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Research Paper

The Effect of Debt Burden on Nigeria's Economic Growth

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ABSTRACT: *This researchused a vector error correction mechanism to investigate the impact of foreign debt (EXD) ongross domestic product per capital growth (GDP) in Nigeria from 1980-2015.The ADF and KPSS test showed that our indicators are non-stationary, while the cointegration trace test confirmed the existence of one cointegration relation.The long-run elasticity coefficient revealed that 1% increment in EXDwill tend todecrease GDP by 29%. The negative consequences of EXD on GDP were the debt overhang and the crowding outeffects on investment and its resultant effect on low productivity growth. Foreign debt crisis affecting Nigeria can be traced on borrowers' side to various organizational causes of indebtedness often aggravated by scrawny macroeconomic strategies and skirmishes; but also to the creditors' willingness to take risk unacceptable to private lenders. Foreign debt problem is an integral part of the poverty trap that many developing countries are caught in; a rancorous circle of low levels of private investment, low degree of export diversification, high susceptibility, low growth, and high debt ratio.There is need for promulgation and implementation of worthymacroeconomic policies so that if debts are contracted, they should be appositelydirected to make evocative improvement on GDP,so that GDP will not be at deficit. Also, more capital generating and revenue making resources should be engaged in the economy.*

Keyword: *Crowding out, Debt overhang, Economic growth, Foreign debt, GDP, VECM.*

I. BACKGROUND TO THE STUDY

No government is an island on its own; it would require aids so as to perform efficiently and effectively. Foreign borrowing or external debt is a major source of assistance. The motive behind external debt is due to the fact that countries, especially the developing ones lack sufficient internal financial resources and there must be a need for foreign assistance. The debt includes money owed to private commercial banks, other governments, or international financial institutions such as the International monetary fund (IMF) and World Bank (Bjerkholt, 2004; Checherita, *et al.* 2010). According to Omoleye,*et al.*2006, Nigeria is the largest debtor nation in sub-Saharan Africa. However, government had a negative influence due to the fall in oil prices in 1978 finances, balance of payment and finance projects were corrected by borrowing.External debt management refers to the establishment of the condition of issue and redemption of foreign loans. It involves the process of administering the external public debt, that is, it provides for the payment of interest and arranging the refinancing of maturity bonds/debt. It also involves a conscious planned schedule of the acquisition and retirement of loans contracted to support the balance of payments or development. Economic histories in the pre and post Nigeria independence era are of important in order to understand the magnitude of her economic problems and the measures in the recent past to combat the external debt crisis and achieve sustainable economy recovery and growth. The Nigeria's inability to meet all its debt payments contributes serious obstacles to the inflow of external resources into the economy. The accumulation of debt service arrears, which is being compounded with penalty interest, has not permitted decrease in the debt stock, despite the fact that government has been servicing it EXD with US $2.0 billion annually between 1991 and 1997 (Sulaiman, 2005). These are varied in some cases, debt problems have mainly aroused from the resourceful use and control of borrowed funds by debtor countries, returns on investment had no cost even on debt servicing in most countries. In other countries, an adequate policy framework for debt management has led to increase of external debts that have proved excessive for the countries debt servicing capacity. Easterly *et al.* 1991 explained that, many debtors have faced much higher than expected growth in debt payment relative to their growth in exports of goods and service. Adepoju,*et al.* 2007 in their research work argued that external debt is a major source of public receipts and financing capital accumulation in any economy. It is a medium used by countries to bridge their deficits and

execute economic projects that are able to increase the standard of living of the public and promote sustainable growth and development. Hameed *et al.* 2008 declared that external borrowing ought to hasten economic growth especially when domestic financing is insufficient. EXD enhances GDP and also improves total factor productivity through an increase in output growth of a nation. The importance of EXD cannot be overemphasized as it is a devoted booster of growth and thus improves living standards thereby alleviating poverty.GDP is the market value of final goods and services produced in a nation during a period of time, usually a year (Todaro, *et al.,* 1995). Diane (2014) stated that GDP is a financial measure of the value of all final goods and services produced in a period (quarterly or yearly). Nominal GDP estimates are commonly used to determine the economic performance of a whole region, and also make international comparisons. Nominal GDP, however, does not reflect differences in the cost of living and the inflation rates of the countries; therefore, GDP is not a complete measure of economic activity, but accounts for final output added at each stage of production, not total output or total sales along the entire production process. There are various empirical studies that have been conducted to examine the impact of EXD burden on GDP in Nigeria and have arrived at different results (Adekunle, *et al.* 2012; Ajayi, 1991; Bakare, 2011; Edo, 2002; Fosu, 1999). A review of the sources of strength in Nigeria's external debt profile, shows that as of June ending 2016, external debt accounted for only 18.33% of the country's total debt stock of about 16 trillion naira (61 billion US dollar) compared to the optimal target of 40% established in the country's medium term debt management strategy (2016-2019). Moreover, within that very small external debt, concessional debt (with average interest rate of about 1.25% per annum and average tenor of about 40 tears) accounted for about 80% of the total. Furthermore, it also includes an assessment of the country's capacity to service existing debts and a judgment on the desirability of contracting loans. Similarly, the ratio of the eternal debt to the GDP was only about 2.24% as at end-June, 2016 compared to the international defined threshold for external debt, of 40% for the applicable peer group. Correspondingly, the external debt service accounted for an insignificant proportion of the total public debt service expenditure. The annual external debt service expenditure for the last five years was always less than 6.5% of the total public debt service outlay.

These futures reflect the strategic stance taken after the exits from the Paris and London Club debts in 2005 and 2006 respectively. Nigeria deliberately decided to develop and depend more on the domestic bond market as a reliable alternative source of borrowing by the government. These were to avoid compelled dependence on external sources.The weigh down of EXD has been a matter of great concern to the government of Nigeria and the nation as a whole which has resulted in embarking upon extreme actions like dividing the nation's limited resources in servicing of debts annually. This action has thus led to disinvestment in the economy, and as a result a fall in the domestic savings and the overall rate of growth. This study is important as its findings will provide a basis which will assist policy makers in proffering polices aimed at managing the debt crisis situation in Nigeria. More so, it will tend to help researchers, financial practical and investors in regulatory frame work in decision making (Adekunle, *et al.* 2012; Abdullahi, *et al.* 2016).

The study seeks to estimate the relationship between the EXD and GDPusing the vector error correction mechanism. In order to fully capture its effect on the economy, a comprehensive analysis will be conducted with set of data covering a period of 35 years i.e., 1980-2015; obtained from World Bank databank, CBN Statistical Bulletin.

II. Methodology

2.1 Model Specification

This study is to establish relation between External Debt and Gross Domestic Product. The model is similar to growth model employed by (Boboye and Ojo, 2012). The model is specified in functional form as:

$$GDP = f\left(EXD\right) \qquad ...2.1$$

Where, GDP isGross Domestics Product per Capita and EXD is the External Debt.GDP per capita is GDP divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. It is used to capture economic growth in this study because it is adjusted for inflation in 2000 and as such provides a more accurate figure. External debt stock is used as a proxy to EXD and it is the amount at which the debt was contracted and it is used as debt burden. The relationship between foreign debt and economic growth has mainly focused on the negative effect of debt overhang. Debt overhang is a situation in which the expected settlement on foreign debt falls short of the contractual value of the debt or a situation in which the debtor country benefits very little from the return to any additional investment because of the debt service obligations. Those economies with heavy indebtedness are considered a leading cause of distortion and slowing down of economic growth, since pull of private investors are unavailable (Sachs, 1989; Bulow, *et al.* 1990; Abdullahi, *et al.* 2016). Crowding out effects occurs due to excessive real interest charges while the terms

of trade of an overly indebted country become worsen while foreign credit markets may no longer be available. Reduction in nation's capability of maintaining its debt resulting from the crowding out effect; and therefore, as it strives to meet some of its obligations, leaving little capital for domestic investment (Patenio, et al. 2007; Abdullahi, et al. 2016).

2.2the Basic Var Model

The basic Vector Autoregression (VAR) model allowed for this research is given as:

$$y_t = A_1 y_{t-1} + A_2 y_{t-2} + \cdots + B_0 x_t + \cdots + B_q x_{t-q} + CD_t + u_t \qquad ...2.2$$

Where, $y_t = (y_{1t}, \ldots, y_{Kt})'$ is a vector of K observation endogenous variables, $x_t = (x_{1t}, \ldots, x_{Mt})'$ is a vector of M observation exogenous or unmodelled variables, D_t contains all deterministic variables which may consist of a constant, a linear trend, seasonal dummy variables as well as user specified other dummy variables, and u_t is a k-dimensional unobservable zero mean white noise process with positive definite covariance matrix $E(u_t u_t^1) = \sum_u$. A_i, B_j and C are parameter matrices of suitable dimension. Equation (2.2) is a standard $VAR(p)$ model with deterministic terms D_t. A univariate AR model is obtained if just one y variable is considered ($k = 1$). Thus the present model framework can also be used for univariate or single equation analysis. The AR or VAR order p may be chosen with the help of model information criteria.

2.3var Estimation

Estimation of the model (2.2) is done by feasible generalized least squares (GLS). For this purpose the individual equations of the system are first estimated by OLS. The residuals are used to estimate white noise covariance matrix.

Σ_u as $\hat{\sum}_u = T^{-1}\sum_{t=1}^{T} \hat{u}_t \hat{u}_t'$. ...2.3

This estimator is then used in the next step to compute the GLS estimator. If all repressors in all equations are identical, the estimator reduces to an equation by equation on OLS estimator.

2.4the Basic Vec Model

If any K series $y_{1t}, y_{2t}, \ldots, y_{kt}$ are cointegrated, then the general VECM allowed for this projectwork is given as:

$$\Gamma_0 \Delta y_t = \alpha \left[\beta' : \eta' \right] \begin{bmatrix} y_{t-1} \\ D_{t-1}^{co} \end{bmatrix} + \Gamma_1 \Delta y_{t-1} + \cdots + \Gamma_p \Delta y_{t-p} + B_{0x_t} + \cdots + B_{qx_{t-q}} + CD_t + u_t \ ...2.4$$

where $y_t = (y_{1t}, \ldots, y_{kt})^1$ is a vector of k observable endogenous variables,
$x_t = (x_{1t}, \ldots, x_{Mt})^1$ is a vector of M observable exogenous variables; D_t^{co} contains all deterministic terms included in the cointegration relations and D_t contains all remaining deterministic variables. Deterministic variables may be constants, linear trends; seasonal dummy variables as well as user specified other dummy variables. Notice thata single deterministic term cannot appear in both D_t and D_t^{co}; so that; the two vectors have to contain mutually exclusive terms. The residual vector u_t is assumed to be a k-dimensional unobservable zero mean white noise process with positive definite covariance matrix $E(u_t u_t^1) = \Sigma_u$. The parameter matrices α and β have dimensions $(k \times r)$ and they have rank r. They specify the long-run part of the model with β containing the cointegratingrelations and α representing the loadingcoefficients. The column dimension of η is also r and its row dimension corresponds to the dimension of D_t^{co}. The notation $\beta^* = \begin{bmatrix} \beta \\ \eta \end{bmatrix}$ will be used in the following and the row dimension of β^* will be denoted by K^*. Hence, β^* is a $(K^* \times r)$ matrix.

2.5 vecm Estimation

There are different estimation procedures available for estimating a model of the type (2.4), depending on the precise model specification. If $\Gamma_o = I$, like in the case of our work, there are no zero restrictions on the Γ_j matrices (j=1,…,p) and there are no exogenous variables, that is, a reduced form model is specified without exogenous variables and where each equation has the same right-hand side variables, then the Johansen reduced rank (RR) estimation procedure (see Johansen, 1995) and a simple two step (S2S) method (see Ahn,*et al.*1990; Lütkepohl, *et al*. 2004) can be applied.

2.6 Model Design

The information criterion specified lag model of order 2, so that VEC(1) design is given as:

$$\begin{bmatrix} d(\log EXD_t) \\ d(\log GDP_t) \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix} \begin{bmatrix} \beta_1 & \beta_2 \end{bmatrix} \begin{bmatrix} \log EXD_{t-1} \\ \log GDP_{t-1} \end{bmatrix} + \begin{bmatrix} \alpha_{11}^{(1)} & \alpha_{12}^{(1)} \\ \alpha_{21}^{(1)} & \alpha_{22}^{(1)} \end{bmatrix} \begin{bmatrix} d(\log EXD_{t-1}) \\ d(\log GDP_{t-1}) \end{bmatrix} + \begin{bmatrix} \alpha_{11}^{(2)} & \alpha_{12}^{(2)} \\ \alpha_{21}^{(2)} & \alpha_{22}^{(2)} \end{bmatrix} \begin{bmatrix} d(\log EXD_{t-2}) \\ d(\log GDP_{t-2}) \end{bmatrix} + \begin{bmatrix} c_1 \\ c_2 \end{bmatrix} + \begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix} ...3.8$$

Where, $d\left(\log EXD_{t-1}\right)$, $d\left(\log GDP_{t-1}\right)$ are the first difference of EXDand GDP per capital, $\alpha_{11}, \alpha_{12}, \cdots$ are the coefficient of EXD and GDP; $d\left(\log EXD_{t-2}\right)$, $d\left(\log GDP_{t-2}\right)$ are the second log difference of both EXD and GDP per capital. Then, c_1 *and* c_2 are the constant at the level (Johansen,l995).

2.7 Data Analysis

This section presents the data analysis for the research work. The data are described using visual representation of the time plot, descriptive statistics, autocorrelation function, and partial function. VECM or VAR are estimated and the result are interpreted. Residual analysis such as portmanteau test, Arch-lm test, stability test and so on.

2.7. 1visual representation

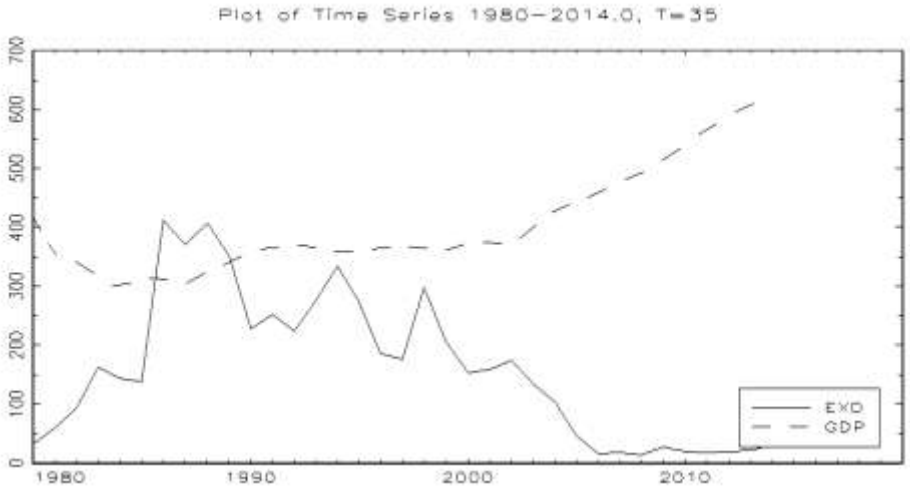

Figure 1.0 Visual Representation of Gross Domestic Product Per Capital and External Debt in Nigerian between 1980-2015 (at level)

Figure 1.0 above displayed the visual representation of GDP per capital and external debt in Nigerian between the year 1980-2015. GDP per capital showed slightly upward trend while external debt showed upward trend up to1990 where it dropped to a certain level and maintained the fluctuation between this level, on till 2005 where it final move down to its lowest ebb. Also it was very noticeable that the mean and variance of the two variables are not stationary and hence, there is need for transformation to stationarity.

Table 3.0 Descriptive Statistics

Variable	Mean	Minimum	Maximum	Standard Deviation
GDP	4.06187e+02	2.93597e+02	6.28056e+02	8.98790e+01
EXD	1.59077e+02	1.44132e+01	4.12074e+02	1.22637e+02

The mean for both GDP and EXD stand at 4.0618×10^2 and 1.5907×10^2 respectively. However, the minimum and maximum values for these variables are2.9359×10^2 ; 1.441×10^2 and 6.2805×10^2; 4.120×10^2respectively.

Table 3.1 Jarque-Bera Test

Variable	Test statistic	p-Value(Chi^2)	Skewness	Kurtosis
GDP	6.6203	0.0365	1.0651	3.0450
EXD	3.0450	3.0450	0.4872	2.1444

The kurtosis of GDP is 3.045 slightly above 3.0 of normal distribution kurtosis which is a very good characteristic of financial time series. However, the kurtosis of EXD is 2.1444. The kurtosis of GDP and EXD are positively skewed. Also they are both are non-normal in distribution.

Table 3.2 Autoregressive Conditional Heteroscadasity-Lm (Arch-Lm) Test

Variable	Test Statistic	p-value(Chi^2)	F stat	p-Value(F)
GDP	31.9147	0.0000	485.2036	0.0000
EXD	10.1385	0.0063	7.3173	0.0026

The test shows that there is a strong heteroscadascity effect at every lag of 2 in the two series under investigation. This implies that the series are non-stationary.

Table 3.3 Autocorrelation Function (P <= 15)

	EXD	GDP
Portmanteau Test	73.6664	87.8253
P-value	0.0000	0.0000
L&B	89.5991	101.4273
P-value	0.0000	0.0000

Table 3.3 revealed that there is a strong serial correlation among the data point of the variables under investigation, i.e., the EXD and GDP data are non-stationary.

Table 3.4 Portmanteau Test

	EXD		GDP	
Lag	**AC**	**PAC**	**AC**	**PAC**
1	0.8204	0.8204	0.8894	0.8894
2	0.6650	-0.0103	0.7754	-0.2857
3	0.5503	0.0498	0.6557	-0.1335
4	0.4428	-0.0690	0.5334	-0.3304
5	0.3630	0.0643	0.4236	0.3132
6	0.2321	-0.2346	0.3257	-0.1132
7	0.1732	0.0125	-0.1132	0.1531
8	0.0899	-0.1222	0.1554	0.0280
9	0.0170	-0.0124	0.0848	0.1778
10	-0.0408	-0.0636	0.0264	0.2911
11	-0.1058	-0.0070	-0.0265	0.0071
12	-0.1541	-0.0465	-0.0589	0.0833
13	-0.2532	-0.2606	-0.0712	-0.2608
14	-0.2913	0.0941	-0.0899	0.2148
15	-0.2847	0.0435	-0.1102	-0.3846

Table 3.4 revealed the serial autocorrelation and partial autocorrelation for EXD and GDP up to lag 15 and these values are significant.

Table 3.5 Adf Test For Series; Exd And Gdp At Log Level

	logEXD			logGDP	
1%	5%	10%	1%	5%	10%
-2.56	-1.94	-1.62	-2.56	-1.94	-1.62
Value oft-stat:	-0.4497		Value of t-sta:	1.6190	
Regression results			Regression results		
Variable	Coefficient	t-stat	Variable	Coefficient	t-stat
x(-1)	-0.0067	-0.4497	x(-1)	0.0019	1.6190
RSS	5.4273		dx(-1)	0.4287	2.4083
			dx(-2)	-0.1389	-0.9373
			dx(-3)	0.4131	2.8613
			dx(-4)	-0.1486	-1.0588
			RSS	0.0149	

The result revealed that the data contain unit root, i.e., the series of log EXD and log GDPare non-stationary. EXD is done at lag 0, while GDP at lag 4 using information criterion.

Table 3.6 Adf Test Series

d(logEXD)			d(logGDP)		
1%	5%		1%	5%	
-2.56	-1.94		-2.56	-1.94	
value of t-stat:-4.8149			Value of t-stat:-2.4527		
regression results:			Regression result:		
Variable	Coefficient	t-stat	Variable	Coefficient	t-stat
x(-1)	-0.8205	-4.8149	x(-1)	-0.3996	-2.4527
RSS	5.2787		dx(-1)	-0.2301	-1.3268
			dx(-2)	-0.3755	-2.9152
			RSS	0.0283	

The series d(logGDP) and d(logEXD) does not contain unit root. Hence, we conclude that both series are integrated of order 1.

Table 3.7 Kpss Test

Log EXD			**Log GDP**	
1%	5%		1%	5%
0.739	0.463		0.739	0.463
t- stat: 0.7972			t- stat: 1.0594	

Table 3.7 revealed that both logEXD and logGDP are non-stationary at log level. Hence, we reject the null hypothesis at 5%.

Table 3.8 Kpss Test

d(logEXD)		**d(logGDP)**	
1%	5%	1%	5%
0.739	0.463	0.739	0.463
t-stat: 0.3512		t-stat: 0.4567	

Table 3.8 shows that d(logEXD) and d(logGDP)are stationary at lag 5. Thus, we have established that the two variables are I(1). Then, we go for the cointegration test.

table 3.9 cointegration trace test

r0	LR	P-value	90%	95%	99%
0	96.35	0.0000	17.98	20.16	24.69
1	6.13	0.1873	7.60	9.14	12.53

The table shows that there exist one cointegration relation between GDP and EXD at log level.

2.8estimation Of Vector Error Correction Mechanism

$$\begin{bmatrix} d(\log GDP_t) \\ d(\log EXD_t) \end{bmatrix} = -7.477 + \begin{bmatrix} -0.043 \\ -0.286 \end{bmatrix} \begin{bmatrix} 1.000 & 0.288 \end{bmatrix} \begin{bmatrix} \log GDP_{t-1} \\ \log EXD_{t-1} \end{bmatrix} + \begin{bmatrix} 0.368 & -0.028 \\ 1.233 & 0.140 \end{bmatrix} \begin{bmatrix} d(\log GDP_{t-1}) \\ d(\log EXD_{t-1}) \end{bmatrix} + \begin{bmatrix} 0.256 & 0.037 \\ -4.113 & -0.081 \end{bmatrix} \begin{bmatrix} d(\log GDP_{t-2}) \\ d(\log EXD_{t-2}) \end{bmatrix} + \begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix} \cdots (3.9)$$

Table 4.0 Error Correction Model

Cointegrating Eq:	**Log GDP(t-1)**	**Log EXD(t-1)**	**CONST**
	1.000	0.288	-7.477
	(0.000)	(0.089)	(0.442)
	[0.000]	[3.228]	[-16.935]

Table 4.0 shows the estimated long run elasticity relation between the GDP and EXD. The result revealed that 1% increase in EXD will tend todecrease GDP by29%; thus, the debt overhang and crowding out problems exist in Nigeria's economy. The rationale is that, high ratio of external debt leads to lower economic growth. The government will have to increase taxes in the future to finance the high debt service payments, thus, a lower after tax return on capital and a reduced incentive to invest. Lower investment indicates slower economic growth. However, in the long-run reimbursements of principal and interest payment absorb the substantial portion of foreign reserves making it challenging to takeoff new investment schemes, hence; increasing foreign debt discourages economic growth. Thus, there is need to improve the revenue reliance currently on GDP in Nigeria. However,if the EXD is properly managed there will be improvement in GDP, in order words, if the EXD are not properly manage then the GDP will be running at loss like our case in Nigerian. There is need for proper implementation and execution of good policies so that, if debts are contracted, they should be properly channeled to make evocative improvement on GDP, so that the GDP will not be at deficit.

Table 4.1 Loading Coefficients

	d(logGDP)	d(logEXD)
ecl(t-1)	-0.043	-0.286
	(0.023)	(0.282)
	{0.062}	{0.310}
	[-1.866]	[-1.016]

The result shows that at disequilibrium, it will take GDP a speed of about -0.043 to return back to equilibrium, while EXD takes a speed of about -0.286.

Table 4.2 Model Checking

Portmanteau Test	
Tested order:	16
test statistic:	38.295
p-value:	0.9477
Adjusted test statistic	52.243
p-value:	0.5424
degrees of freedom:	54.000

The model checking test shows that there is no serial correlation among the error terms.

Table 4.3 Tests For Non Normality

Non normality Test	
Joint test statistic:	1.6223
p-value:	0.8048
degrees of freedom:	4.0000
Skewness only:	0.7580
p-value:	0.6845
Kurtosis only:	0.8643
p-value:	0.6491

Table 4.3 showed that the VEC model follows a normal distribution.

Table 4.4 Jarque-Bera Test

Variable	Test stat	p-Value(Chi^2)	skewness	kurtosis
u1	2.7394	0.2542	0.2542	3.5571
u2	0.5578	0.7566	0.1623	2.4406

The multivariate non-normal test shows that the error terms are normally distributed and the VEC model is adequate.

Table 4.5 Multivariate Arch-Lm Test

VARCHLM test statistic:	51.3454
p-value(chi^2):	0.2391
degrees of freedom:	45.0000

The ARCH-LM test with 5 lags showed that the VEC model is adequate.

III. CONCLUSION

This study investigated the long-run impact of EXD on GDP in Nigeria via VECM. It was observed that the indicators are non-normal in distribution and also integrated of order one. The long-run elasticity revealed that 1% increase in EXD will tend todecrease GDP by29%; thus, EXD exerts negative effect onGDP.The loading coefficient for the cointegration relation showed that at disequilibrium, it will take GDP a speed of about -0.043 to return back to equilibrium, while EXD takes a speed of about -0.286.However, it has been revealed in the existing literature that if the EXD is properly managed, there will be improvement in GDP per capital; in order words, if the EXD are not properly manage then the GDP per capital will be running at loss like our case in Nigeria. There is need for proper implementation and execution of good policies so that, if debt are borrowed it will be channeled properly to make meaningful improvement on GDP, so that the GDP will not be at deficit.

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