4 reveals the Granger Causality/Block Wald Test results, it shows the direction of relationship among the variables in their lagged periods. The null hypothesis for the Wald test is that, the joint lagged coefficient of a variable equals zero or less than 5%, the rejection of this hypothesis at less than 0.05 probability level implies the nonexistence of causality.

Table 4. Granger Causlaity/ Wald Test

NULL HYPOTHESIS	CHI-SQ	PROB.	DIRECTION OF RELATIONSHIP
LRGDP —/—► LEXTD	6.221018	0.0446	LRGDP ——► LEXTD
LEXTD —/—► LRGDP	4.287878	0.1172	
LRGDP —/—► LEDS	1.066287	0.5868	
LEDS —/—► LRGDP	6.237868	0.0442	LRGDP ◄—— LEDS
LRGDP —/—► EXRATE	0.000779	0.9996	
EXRATE —/—► LRGDP	2.862950	0.2390	
LEXTD —/—► LEDS	10.17992	0.0062	LEXTD ——► LEDS
LEDS —/—► LEXTD	5.186551	0.0748	
LEXTD —/—► EXRATE	0.037997	0.9812	
EXRATE —/—► LEXTD	6.865793	0.0323	LEXTD ◄—— EXRATE
LEDS —/—► EXRATE	2.522138	0.2834	
EXRATE —/—► LEDS	0.218627	0.8964	

Keys
—/—► Null Hypothesis (No causality)
——► / ◄—— Rejection of Null Hpothesis (Unidirectional Causality)

Source: Authors' Computation, 2016 using Eviews 9.0

The result in table 4 shows that a unidirectional relationship exist from real GDP to external debt stock, and from external debt service payment to real GDP. Similarly, a unidirectional causation is observed from external debt stock to external debt service payment and from exchange rate to external debt stock. Some possible explanation to the result of the causality test is that, the magnitude of economic growth determines the level of external debt to be contracted. Also, the process of loan payment or debt service payment, affects the level of economic growth in return, lastly the level of exchange rate affects external debt stock of the country.

4.6. Impulse Response

The results of the impulse response function presented in Figure 2 depict how one standard deviation shock in the change in oil price influences macroeconomic series and real GDP growth in the model.

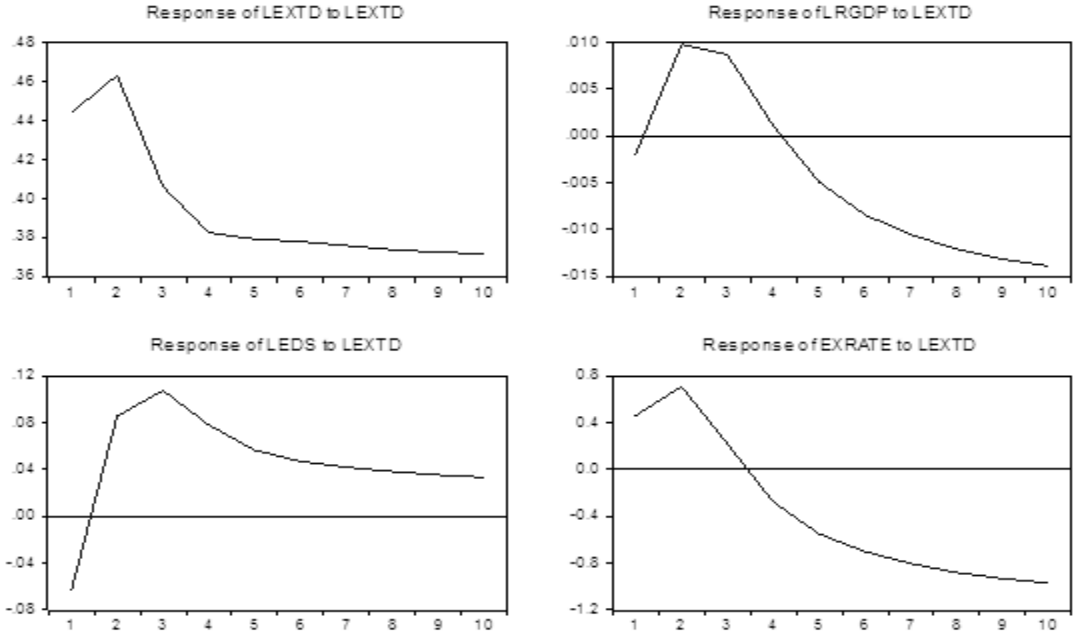


Figure 2. Impulse response Function

Source: Authors' drawings, 2016 using Eviews 9.0

In the figure 2, own shock is seen to be positive but declining in most of the periods. The response of real GDP to shocks in external debt is seen to be positively rising and declining in the 1st four periods, afterwards, the declining trend becomes negative to the tenth period. External debt service is negative in the first period after which the response positively increases and decreases all through the remainder. Exchange rate response to external debt stock was positive in the first three periods but negatively decreasing in the remaining periods.

The response of real GDP signifies that even though external debt stock may have an initial positive impact on the economy in the short run, its long run impact is largely negative. It is no surprise that external debt service responded positively in most periods to shocks in external debt stock, this is because as external indebtedness of the country grows, the cost of servicing debt grows as well. The negative response of exchange rate to shocks in external debts stock signals the declining impact external debt has on exchange rate.

4.7. Variance Decomposition

Table 5 presented below shows the variance decomposition of all the endogenous variables in the VAR system. It explains the magnitude of the variation's impact, decomposed among all the variables in the system from the current period to 10th period in the future, as a result of one standard positive shock in the residuals of the models in the VAR system.

Table 5.Variance Decomposition

Variance Decomposition of LEXTD:					
Period	S.E.	LEXTD	LRGDP	LEDS	EXRATE
1	0.444002	100.0000	0.000000	0.000000	0.000000
4	0.961232	78.23347	0.001359	21.65661	0.108561
7	1.274766	70.80652	0.022894	29.10547	0.065116
10	1.530362	66.91504	0.047186	32.98104	0.056735
Variance Decomposition of LRGDP:					
1	0.057224	0.114932	99.88507	0.000000	0.000000
4	0.108349	1.503010	66.28524	29.35438	2.857364
7	0.174112	1.262847	32.47125	59.36545	6.900457
10	0.234181	1.631367	20.56687	69.19370	8.608064
Variance Decomposition of LEDS:					
1	0.584417	1.184247	3.058994	95.75676	0.000000
4	1.182486	2.073342	8.584414	87.85252	1.489720
7	1.450360	1.717098	12.73107	82.45317	3.098664
10	1.661079	1.447421	15.62265	78.55695	4.372979
Variance Decomposition of EXRATE:					
1	12.18777	0.142206	3.629323	2.389069	93.83940
4	26.58314	0.118706	7.884336	9.268450	82.72851
7	37.57170	0.161779	8.617084	13.57789	77.64325
10	46.57424	0.224845	8.925197	15.76306	75.08690

Source: Authors' Computation, 2016 using Eviews 9.0

In the variance decomposition of external debt stock, external debt service has highest and increasing variation impact on external debt stock apart from own shock, it increased from 0% in the first period to 21% in the fourth period and further increased to 32.98% in the tenth, while both real GDP and exchange rate had no significant variation impact on external debt. In the variance decomposition of RGDP, external debt service also has an increasing and the highest variation impact in most of the periods of shocks in real GDP.

Our findings from the Variance Decomposition have demonstrated that external debt service characterizes a high and increasing variation impact on economic growth, external debt stock, as well as exchange rate. However, the impact seen via the impulse response is largely negative for most of the variables except for external debt stock which continues to surge as debt service or (payment) increases,

The findings in this study confirms the debt overhang effect of external debt on economic growth in Nigeria and corroborates the findings from Ijeoma, (2013), Ajayi, and Oke, (2012), Obademi, (2012), Izedome and Ilaboya, (2012) who discovered a significant and negative impact of external debt on economy growth in Nigeria.

5. CONCLUSION AND RECOMMENDATIONS

The study has investigated the impact of external debt on economic growth in Nigeria between 1980 and 2014. The empirical findings through the impulse response analysis and variance decomposition have revealed that external debt

service payment negatively impacts GDP per capital growth in Nigeria, significantly signaling the existence of the debt overhang impact on the country's economic growth. The Granger causality/Wald test has indicated a unidirectional causation from real GDP to external debt stock and from external debt service payment to real GDP signifying that the magnitude of real GDP determines the rate at which the government embarks on external borrowings. Also, the process of loan payment or debt service payment in returns affects the level of economic growth in the country.

The empirical findings in this study has established a negative and unstable future for the Nigeria's economic growth, as long the external indebtedness persists. The following recommendations therefore are advanced. Firstly, external debt should be discouraged for it cannot be relied on by government for the promotion of economic growth because of its retarding influence on growth. Secondly, if there is need for external debt, government should consider the economic yearnings via the strict compliance with fiscal discipline as this guides the effective operations of the fiscal regime. In addition, government should channelize the incurred debt to productive and developmental projects for economic fostering rather than political improvidence. Lastly, government should look inward for revenue generation and reinforce other sources of revenue such as taxation, and promotion of exports with massive emphasis on non-oil exports.

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