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Nigerian Debt Portfolio and Its Implication on Economic Growth

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Abstract
This study examines the relationship between economic growth and debt variables for the period 1981-2012 using Vector Error Correction Model (VECM) approach. Variables were stationary at their first differences at 1% level of significance and there is one co-integrating relationship among the variables at 0.05 level. Granger test reveals that causality flows from GDP to both External debt (EXD) and its servicing (SERV). On the other hand, domestic debt (DDB) granger causes GDP. Bi-causality relationship was also found between EXD and SERV. The error correction value of 55.1% which is significant at 1% means that the speed of adjustment of the short-run to the long-run is slightly above average. Instrumental variable (IV) analysis (GMM) confirms non-linear (inverted-U) relationships between economic growth and the domestic/external debts. Debt-to-GDP ratios of 21.4% (domestic debt) and 26.9% (external debt) reveal that Nigeria can benefit from borrowed funds provided it stays below these limits and the repayment conditions are favorable. Hence, funds channeled towards developmental efforts will have positive ripple effects on the economy.
Keywords: Debt stock, debt service, economic growth, sustainability ratio, vector error correction

1. Introduction

Nations of the world make use of their resources and endowments in developmental efforts. However, situations arise whereby such innate resources will not be able to cater for the economic and social needs of the country to foster growth. In such situations, sovereign states resort to borrowing. Debt is a specified amount owed to lenders outside or within the debtor's country. The debtors can be the government, corporations and citizens of such country. Debt could be external or domestic. External debts are economic obligations taken from elements outside the country on behalf of a sovereign state by its government while domestic debts are financial contracts entered into by government or its representatives within the walls of a country. It might come in terms of bonds and treasury bill issuance.

Countries can access loan due to various reasons. External borrowing (and by extension domestic debt) is an important and powerful financial tool for an economy if it is used prudently in investment or expended for national development. This can enhance investment growth and increase growth rate in the economy, if the debt servicing cost is lower than the returns of the investment or slow down the growth if the cost is on the high side. Developing countries are often faced with deficient finance and borrow from developed countries, international organizations, and international finance institution mainly to boost their economic growth which invariably leads to infrastructural development, education, health and general wellbeing of the nation. As countries expand their output, they also tend to rely more heavily on domestic public debt issuance to finance growth and a strong cross country relationship has been found between economic growth and the total size of the debt market (Adofu & Abula, 2010). Nevertheless, high debt burden has been found to be detrimental to growth with special reference to low-income countries (Freytag & Penhelt, 2009) which is characteristic of Sub-Saharan Africa. Nigeria is a country blessed with abundant human and natural resources. However, despite the economically advantageous position that the country finds itself as a result of vast deposit of natural resources, it has been embroiled in debt trap. How has this been so?

The borrowing spree in Nigeria started around the oil boom era (1971-1981). The crashing of the oil price in the early 80's made it difficult for the nation to fulfill repayment agreement and this caused buildup of both interest and capital. This was made worse during the military era (1985-1993; 1993-1998) when the government stop paying its debt to the Paris Club due to the refusal of the creditors to substantially reduce Nigeria's debt (DMO, 2005). Debt Management Office (undated) submitted that the debt situation of Nigeria could be attributed to some key variables. These include: exchange rate/interest rate fluctuations, non-commitment to paying terms which led to accumulation of the principal and the interest overtime, poor debt management practices, inefficient loan utilization and inability to sieve loans for necessity coupled with poor understanding of the loan conditions. A critical look at the factors points to governance problems, essentially.

Assessing loan, especially from external sources, brings with it the burden of debt servicing and the evil of debt trap through accumulation of both principal and interest. For example, it is interesting to note that as at December 2000, the structure of debt owed Paris Club of creditors is as follows: principal balance – 7%, principal arrears – 48%, late interest – 24% and interest arrears – 21% (DMO, 2005). This trend of arbitrary rise is similar in many developing countries of the world (Freytag & Penhelt, 2009). In addition, the huge amount of resources usually committed to debt servicing is not limited to the external sources of borrowing. This becomes clear when the amount used in servicing debt post-debt relief is observed: ₦526.46billion (2008), ₦542.50billion

(2009), ₦591.50 billion (2011), ₦766.70 billion (2012) and ₦935.10 billion (CBN 2009-13); over a period in which domestic debt took lion share of the total debt stock (Figure 1).

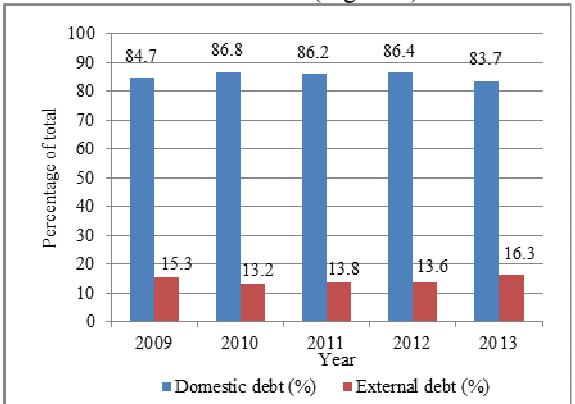

Figure 1. Domestic and external debts as percentages of total debt stock

Debt relief was introduced in 1996 and 1999 by creditor's nations to Heavily Indebted Poor Countries (HIPC) in order to remove the impeding effect of debt overhang which is a situation when the stock of external debt in a country exceeds her repayment ability (Clements *et al.*, 2005). Freytag and Penhelt (2009) maintained that an estimated 50 billion US dollars in debt relief had been enjoyed by developing countries in the last 10 years and this has bolstered their repayment ability, enable them to attract foreign investment and put them on the path of sustainable growth and development. As it is, most of those classified as Highly Indebted Poor Countries (HIPCs), who had the opportunity of debt forgiveness, fall within the Sub-Saharan African (SSA) enclave.

Debt relief, which was hard-won by the civilian administration of President Olusegun Obasanjo, came as a welcome succor because of its anticipated benefits. The expectations are that the resources required previously to pay and service such external debt should now be channeled to investment and other viable projects to boost economic growth. Huge debt burdens tend to be associated with low investment and low economic growth in low-income countries, debt relief might have a stimulating effect on investment and economic development. Despite the debt forgiveness received by Nigeria from Paris club, the evidence of accelerated economic growth looks sketchy (Bakare, 2010). The ripple effect of this relief which ought to be seen in improved foreign exchange rate, investment and economic growth is not in place. The performance in the education, health and other sectors does not show evidence of improved poverty status. This is supported by the view of Chauvin and Kraay (2005) which showed that debt relief in 62 developing countries during 1989–2003 neither improved the institutional quality nor led to rising foreign direct investment or higher rates of economic growth.

Despite the fact that Nigeria has been granted debt relief, its total debt stock has been on the rise. This could be attributed to domestic debt which may have been seen as an internal issue and might not have been taken serious by the government. This introduces another dimension to the issue of government default, which in itself might not be healthy for the economy. Also, literature suggests that for a country to enjoy the benefits of external or internal borrowing, the sustainability analysis of the economy must exhibit a healthy pattern. Some of the indicators used in sustainability analysis include: total debt-to-GDP, total external debt-to-GDP, total domestic debt-to-GDP, total external debt-to-export, debt service-to-revenue and total debt-to-revenue (all in percentages). These should compare favorably with the international thresholds which are given as 30%, 30%, 40-60%, 100%, 20-25% and 150% percent respectively. Debt ratio is a good indicator in determining the ability of a country to repay its debt (Apere, 2014). The farther away the debt stock-to-GDP ratio is from the threshold, the better for the economy. It is evident in Figure 2 below that debt ratio for Nigeria improved considerably after the debt relief. However, the question is whether this has translated to welfare gains through growth effect or not.

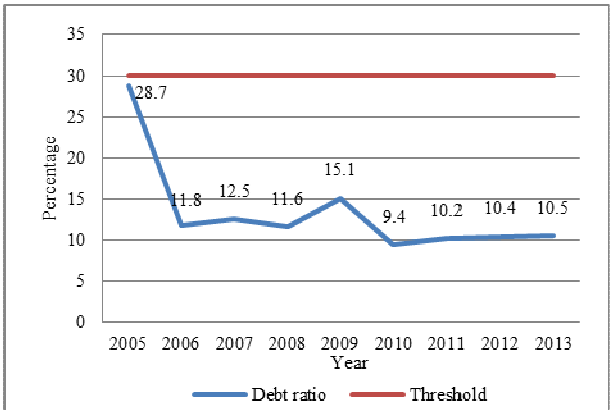

Figure 2. Graph showing the debt ratio as against the threshold

Nigeria has been given a reprieve since 2005 in a whooping 18 billion US Dollars debt relief package and the expectation is that this will translate into welfare gains for the citizens. However, the deepening poverty situation in Nigeria calls for assessment of the inter-relationship between debt stock and economic growth in order to establish the underlying causes of the seemingly helpless condition. More so, this era of falling oil prices with its attendant loss in government revenue can adversely affect government ability to meet up with obligations on the economy, which include debt servicing. Thus, the claim of Nigeria having the highest GDP (and by extension, growth rate) in Africa is put to test.

In line with these, the study will (a) investigate the short run and long run relationship between Nigerian economic growth and debt portfolio (b) assess the impact of the debt ratio on economic growth. This study considers both external and domestic debts because after the debt relief, domestic debt became a major component of total debt stock in Nigeria.

2.0 Theoretical Framework and Literature Review

This study is hinged upon the Debt Overhang Theory as enunciated by Sachs (1983) and Krugman (1988). In the submission of Koeda (2008), one of the reasons usually adduced for debt relief provision is 'debt overhang' and it describes the relationship between heavy debt and low growth. Debt overhang is a situation of high external debt-to-GDP ratio. It is a situation where level of debt has got to the extent that the creditors too are not sure of being fully repaid (Krugman, 1988). Although highly indebted countries still engage in economic activities for revenue generation, the burden of the huge debt overshadows economic gains on any additional investment. This becomes evident when the huge payments on loans are considered. With high debt stock, any current payment raises the opportunity cost of future economic growth because the resources that should have been invested for future gains are used for debt servicing (Freytag & Penhelt, 2009).

This brings to fore, the issue of debt Laffer curve. According to Freytag & Penhelt (2009), the debt Laffer curve shows the relationship between the value of current loan repayment and a country's debt stock. The Net Present Value (NPV) of debt repayment increases as the face value of debt stock increases up to a certain level beyond which higher face value is associated with lower investment, slower growth and subsequent loss in the value of loan repayment. Thus, debt relief will enable countries move out of this overhang problem because future financial obligations would have been removed or at least reduced to a sustainable level.

Different methodologies have been utilized in the debt-growth effects assessment in literature. Johanson (2009) applied regression analysis to study the effect of debt relief on growth and development in developing countries making use of Generalized Method of Moment (GMM) estimation technique because the presence of endogenous variables introduces bias into OLS estimates. This is taken care of by the GMM estimator. Checherita-Westphal and Rother (2012) studied the impact of high government debt on economic growth for the Euro area using quadratic model form because the linear form did not give significant result. The study also made use of 2-stage Least Square (2SLS) and Generalized Method of Moment (GMM) estimators in Instrumental Variable (IV) approach to correct for endogeneity.

Conversely, augmented Cobb-Douglas functional form was employed by Obademi (2012) to assess the impact of exogenous variables on GDP. The problem of over-identification in an earlier work that made use of 2-stage least square (2SLS) and the fact that all the variables to be used will not be captured sufficiently were given as reasons for not utilizing simultaneous equation model. In his submission, the augmented Cobb-Douglas equation captures direct effect of the debts on growth and the coefficients of the variables are the elasticity value of variables with respect to the dependent variable. Also, value impact variables (e.g debt stock) were taken as a ratio of GDP in order to arrive at proportional impact variables (e.g. debt ratio). Kasidi & Saidi (2013) adopted the Ordinary Least Square (OLS) method in the study of external debt impact in Tanzania while Boboye and

Oke (2012) and Sulaiman and Azeez (2012) also applied it to Nigeria.

Several studies have been conducted to assess the effect of debt on economic growth and the results are essentially mixed (Kasidi & Said, 2013) in line with differing propositions of economists on debt. In Nigeria, a number of studies exist on the relations between external debt and economic growth. Osinubi and Olaleru (2006) assessed budget deficit-external debt-economic growth nexus and confirmed the existence of debt Laffer curve and the non-linear effects of external debt on growth for Nigeria. The study concluded that if budget deficits are financed by debt for sustainable debt-ratio stabilization, debt overhang problem will not occur. Ogunmuyiwa (2012), in answering the question posed: 'Does external debt promote economic growth in Nigeria?' found out that causality does not exist between external debt and economic due to the weak and insignificant relationship.

Imimole *et al.* (2014) discovered a long-run relationship between external debt and the explanatory variables for Nigeria and reported GDP, debt service and exchange rate as the main determinants of external debt. Dijkstra (2013) also observed that good number of studies found a non-linear relationship between growth and debt; the debt becoming only a burden on growth above certain threshold. Aminu and Anono (2012) conducted a study on external debt relationship in Nigeria and found that external debt impacted positively on the growth of the economy within the period under review. Also, external debt does not cause GDP, but the flow of causation runs from GDP to external debt. However, Egbetunde (2012) revealed the existence of bi-directional causality between external debt and economic growth as well as domestic debt and economic growth. The view of Aminu and Anono (2012) contrasts with the submission of Boboye and Ojo (2012) that external debt burden has negative effect on National Income (NI) and per capita income.

3.0 Methodology

3.1 Data and source

Data used include real GDP (which represents economic growth), government debt (external and domestic), debt service, value of export, real exchange rate, inflation rate and foreign direct investment. Data from CBN annual reports and statistical bulletin and WDI data of the World Bank were used.

3.2 Analytical techniques

Several tests were carried out in the study. They are stationarity (unit root) test to determine if variables are stationary, cointegration test to examine the long run relationship among macro variables. Vector Error Correction (VEC) model was used to test the short run disequlibrium among variables and granger causality test to examine the direction of causality among variables. Non-linear (quadratic) functional form in a semi-log context was also used in the regression analysis of the debt variables on growth. The essence is because of the non-linear relationship that exists between external debt and economic growth (Osinubi & Olaleru, 2006; Apere, 2014). Also, Instrumental variables (IV) approach in the context of Generalized Methods of Moments (GMM) was used due to endogeneity problem and reverse causation that exist between economic growth and debt stock (Checherita-Westphal & Rother, 2012).

3.2.1 Stationarity (Unit root) test

A variable is said to contain a unit root or I (1) if it is non-stationary. The use of data characterized by unit root may lead to serious error in statistical inference.

$$Y_t = \beta Y_{t-1} + \varepsilon_t \qquad \ldots(1)$$

In the equation above, if β equals 1 the model is said to be characterised by unit root (the equation becomes the random walk model and the series is non –stationary. For a series to be stationary β must be less than unity in absolute value. Hence stationarity requires that $-1 < \beta < 1$. (Vaura *et al*, 2005). An augmented Dickey–Fuller test (ADF) determines the order of integration of the series which is the number of times a series has to be differenced for it to become stationary.

$$\Delta Y_t = \beta_1 + \beta_{2t} + \delta Y_{t-1} + \sum_{i=1}^{k} \rho_i \Delta Y_{t-i} + \varepsilon_t \qquad (2)$$

where ΔY is the time series, Δ is the first difference operator, $\mathcal{E}_t$ is the error term with zero mean and constant variance, and $\beta_{1,}$, β_2 $(i = 1, \ldots, \rho)$ are parameters to be estimated. The non rejection of the null hypothesis implies that there is non-stationarity. In this case differences are necessary to reach stationarity. The regressions provide a t-statistic of the estimated δ. The t-statistic is then compared to the critical value t-statistic, If the value of the ADF statistic is less that is more negative, (because these values are always negative) than the critical value at the conventional significant level (usually the five percent significant level) then the series (Y_t) is said to be stationary and vice versa.

3.2.2 Cointegration test

Co-integration analysis is concerned with the existence of a stable relationship among variables in different localities. When a long-run linear relation exists among different series, these series are said to be co-integrated (Engle & Granger, 1987). Co-integration, on the other hand, allows a way of dealing with time series data that

avoids spurious results, thus enhancing the authenticity of research findings. Johansen (1988) and Johansen and Juselius (1990), developed a multivariate co-integration method which was a robust procedure for testing long run relationship between stationary variables and also allow tests for multiple co-integrating vectors. It constructs a test statistic, called the likelihood ratio (LR) test, to determine the number of co-integrating vectors in a co-integration regression. The trace test the Ho of r co-integrating vectors, where r = 0, 1, 2….n-1, it is computed as

$$LRtr(^{r}/_{n}) = -T\sum_{i=r+1}^{n} log(1-\lambda) \quad \ldots(3)$$

n-number of variables in the system, λ – max eigenvalue, T – sample size. The criterion for selection is that the trace statistical value must be greater than the critical value at 5% level of significant, the Ho of no co-integration i.e., r = 0 is rejected.

3.2.3 Vector error correction model (VECM)

The vector autoregressive (VAR) model describes the dynamic interrelationship among stationary variables. A vector error correction model (VECM) evaluates the short run properties of a cointegrated series and also quantifies the rate of adjustment across macro variables in the long run. According to Hendy and Juselius (2000), the use of the VECM is facilitated when variables are stationary at first difference and co-integrated. If variables are co-integrated, it confirms the existence of long-run relationship. The evaluation of short-run relationship is done using VECM. The regression equation form for VECM is as follows:

$$\Delta Y_t = \alpha_1 + p_1 e_1 + \sum_{i=0}^{n} \beta_i \Delta Y_{t-i} + \sum_{i=0}^{n} \delta_i \Delta X_{t-i} + + \sum_{i=0}^{n} \gamma_i Z_{t-i} \quad \ldots(4)$$

$$\Delta X_t = \alpha_2 + p_2 e_{i-1} + \sum_{i=0}^{n} \beta_i Y_{t-i} + \sum_{i=0}^{n} \delta_i \Delta X_{t-i} + + \sum_{i=0}^{n} \gamma_i Z_{t-i} \quad (5)$$

3.2.4 Granger Causality test

The statement(y) Granger causes (x) or vice versa, represents how much of the current (y) and (x) can be explained by the past values of (y) and (x) (lagged values). For this reason, the causality relationship between GDP(y) and external debt(x) can be evaluated by estimating the following regressions:

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{m} \beta_{1t} \Delta Y_{t-i} + \sum_{i=1}^{n} \beta_{2t} \Delta X_{t-i} + \varepsilon_t \quad \ldots(6)$$

$$\Delta X_t = \beta_0 + \sum_{i=1}^{n} \beta_{1t} \Delta Y_{t-i} + \sum_{i=1}^{m} \beta_{2t} \Delta X_{t-i} + \varepsilon_t \quad \ldots(7)$$

Unidirectional causality occurs when estimated coefficient of one lagged variable is statistically different from zero while the coefficient of the other lagged variable is not statistically different from zero. Bilateral causality exists when the sets of both coefficients are statistically significantly different from zero. The null hypothesis of no causality is rejected if the computed F value exceeds the critical F value at the chosen level of significance.

3.2.5 Model specifications

For the regression analysis to assess non-linear relationship between economic growth and debt variables, the following quadratic (binomial) function is modified from Apere (2014),

$$GDP_t = f(DDB, EXD)^2 \quad \ldots(8)$$

Thus, expanding and including control variables,

$$GDP_t = \alpha + \beta_1 DDB_t + \beta_2 DDB_t^2 + \beta_3 EXD_t + \beta_4 EXD_t^2 + \beta_5 EXPORT_t + \beta_6 INF_t + \beta_7 EXR_t + \mu_t \quad \ldots(9)$$

With semi-log specification,

$$\ln GDP_t = \alpha + \beta_1 DDB_t + \beta_2 DDB_t^2 + \beta_3 EXD_t + \beta_4 EXD_t^2 + \beta_5 EXPORT_t + \beta_6 INF_t + \beta_7 EXR_t + \mu_t \quad \ldots(10)$$

Where $\ln GDP_t$ = natural logarithm of real Gross Domestic Product

DDB_t = Domestic Debt as a share of GDP

EXD_t = External Debt as a share of GDP

EXPORT = Total Export

INF = Inflation Rate

EXR = Real Effective Exchange Rate

$\beta_1 - \beta_7$ = coefficients and μ_t = stochastic error term

The points of inflexion (PI) for the debt ratios are given thus,

$$\text{Domestic debt-to-GDP} = -\frac{\beta_1}{2\beta_2} \quad \ldots(11)$$

$$\text{External debt-to-GDP} = -\frac{\beta_3}{2\beta_4} \quad \ldots(12)$$

In order to assess long and short-run relationships, the following was also specified,

$$GDP = f(DDB, EXD, INF, EXR) \quad \ldots(13)$$

By expansion, the linear functional form gives,

$$GDP_t = \alpha + \beta_1 DDB_t + \beta_2 EXD_t + \beta_3 INF_t + \beta_4 EXR_t + \mu_t \quad \ldots(14)$$

Taking logarithms of both sides of the equation,

$$\log GDP_t = \alpha + \beta_1 \log DDB_t + \beta_2 \log EXD_t + \beta_3 \log INF_t + \beta_4 \log EXR_t + \mu_t \quad \ldots(15)$$

where,

Log GDP_t = log of real Gross Domestic Product at time *t*
Log DDB_t = log of total Domestic Debt
Log EXD_t = log of total External Debt
Log INF_t = log of Inflation Rate
Log EXR_t = log of Exchange Rate
α = constant, $\beta_1 - \beta_5$ = coefficients and μ_t = error term

The two regressions (non-linear and long/short-run relationships) were carried out with gross domestic product, domestic debt and external debt data from domestic source (CBN). The analysis of long/short-run relationship was extended to the WDI data with the following specification,

$$GDP_t = f(EXD, SERV, INF, EXR, FDI) \quad \ldots(16)$$

Where GDP = Gross Domestic Product
EXD = total External Debt Stock
SERV = total External Debt Service
INF = Inflation Rate
EXR = Real Effective Exchange Rate
FDI = Foreign Direct Investment

4. Results and Discussion

4.1 Trend Analysis

The trend analysis for the gross domestic product, debt variables and control variables is presented in Figure 3. The GDP shows an upward trend for the period under study when data from domestic source is considered. However, the WDI data shows an initial downward movement and minor dip around 1993 before picking up. In Figure 3a, the external debt rises from 1981, stabilizing from around 1987 before falling very significantly in 2005, the year Nigeria was granted debt relief by the Paris Club of creditors. There was stability up to 2008 when the debt started rising again. In contrast, Figure 3b shows an initial upward trend in external debt, a sharp rise in 1998 and a sharp dip in 2005 before rising again in 2007. The external debt service shows significant fluctuations, rising sharply just prior to 2005 debt relief when Nigeria was required to pay a certain lump sum as one of the pre-conditions for debt forgiveness. The external debt service fell drastically afterwards. In contrast, domestic debt (Figure 3b) has an upward trend throughout the period under study. The foreign direct investment (FDI) is fairly stable while the inflation rate shows large fluctuations.

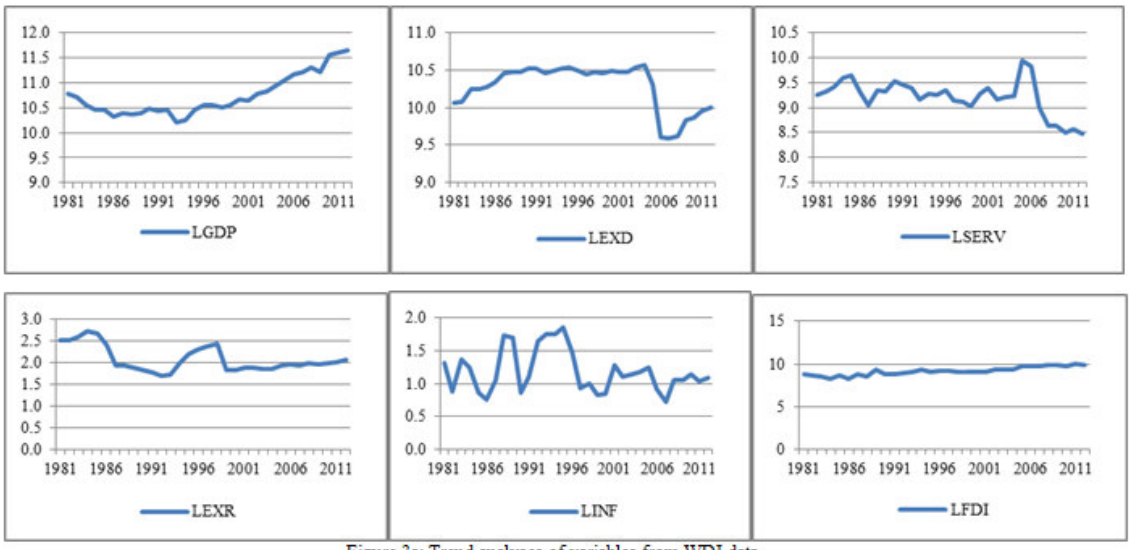

Figure 3a: Trend analyses of variables from WDI data

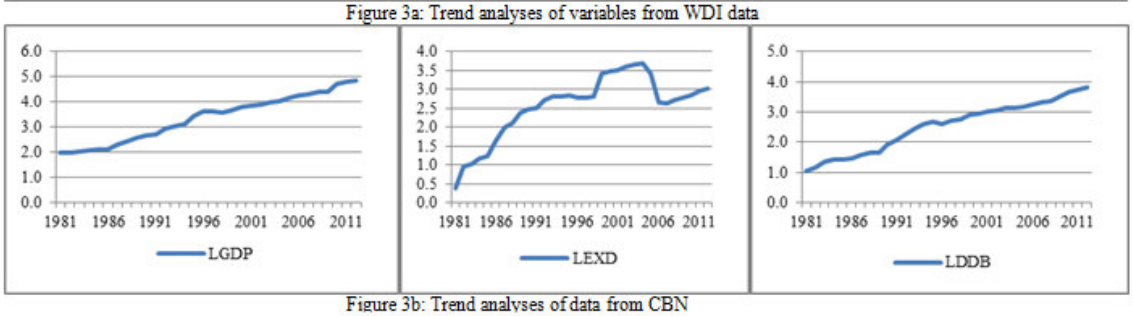

Figure 3b: Trend analyses of data from CBN

4.2 Test of Stationarity

The unit root test results, using Augmented Dickey Fuller (ADF), are presented in Tables 1a&b. The test was applied to each variable over the period of 1981–2012 using Eviews7. Variables are non-stationary at levels and their usage may produce a spurious regression as suggested by Mesike, Okoh and Inoni (2010). In addition, Yusuf and Falusi (1999) observed that such is not ideal for policy making and cannot be used for prediction in the long run. The variables were all stationary at their first difference at 1% level of significance and integrated of same order i.e. I (1) level. The H_o of unit root for all the variables were rejected at their first difference, since their ADF result test statistic were greater than the critical values at 1% level of significance.

Table 1a: Augmented Dickey Fuller test result

Variables	ADF at Level	ADF at first difference	Order of integration
LGDP	0.1054	-5.2574	I (1)
LDDB	-1.1542	-4.2608	I (1)
LEXD	-3.3088	-4.2899	I (1)
LINF	-3.0938	-6.1283	I (1)
LEXR	-1.9542	-4.0825	I (1)

LGDP- log of Gross Domestic Product; LDDB- log of Domestic Debt; LEXD- log of External Debt; LINF- log of Inflation rate and LEXR-log of Exchange rate.

Table 1b: Augmented Dickey Fuller test result

Variables	ADF at Level	ADF at first difference	Order of integration
LGDP	-1.0403	-5.0973	I (1)
LEXD	-1.9704	-3.7791	I (1)
LSERV	-1.5539	-4.0825	I (1)
LEXR	-1.9542	-6.1283	I (1)
LINF	-3.0938	-3.8202	I (1)
LFDI	-0.1666	-11.1933	I (1)

Statistical level of significance: 1% (-3.6702), 5% (-2.9639) and 10% (-2.6210)

LGDP- log of Gross Domestic Product; LEXD- log of External Debt; LSERV- log of Debt Servicing; LEXR- log of Exchange rate; LINF- log of Inflation rate and LFDI-log of Foreign Direct Investment.

4.3 Tests for Relationship among Macroeconomic Variables

The long run relationship among variables considered is presented in tables 2a&b. Cointegration analysis was based on trace test likelihood ratio. From the result, the likelihood ratio indicated one co-integrating equation at 5% level of significance as the null hypothesis r = 0 is rejected. From the result, there exists unique long run equilibrium between the variables. This is in line with Hallam and Zanoli (1992), that where only one co-integrating equation exists, its parameters can be interpreted as estimate of long run co-integrating relationship between variables concerned. Hence, there is a long run relationship among the variables which is also consistent with Ezeabasili *et al.* (2011) and Saad (2012).

However, the test for short run relationship was analysed using VECM. From the result presented in table 2c, the short run disequilibrium captured by VECM was above average (55.1%) and significant. This means that 55.1% of the disequilibrum in the short run is corrected in the long-run. On the other hand, data sourced from the WDI data shows a weak (1.4%) disequilibrium though also significant (Table 2d). The result implies that there is a slow adjustment of the short run to the long run equilibrium. By comparison, Obademi (2012) reported an ECM value of 1.4% while Imimole *et al.* (2014) reported 32.0%. This difference could be attributed to different data sources as evident from this study. External debt is found to be beneficial to the country in the short run judging from the positive coefficients while the negative values of the domestic debt means it is detrimental to growth. This is also the case with debt service. The coefficient of foreign direct investment (FDI) is negative suggesting that inflow of capital to the nation is reducing due to the challenges of security and infrastructure. This is having negative effect on the growth of the economy in the short run.

Table 2a: Johansen test result
Trend assumption: Linear deterministic trend
Series: LGDP LDDB LEXD LINF LEXR
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.749934	83.92829	69.81889	0.0025
At most 1	0.496398	42.34738	47.85613	0.1492
At most 2	0.427777	21.76828	29.79707	0.3116
At most 3	0.140951	5.021460	15.49471	0.8065
At most 4	0.015334	0.463572	3.841466	0.4960

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 2b: Johansen test result
Trend Assumption: Linear Deterministic Trend
Series: LGDP LEXD LSERV LEXR LINF LFDI

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.836637	119.3391	95.75366	0.0005
At most 1	0.616057	64.98578	69.81889	0.1144
At most 2	0.436118	36.26796	47.85613	0.3830
At most 3	0.339145	19.08066	29.79707	0.4871
At most 4	0.195009	6.654028	15.49471	0.6182
At most 5	0.004865	0.146320	3.841466	0.7021

Source : Authors computation
Trace test indicates 1 cointegrating eqn (s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 2c: Vector Error Correction result
Dependent variable: D(LGDP)

Variables	Coefficient	Standard error	t-statistics
ECM(-1)	-0.55143	-0.08753	-6.29974***
D(LGDP(-1))	-0.57293	0.13920	-4.11579***
D(LGDP(-2))	-0.89911	0.18342	-4.90184***
D(LGDP(-3))	-0.36273	0.18484	-1.96246**
D(LDDB(-1))	-1.32999	0.32260	-4.12269***
D(LDDB(-2))	-0.81925	0.23982	-3.41611***
D(LDDB(-3))	-0.27744	0.19660	-1.41118
D(LEXD(-1))	0.30715	0.07808	3.93397***
D(LEXD(-2))	0.18912	0.06546	2.88925***
D(LEXD(-3))	0.36793	0.06538	5.62728***
D(LINF(-1))	-0.39632	0.11548	-3.43205***
D(LINF(-2))	-0.28311	0.06956	-4.06985***
D(LINF(-3))	-0.09154	0.05529	-1.65544*
D(EXR(-1))	0.20939	0.11529	1.81624*
D(EXR(-2))	0.028906	0.08662	0.33371
D(EXR(-3))	0.183904	0.09388	1.95886*
C	0.426129	0.06168	6.90864***

R^2 = 0.880997, Adj. R^2 = 0.707901, S.E= 0.045536, F-stat= 5.089654
Critical values (2-tailed): 10%*(1.65), 5%** (1.96) and 1%***(2.56)

Table 2d: Vector Error Correction result
Dependent variable: D(LGDP)

Variables	Coefficient	Standard error	t-statistics
ECM(-1)	-0.013982	0.00488	-2.86499***
D(LGDP(-1))	-0.258247	0.23109	-1.11752
D(LGDP(-2))	-0.113515	0.21302	-0.53289
D(LEXD(-1))	0.807631	0.30569	2.64198***
D(LEXD(-2))	0.260084	0.28190	0.92260
D(LSERV(-1))	-0.367292	0.20656	-1.77815*
D(LSERV(-2))	0.146089	0.12470	1.17151
D(LEXR(-1))	-0.703102	0.26532	-2.64998***
D(LEXR(-2))	-0.532032	0.28828	-1.84553*
D(INF(-1))	-0.053465	0.08655	-0.61777
D(INF(-2))	0.061284	0.07835	0.78215
D(LFDI(-1))	-0.588807	0.24667	-2.38699**
D(LFDI(-2))	-0.135859	0.15903	-0.85430
C	0.059470	0.02590	2.29629**

R^2 = 0.449887, Adj. R^2 = -0.026877, S.E= 0.111776, F-stat= 0.943626
Significance level: 10%*, 5%** and 1%***

4.4 Granger Causality Test Result

The result in Table 3a reveals three (3) unidirectional granger causalities while Table 3b shows six (6) unidirectional granger causalities at different levels of significance. One bi-directional causality exists between debt servicing and external debt at (5 and 1) % significant levels respectively as shown in Table 3b. Gross domestic product granger cause external debt and external debt service at 5% significance level. The null hypotheses that LGDP does not Granger Cause LEXD and LSERV are rejected since their probabilities (0.0307 and 0.0457 respectively) are less than the significant level 5% (0.05). In addition, the F statistics values are significant, hence rejection of null hypothesis. This shows that GDP of Nigeria can be explained by the level of external debt accumulated by the nation and the amount committed to its servicing indicating that both variables influenced the level of economic growth during the period under study. The statement that LEXD granger cause LGDP or vice versa represents how much of the current external debt and gross domestic product can be explained by their past values.

The increase of external debt level will improve economic growth if spent for the initial (investment) purposes as returns accrued exceed the loan rate. If not the positive relationship of external debt is detrimental to economic growth because it causes reduction in potential investment as well as misallocation of the borrowing capital or waste on consumption suggested by Iyoha (2001). From the result, LFDI granger cause LGDP and

LSERV while causality in turn runs from LEXR and LINF to LFDI. The implications are as follows: past values of gross domestic product and external debt service could be linked to foreign direct investment while past values of foreign direct investment are associated with the exchange and inflation rates.

Table 3a: Pairwise Granger Causality Test Result
Sample: 1981 2012
Lags: 3

Null hypothesis	Observation	F statistic	Probability
LDDB does not Granger Cause LGDP	29	3.71111	0.0267**
LDDB does not Granger Cause LINF	29	3.61997	0.0291**
LEXR does not Granger Cause LINF	29	5.00118	0.0086***

Table 3b: Pairwise Granger Causality Test Result
Sample: 1981 2012
Lags: 2

Null hypothesis	Observation	F statistic	Probability
LGDP does not Granger Cause LEXD	30	4.01669	0.0307**
LGDP does not Granger Cause LSERV	30	3.49854	0.0457**
LFDI does not Granger Cause LGDP	30	4.84404	0.0167**
LSERV does not Granger Cause LEXD	30	4.59757	0.0199**
LEXD does not Granger Cause LSERV	30	8.01043	0.0020***
LFDI does not Granger Cause LSERV	30	4.22728	0.0262**
LEXR does not Granger Cause LFDI	30	3.04694	0.0654*
LINF does not Granger Cause LFDI	30	3.13317	0.0611*

Source: Authors computation
Significance level: 10%*, 5%** and 1%***

Table 4a**:** Regression result
Dependent variable: LGDP(-1)

Variables	Coefficient	Standard error	t-statistics*
LDDB(-1)	-1.709106	0.04222	-40.4766
LEXD(-1)	0.727144	0.04474	16.2520
LINF(-1)	-0.975842	0.10250	-9.52077
LEXR(-1)	1.419140	0.09397	15.1025
C	-2.679523		

*All variables are significant at 1% level.

Table 4b: Regression result
Dependent variable: LGDP(-1)

Variables	Coefficient	Standard error	t-statistics*
LEXD(-1)	-14.30186	4.19144	-3.41216
LSERV(-1)	-47.17180	9.10961	-5.17825
LEXR(-1)	-29.44489	5.69558	-5.16978
LINF(-1)	-20.66688	4.47461	-4.61870
LFDI(-1)	-59.71830	8.32186	-7.17608
C	1204.449		

*All variables are significant at 1% level
Critical values (2-tailed): 10% (1.65), 5% (1.96) and 1% (2.56)

4.5 Effect of Debt Portfolio on Economic Growth

The long run regression results show that domestic debt (DDB), external debt service (SERV), inflation rate (INF) and foreign direct investment (FDI) have negative relationship with the growth variable. This implies that these variables have adverse effect on economic growth in the long-run. Increase in the domestic debt by government translates to a decrease in the precursor to production of goods and services especially in situations where such debt is used for recurrent expenditure. External debt service denotes capital flight from the nation and high inflation rate means high cost of goods and services which reduces purchasing power as well as affecting global competitiveness of Nigerian products negatively.

The long-run effect of external debt (EXD) and exchange rate (EXR) on GDP is mixed when the different data sources are considered. The effect of external debt depends on the perspective from which it is

assessed and the extent to which the fund is put to judicious use. External debt comes with the obligation of debt servicing which translates to reduction in the finance meant for developmental purposes. On the other hand, if external debt is put to productive use and the returns far outweigh the cost, the effect will be positive on the economy. In the case of exchange rate, high value means high cost of meeting both domestic and foreign obligations by government, which can in turn lead to increased debt stock as found out by Ijeoma (2013), in a global economy denominated in foreign currency. Negative value for the coefficient of exchange rate has been reported by Ezeabasili *et al*. (2011), Boboye and Ojo (2012) and Sulaiman and Azeez (2012) for Nigeria while Kasidi and Saidi (2013) reported positive value for Tanzania.

The result of the static model which shows the relationship between gross domestic product and the debt variables for the period 1981 – 2012 is presented in Table 5. As mentioned earlier, the observation of bicausal relationship between economic growth and debt in literature informed the use of instrumental variable (IV) approach, especially the Generalized Method of Moments (GMM) which produces more efficient estimates. The main challenge of using IV is the choice of instruments. For this study, the lagged values (up to the 7th lag) of the external and domestic debts as share of GDP (EXD and DDB) were used as instruments as suggested in Checherita-Westphal and Rother (2012).

Six (6) out of the seven (7) explanatory variables are significant: five (5) at 5% and one (1) at 1%. The adjusted-R^2 (75.4%) and probability of the J-statistic (>0.50) indicate the appropriateness of the model. Export and Inflation rate are significant and have the right signs but the effect of export on GDP is infinitesimal. External debt as a share of GDP (EXD), Domestic debt as a share of GDP (DDB) and their squares are significant. Both EXD and DDB have positive signs while their squares have negative signs. This means that the relationship between GDP and each of EXD and DDB is inverted U-shaped which is in line with non-linear relationship reported by Dijkstra (2013) for many studies. The turning (inflexion) point for EXD is 26.9% while it is 21.4% for DDB. These thresholds are below the international values which is 40-60% for DDB-to-GDP ratio and 30% for EXD-to-GDP ratio (CBN, 2013). The threshold values in the result denotes that for an initial 1% increase in EXD, GDP increases by 12.6055% until EXD reaches a threshold of 26.9% when further 1% leads to 23.4726% decrease in GDP. In the case of DDB, an initial 1% increase causes the GDP to increase by 79.3234% until DDB reaches 21.4% when further 1% increase will cause the GDP to drop by 185.2603%.

Table 5**:** Instrumental Variable (IV) analysis result
Method: Generalized Method of Moments (GMM)
Dependent Variable: LnGDP
Instrument specification: EXD(-1) EXD(-2) EXD(-3) EXD(-4)
EXD(-5) EXD(-6) EXD(-7) DDB(-1) DDB(-2) DDB(-3) DDB(-4) DDB(-5) DDB(-6) DDB(-7)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXD	12.60546	3.574981	3.526021	0.0024**
EXD^2	-23.47260	4.464402	-5.257726	0.0001**
DDB	79.32338	16.94963	4.679948	0.0002**
DDB^2	-185.2603	41.85372	-4.426375	0.0003**
EXPORT	0.000410	7.21E-05	5.693336	0.0000**
INF	-0.019986	0.008098	-2.468155	0.0238*
EXR	-0.000905	0.004835	-0.187232	0.8536

R-squared	0.815198	Mean dependent var	8.569163
Adjusted R-squared	0.753597	S.D. dependent var	1.629919
S.E. of regression	0.809075	Sum squared resid	11.78285
Durbin-Watson stat	2.492615	J-statistic	6.758318
Instrument rank	15	Prob(J-statistic)	0.562919

Significance level: 5%*, 1%**

The result has policy implications. Both domestic and external debts boost economic growth. However, there is a threshold to which each can be accumulated because of negative impacts on the economy beyond such levels. This result also shows that in as much as finances could be sourced internally through government bonds and other instruments, an excessive exploration of this avenue without recourse to caution could cause serious problem for the economy, more so if such is not channeled for productive purposes.

5. Conclusion

This study analyses empirically the relationship among economic growth, external debt, domestic debt, debt servicing, inflation rate, exchange rate and foreign direct investment in Nigeria over a period of 32 years (1981-2012). The variables were co-integrated in the long run and the VECM result shows an above-average (55.1%) and weak (1.4%) short run disequilibrium adjustment in the long run when growth and debt variables from domestic and foreign sources are considered respectively, implying that variation can result from different data sources. The results also showed bi-directional causality between external debt and debt servicing but uni-directional causality from economic growth (GDP) to external debt which implies that the stability of Nigerian economy depends largely on the level of external debt. Domestic debt was found to be detrimental to the economy from the results of both short run and long run models which is in contrast to the findings of Egbetunde (2012). On the other hand, external debt was found to be beneficial from the result of the short run model but has mixed effect when the long run model is considered. The static model (IV), in which endogeneity and reverse causation were controlled for, gives opportunity of reconciling the differences: there is a threshold each beyond which domestic and external debts will negatively affect growth. Debt service and inflation rate variables show consistent negative relationship with GDP while the effect of exchange rate is rather mixed. Debt service payment and high inflation rate are injurious to the economy due to diversion of funds meant for developmental projects and high cost of goods and services thus endangering the standard of living of the citizens. Government should therefore ensure that its external debt is sustainable, obtained with good terms (interest rate and other repayment conditions) and utilized for developmental purposes. In the same vein, domestic debt should be cut down as much as possible. Finally, exchange rate effect on the economy depends on the success or otherwise of government policy tools.

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