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Impact Public Debt on Economic Development in Nigeria: 1986 - 2017

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Abstract

The study examined the impact of public debt on economic development in Nigeria for the period of 1986 to 2017. Three research questions and objectives guided the study. Vector Error Correction Model (VECM) technique and Johansen Co-integration test were employed for testing the hypotheses of the study. The VECM analysis results shows that Domestic debt had a positive impact on economic development in the short run, while in the long-run, domestic debt impacted negatively on economic development in Nigeria. The analysis shows that external debt impacted positively on GDP per capita income, indicating that it tends to contribute largely to economic development than domestic debt in Nigeria. The co-integration test results show that there exist a long-run relationship between public debt and economic development in Nigeria. Hence, the study recommends that policy makers like the Debt Management Office (DMO) should be seen to support the government in financing infrastructural development in production sectors and other priority areas of the economy, in order to promote increase in the volume of commodities exported from the country so as to boost earnings from foreign exchange, improve the living standard of people and eradicate poverty. Also, new debt management strategy should be created to contain guidelines to encourage export promotion and import substitution, as this would lead to increase in productivity level and promoting foreign exchange earnings, among others.

Keywords: Domestic Debt, External Debt, GDP per capita income, Interest Rate, Development, Nigeria.
JEL Codes: H63

1. Introduction

Debt in itself refers to the resources of money in use in an organization which is not contributed by its owners and does not in any other way belong to them. It is a liability represented by a financial instrument of other formal equivalent (Cohen, 2001). When a government borrows, the debts is a public debt, debt are incurred by government through borrowing in the domestic and international markets to finance domestic investment. Therefore, the public debt is seen as all claims against the government held by the private sector of the economy, or by foreigners, whether interest-bearing or not (and including bank held debt and government currency, if any); less any claims held by the government against the private sector and foreigners (Rogoff, 2010).

In the same vein, Muley (2016) submitted that public debt burden refers to the economic hardship which the public debt imposes. The hardship may take the form of waste of productive efficiency (misdirection of production) for the economy as a whole or undesirable economic burdens imposed upon particular classes. The problem of public debt in Nigeria has resulted in various distortions in the macro-economy. Essentially, these distortions are structural in nature and thus affect the level of per capita incomes and are instrumental to the rising

poverty in the country. The latter has attributed the attention of various authors and Nigerian economic planners. The various points of view are all agreed that the condition of Africa in general and that of Nigeria in particular have now characterized to an economic and political catastrophe (Nzotta, 2004).

Basically, Nigeria began to experience public debt problem from the early 1980s when foreign exchange earnings plummeted as a result of the collapse of prices in the international oil market and external loans began to be acquired indiscriminately (Udoka & Ogege, 2012). The debt crisis, which is the combination of accumulated debt stock and difficulty servicing, has imposed several problems on the Nigerian economy. This is reflected in the fall in real Gross Domestic Product (GDP), investment rate and export earning since 1980 (Cohen, 2001). The problem of public debt has clearly been a constraining factor on rapid economic recovery growth and development with the public debt increasing at an alarming rate.

However, funds which should have been used for economic development are channeled towards servicing the public debt. The constraining effect of the public debt services is more pronounced as the economy has failed to grow sufficiently to reduce the problem to a sustainable level.

In recent times, Nigerian economy has been characterized by highly levels of public debt along with persistent low economic growth and development. As such, an understanding of the dynamics between public debt and development is critical in addressing the obstacles to economic growth and development, and to improve debt sustainability in Nigeria (Omet, Akthan & Fadwa, 2002). Traditionally, the main drivers of economic development are the level and quality of a country's physical and human capital, technological advancement and the quality of the labour force as well as the country's level of openness to international trade (Omet et al, 2002). However, it is now universally accepted that a country's ability to grow also depends critically on its level of indebtedness.

Nigeria has relied much on public debt to finance its development projects in the past two decades with public debts which put its debt profile so high. Thus, before the debt write-off by the Paris-Club and London Club actually reduced Nigeria's external debt, whereas the domestic debt and the effect created by the huge debt before the debt write-off still have lag effect on the economy (Yusuf, 2017).

The Nigerian economy in the 1980s and 1990s has been filled with trepidation as the level of growth and development was weak and volatile, unemployment soared, and rise in poverty level. In addition, the economy was buffeted with a new economic slogan "debt overhang" in the 1990s. this was as a result of debt incurred in the decade and the debt incurred in the 1970s. The year 1972 saw dramatic increases in the price of oil, favourable for an oil-producing nation to begin development. Nigeria borrowed more from the international market, but by the end of the decade, oil prices has collapsed, and debt soared on the back of the inability of the government to service the debts (Business Post, 2018).

However, various approaches have been adopted towards making public debt sustainable for economic development in Nigeria. For instance, under the Structural Adjustment Programme (SAP), the economy adopted several strategies to make improvement on domestic debt which include the acquisition of domestic debt, restructuring of domestic debt, and servicing of domestic debt. On the external debt, the strategies employed included embargo on new loans, limit on debt servicing payments (i.e. maximum of 30% of export earnings), debt restructuring through refinancing, rescheduling, issuance of collateralized bonds, and debt conversion schemes. In addition, international debt reduction strategies were adopted which included the Paris Club Plan (1987), the Africa

Development Bank Plan, the Baker Plan (1985), the IMF Facilities Plan, and the World Bank Facilities Plan (Udoka & Ogege, 2012). Despite all these measures and strategies created and adopted for reducing the level of domestic and external debt, yet the picture has not changed from what it is known to be as the Nigeria's public debt still continues to rise to a very devastating rate. This in turn, stands as an epidemic for development of the Nigerian economy.

From the SAP period of 1986, the level of development in Nigeria by its GDP per capita was N0.0015 billion and increased to N0.0021 billion in 1987 (CBN, 2017). On the other hand, external debt at that period grew from N41.4 billion in 1986 to N100 billion in 1987. While, domestic debt increased from N28.4 billion to N36.7 billion. In the 1990s, as the GDP per capita increased to N0.013 billion in 1994 and N0.026 billion in 1995; the external debt increased to N716 billion while, domestic debt increased to N477 billion. However, from 1996 to 1997, external debt stock reduced drastically to N595 billion while, domestic debt stock further increased to N501 billion. On the other hand, the value of GDP per capita from 1996 to 1997 kept rising to N0.36 billion (DMO, 2005). At this period, there was obviously a reduction in the external debt which showed that the available resources at that time were judiciously managed by the government and which focused more on domestic borrowings.

Moreover, from 1997 to 1997, the GDP per capita reduced to N0.039 billion leaving the external debt stock to rise at N2577 billion, and the domestic debt stock to rise at N709 billion. From 1999 to 2004, as the GDP per capita increased to N0.083 billion, the external debt stock rose further to N4890 billion while, domestic debt rose to N1370 billion (DMO, 2005). At this point, as the GDP per capita in the economy kept increasing, the external debt also increased at a higher rate than the domesticp debt. This made debt servicing difficult for the government due to its high service obligations, hence managing and controlling external debt was unsustainable. According to Matthew and Mordecai (2016), this resulted the government to cancel debt negotiations with the Paris Club Creditor nation. As a result, the government was able to procure debt relief of $18 billion in 2005, which brought the country's external debt stock level to N431 billion in 2007 (DMO, 2006).

However, according to CBN (2017) in 2007, the GDP per capita had an increase in its value of N0.14 billion. And as a result of the reduction in external debt, the government focused more domestic borrowing leading the domestic debt level to peak at N2169 billion at the end of 2007. While, from 2008 to 2015, the external debt stock increased from N523 billion to N1631 billion, while domestic debt stock increased from N3228 billion to N7904 billion. As a result, the GDP per capita increased from N0.16 billion in 2008 to N0.498 billion in 2015. From 2015 to 2017, Nigeria's external debt rose to N5.78 trillion while, domestic debt rose to N15.93 trillion bringing the total debt stock of the country to N21.72 trillion (DMO, 2017).

Fundamentally, the high debt profile of the Nigerian economy came as a result of the mono-cultural nature of the economy and the volatile nature of international oil market prices, which led the economy to unfavourable balance of payments, low per capita income, persistent fiscal deficits, unemployment, vast poverty, and low productivity (Igberi, Odo, Anoke & Nwachukwu, 2016). It is on this note that; this study therefore examines the impact of public debt on economic development in Nigeria with particular interest on determining whether or not the external debt stock or domestic debt stock is necessary for the development of the Nigerian economy.

2. Literature Review

Theoretical Framework

This study was anchored on the Keynesian Theory of Public Debt. The Keynesian theory of public debt as postulated by John M. Keynes (1936) stated that a large amount of public debt is a national asset rather than a liability and that continuous deficit spending is essential to national economic development.

Keynes (1936) held the views that increase in public debt through the multiple effects would raise the national income of a country. He linked public borrowing with deficit financing and authorized government to borrow for all purposes so that effective demand in the economy is increased resulting in increased employment and output. Keynes borrowing for consumption was as desirable as borrowing for investment in productive goods because consumption expenditure induced investment to rise.

For the purpose of this study, the Keynesian national income model was modified as depicted in Equation [1]:

$Y = C + I + G + (X - M)$----------2.1

Where *Y* represents national income (proxied with GDP per capita income);

C = represents private consumption;
I = represent private investment;
G = represents government expenditure;
(X – M) represents net exports.

Empirical Review

In this section, various empirical works were reviewed on the analysis carried out between public debt and economic growth, as well as its level of development in Nigeria. It consists of economies outside Nigeria, various methodologies, period of study, and the outcomes.

Egbetunde (2012) examined the causal nexus between public debt and economic growth in Nigeria between 1970 and 2010 using a Vector Autoregressive (VAR) estimation technique. The time series data conducted for the study were obtained from Central Bank of Nigeria Statistical Bulletin (2010). The findings of the study revealed that there is a bi-conditional causality between public debt and economic growth in Nigeria.

Ekperiware and Oladeji (2012) examined the effect of external debt relief on economic growth in Nigeria using regression technique on quarterly time series of external debt, external debt service and real gross domestic product. The quarterly time series data were sourced from CBN statistical bulletin (2006) which was analyzed for the period between 1975 to 2005. Applying Chow-test to the regression analysis, the result revealed that there was a structural break in the relationship between economic growth and external debt in Nigeria.

Jadoon, Batool and Mehmood (2014) conducted to discover the impact of foreign debt servicing on per capita income growth rate of Pakistan for the period 1981 to 2010, by applying the autoregressive distributed lag (ARDL) estimation technique. The time series data for the study were generated from World Development Indicators (2010). The results confirmed that foreign debt servicing had adverse and significant impact on per capita income growth rate in Pakistan in both short-run and long-run period.

Bassey, Oparah and Ndiyo (2014) empirically analyze the relationship between public debt and inclusive economic growth in Cross River State, Nigeria. The study adopted the primary type of data analysis which was descriptive in nature using tabular and graphical methods. Secondary data were sourced from the Cross River State statistical bulletin and National Bureau of Statistics (NBS). The study revealed that the Cross River State government has undertaken lots of people oriented projects from money raised by borrowing indicating that public debt has enabled government to undertake programmes that were beneficial to the poor thereby influencing inclusive economic growth.

Hassan, Sule and Abu (2015) employed the ordinary least square (OLS) estimation technique to examine the effect of government debt on economic growth in Nigeria from 1986 to 2013. The annual time series data for analysis were sourced from CBN statistical bulletin (2015). Their study

showed that there was no significant positive impact of government debt on economic growth in Nigeria.

Essien, Agboegbulem, Mba and Onumonu (2016) employed the vector autoregressive (VAR) and granger causality test estimation techniques to examine the impact of public sector borrowings on prices, interest rates, and output in Nigeria. The time series data for the study were sourced from CBN statistical bulletin (2015) which was analyzed for the period between 1970 and 2014. The findings of the study revealed that shock to external debt increases prime lending rate, but with a lag. Hence, the study concluded that external and domestic debt had no significant impact on the general price level and output in Nigeria.

Saifuddin (2016) employed the two-stage least square (TSLS) to examine how public debt can influence economic growth in Bangladesh within a period of 1974 to 2014. The time series data of the study were sourced from World Development Indicators database, Economic Relation Division of Bangladesh, Bangladesh Economic Review, and Economic Trend of Bangladesh Bank. The result of the study revealed public debt is positively related to both investment and economic growth. It also revealed that public debt had an indirect positive effect on growth through its positive influence on investment.

Bakare, Ogunlana, Adeleye and Mudasiru (2016) employed the ordinary least square (OLS) regression technique to establish the extent to which domestic debt empirically impact on economic growth in Nigeria between 1981 to 2012. The data used for its estimated were sourced from CBN statistical bulletins (2012), Debt Management Office (DMO), and National Bureau of Statistics (NBS). As a result, the study discovered a positive relationship between domestic debt and economic growth. This implies that increasing domestic debt (up to a certain level) would increase economic growth, provided proceeds from domestic debts are channeled into productive sectors of the economy.

Oloruntoba, Olusegun and Olusola (2016) employed the ordinary least square (OLS) and co-integration techniques to examine the effect of public debt on economic growth in Nigeria between 1970 and 2011. The time series data were sourced from CBN statistical bulletin (2011) and World Development Indicator (WDI). The results of the study revealed that there exist no long-run relationship between public debt and economic growth in Nigeria. It further revealed a positive but non-significant relationship between per capita domestic public debt and economic growth, while a negative and non-significant relationship was found to exist between per capita external public debt and economic growth.

Senibi, Oduntan, Uzoma, Senibi and Oluwaseun (2016) assessed the impact of public debt on external reserve in Nigeria between 1981 and 2013. The time series data were sourced from CBN statistical bulletin (2013) and analyzed using the Johansen co-integration estimation technique. The result of the study revealed that public debt had a positive and significant effect on external reserve stock in the long-run.

Okwu, Obiwuru, Obiakor and Oluwalaiye (2016) employed the multiple regression analysis technique to examine the effects of domestic debt on economic growth in Nigeria during the 1980-2015 periods. The time series data were sourced from CBN statistical bulletin (2015) and National Bureau of Statistics (NBS). The findings of the study revealed that domestic debt stock had a significant short and long-run positive effect on economic growth, while domestic debt servicing expenditure had a negative effect on economic growth in Nigeria.

Jibir, Abdullahi, Abdu and Ibrahim (2017) employed the autoregressive distributive lag (ARDL) econometric technique to analyze the external debt-growth nexus in Nigeria. The time series data for the study were sourced from CBN statistical bulletin (2016) and World Bank (2016) which spanned between 1981 and 2016. The results of the study revealed that external debt was

negatively related with economic growth in both short and long-runs.

From the empirical review, studies like Saifuddin (2016) and Jadoon *et al* (2014) were not focused on the Nigerian economy. It was also discovered from the research work conducted by Egbetunde (2012), Bakare *et al* (2016), Oloruntoba *et al* (2016), Senibi *et al* (2016), Okwu *et al* (2016), Bassey *et al* (2014), Jibir *et al* (2017), Essien *et al* (2016), Ekperiware & Oladeji (2012), and Hassan *et al* (2015) that there was more emphasis made on the relationship between domestic debt, external debt and economic growth, without capturing its impact analysis on the development of the Nigerian economy. In addition, the period of previous studies did not cover the SAP period of 1986 and was not extended to the year 2017.

To overcome the aforementioned limitations on the empirical analysis of public debt, the study therefore adopts the Vector Error Correction Model (VECM) estimation technique and annual time series data to examine the impact, long-run relationship, and direction of causation between the components of public debt and economic development in Nigeria. Other explanatory variables include government investment, GDP per capita income and interest rate. The annual time series data were analyzed spanning for 31 years, from the SAP period of 1986 to 2017.

3. Methodology

The data utilized for the study consists of annual observations sourced from CBN statistical bulletin (2017) and World Bank Indicators, which adopts the Vector Error Correction Model (VECM) to examine the impact of public debt (domestic and external debt) on economic development in Nigeria. In the course of examining the impact of public debt on economic development in Nigeria, secondary data adopted for the analysis covered the period of 31 years (1986-2017). In achieving the analysis of the study, the E-views econometric software version 10.0 was adopted.

Model Specification

In order to examine the impact of public debt on the economic development in Nigeria, the Keynesian national income model in Equation [3.1] was adopted which was modified by Favour, Idenyi, Oge and Charity (2017). For the purpose of this study, Equation [1] is transformed to obtain Equation [2] where public debt is disaggregated into domestic debt and external debt. The implicit form of the model is presented in Equation [2] as thus:

$GDPPC = f(DDS, EDS, GDI, INT)$----3.1

Where *GDPPC* is Gross Domestic Product Per Capita Income (proxied for economic development); *DDS* is Domestic Debt Stock; *EDS* is External Domestic Stock; *GDI* is Government Investment; and *INT* is Interest Rate.

The implicit function in Equation [2] can be reduced to a linear functional form as in Equation [3.1]:

$GDPPC = a_0 + a_1DDS + a_2EDS + a_3GDI + a_4INT + u$----------3.2

Where a_0 is the intercept; a_1a_2, a_3 and a_4 are the coefficients of all the explanatory variables; and u is the error term. The a priori expectation are, :a_1a_2, $a_3 > 0$; $a_4 < 0$.

Estimation Procedure

To ensure that the outcome of the regression is not spurious, the annual time series data was subjected to stationary test using the Augmented Dickey-Fuller test. The Lag Order Selection test is carried out to determine the optimal lag order in constructing the VECM estimates. In addition, the Johansen Co-integration test was used to ascertain the long-run relationship between the variables in the model of the study. Lastly, to ensure there is no presence of autocorrelation in the VECM model, the study employed the Breusch-Godfrey serial correlation LM test.

4. Discussion of Results

Unit Root Test Result

The Augmented Dickey-Fuller unit root test result presented on Appendix 2, shows that all time series data except Domestic Debt

Stock (DDS) were stationary at first difference. While, DDS became stationary at level with a 5% critical level.

VECM Lag Length Result

The lag length selection criterion to determine the optimal lag structure to employ in carrying out the VECM analysis is presented on Appendix 3. The result shows that the study uses the Lag Length Criterion based on the Schwarz Information Criterion (SC) to select 2 lags for estimating the VECM and Johansen co-integration test.

Co-Integration Test Result

The Johansen Co-integration test result is presented on Appendix 4 which is used to determine the existence of long-run relationship in the model as speculated in the third objective of this study. The result on Appendix 4 reveals that trace test statistics has 5 co-integrating equation(s) at 5% level, while the max-eigen value statistics reveals 4 co-integrating equation(s) at 5% level. This result indicates the presence of long-run relationship among the variables. Thus, we reject the null hypothesis and accept the alternative that there exist a long-run relationship between public debt and economic development in Nigeria.

Vector Error Correction Model (VECM) Result

The result of the VECM estimate is presented on Appendix 5. From Appendix 5, the coefficient of error correction estimate (ECM) was -0.417108 and has a negative sign. This indicates that the variables are significant at 5% level. The result which shows the speed of adjustment revealed that deviation from equilibrium is corrected 41% annually in economic development in Nigeria. The negative and significance of the ECM coefficient confirms the existence of a long-run stable equilibrium relationship in the model.

The result of the analysis on Appendix 5 shows that the VECM coefficient of the past value of Domestic Debt Stock in period one (DDS (-1)) positively impacted on economic development in Nigeria. This conforms to apriori expectation. In period two, the VECM coefficient of the past value of Domestic Debt Stock (DDS (-2)) negatively impacted on economic development in Nigeria. However, this did not conform to apriori expectation. Therefore, from the result, a unit change in past value of Domestic Debt Stock in period one (DDS (-1)) will result in 0.981units change in current value of economic development (GDPPC). While, a unit change in past value of Domestic Debt Stock in period two (DDS (-2)) will result in 1.530units reduction in current value of economic development (GDPPC). The result also shows that the impact in period one (DDS (-1)) was statistically significant at 5% level given the probability value of 0.0000. While in period two (DDS (-2)), the impact was statistically significant at 5% level given the probability value of 0.0002.

The VECM coefficients of External Debt Stock in period one (EDS (-1)) and period two (EDS (-2)) positively impacted on economic development in Nigeria. This conforms to apriori expectation. Therefore, a unit change in past values of External Debt Stock (EDS (-1)) and (EDS(-2)) will result in 0.0204units and 0.089units change in current value of economic development (GDPPC) respectively. The result shows that the impact in period one (EDS (-1)) and period two (EDS(-2)) were statistically significant at 10% level given the probability values of 0.6797 and 0.0858 respectively.

The VECM coefficients of Government Investment in period one (GDI (-1)) and period two (GDI (-2)) positively impacted on economic development in Nigeria. This conforms to apriori expectation. Therefore, a unit change in past values of Government Investment (GDI (-1)) and (GDI(-2)) will result in 0.104units and 0.154units change in current value of economic development (GDPPC) respectively. The result shows that the impact in period one (GDI (-1)) and period two (GDI (-2)) were statistically significant at 5% level given the probability values of 0.0045 and 0.0000 respectively.

The VECM coefficients of Interest Rate in period one (INT (-1)) and period two (INT(-2)) negatively impacted on economic development in Nigeria. This conforms to apriori expectation. Therefore, a unit change in past values of Interest Rate (INT (-1)) and (INT (-2)) will result in 12.43units and 7.830units reduction in current value of economic development (GDPPC) respectively. The result shows that the impact in period one (INT (-1)) was statistically significant at 10% level given the probability value of 0.0839. While, the impact in period two (INT(-2)) was statistically significant at 5% level given the probability value of 0.2090.

The overall goodness of fit of the VECM model is indicated by the R-squared coefficient of determination. The value of the R-squared statistics for the VECM model on Appendix 5 is 0.854. this indicate that about 86% of the variation experienced in GDPPC (economic development) in Nigeria for the period of 1986 to 2017 in explained by the explanatory variables included in the model.

Since the critical value of the F-statistic is 9.07 and is greater that its tabulated value of 0.000041; it then indicates that the explanatory variables have a significant impact on economic development (GDPPC) in Nigeria. The Durbin-Watson statistic value of 2.80 indicates the absence of serial correlation in the VECM model.

Policy Implications

The study sought out to examine the impact of public debt on economic development in Nigeria, and its long-run relationship from 1986 to 2017. In achieving this, the study adopted the Vector Error Correction Model (VECM) estimation technique and the Johansen Co-integration test to determine the impact of the variables on economic development and its long-run relationship respectively.

Based on the objectives of the study, the VECM results showed that in the short-run, Domestic Debt Stock (DDS) had a positive impact on economic development in Nigeria. While in the long-run, Domestic Debt Stock had a negative impact on economic development in Nigeria. This is implicative of the fact that increasing domestic debt would lead to a decrease in the level of GDP per capita income (economic development), provided the benefits of domestic debts are not skewed towards the productive sectors of the economy, which will create great consequence on the living standard and welfare of the people in Nigeria.

The findings of the study also revealed that external debt impacted positively on economic development in Nigeria. As a result, an increase in the amount of external debt stock would increase the level of GDP per capita income (economic development). This implies that external debt stock compared to domestic debt contributes largely to economic development in Nigeria.

5. Conclusion and Recommendations

The study examined the impact of Public debt on economic development in Nigeria from 1986 to 2017. The Vector Error Correction Model (VECM) estimation technique and Johansen Co-integration test were employed to achieve the objectives of the study. The results of the analysis showed that Domestic Debt had a positive impact on economic development in the short-run, while in the long-run, domestic debt impacted negatively on economic development in Nigeria. The results also revealed that external debt tend to contribute largely to economic development compared to domestic debt in Nigeria. Therefore, it was revealed that most of the benefits of domestic debts are not invested or skewed to the productive sectors of the economy, as domestic debt had a negative impact on the economy. However, it is believed that if these implications and challenges are checkmated and tackled accordingly, the public debt would be adequately managed to promote economic development in Nigeria.

Based on the findings and policy implications of the study, the following recommendations are proffered;

In order to correct the fact that proceeds from domestic debts are not skewed to the

productive sectors of the economy, policy makers like the Debt Management Office (DMO) should be seen to support the government in financing infrastructural development in production sectors and other priority areas of the economy, thereby promoting increase in the volume of commodities export which will boost earnings from foreign exchange, and help reduce fiscal deficit in the Nigerian economy.

In order to create a sustainable economic development, employment, reducing poverty, and increasing the standard of living of Nigerians, the government should carve out new initiatives aimed at developing debt management strategy that would ensure that in the face of macroeconomic and other financial constraints, the cost and risk profile of the public debt portfolio remains within acceptable limits over time.

In addition, the Debt Management Office (DMO) should carve out better and sustainable debt management strategy other than the SAP-induced strategies of 1986 which has contributed to the persistent absolute poverty and low standard of living in the country. Hence, new debt management strategy should contain guidelines and policies that will encourage export promotion and import substitution, as this would lead to increase in productivity level and promoting foreign exchange earnings. This would aid in reducing the debt burden in the Nigerian economy.

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APPENDICES

Appendix 2:*ADF Unit Root Test Result*

Variables	ADF Statistics	Critical value at 5% level	Order of Integration	Remark
GDPPC	-4.793456	-3.603202	1(1)	Stationary
DDS	8.208658	-3.603202	1(0)	Stationary
EDS	-3.717349	-3.568379	1(1)	Stationary
GDI	7.079503	-3.612199	1(1)	Stationary
INF	-4.120411	-3.562882	1(1)	Stationary

Source: Researcher's computation (2018) using Eviews 10.0

Appendix 3: *Lag Length Selection Test*

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1110.604	NA	1.37e+26	74.37361	74.60715	74.44832
1	-985.7952	199.6944	1.82e+23	67.71968	69.12088	68.16793
2	-928.4150	72.68153*	2.44e+22*	65.56100*	68.12986*	66.38280*

** indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion*

Appendix 4: *The Johansen Co-Integration Test Result*

Hypothesized No. of CE(s)	Trace Statistic	5 Percent Critical Value	Hypothesized No. of CE(s)	Max-Eigen Statistic	5 Percent Critical Value
None *	202.0658	69.81889	None *	107.8990	33.87687
At most 1 *	94.16677	47.85613	At most 1 *	51.30483	27.58434
At most 2 *	42.86193	29.79707	At most 2	20.25452	21.13162
At most 3 *	22.60742	15.49471	At most 3 *	17.83129	14.26460
At most 4 *	4.776122	3.841466	At most 4 *	4.776122	3.841466

**(**) denotes rejection of the hypothesis at the 5%(1%) level*
Source: Researcher's computation (2018) using Eviews 10.0.

Appendix 5: *Vector Error Correction Model (VECM)Result*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	175.4583	77.34328	2.268566	0.0366
D(GDPPC(-1))	-0.138136	0.172904	-0.798917	0.4354
D(GDPPC(-2))	0.499756	0.198140	2.522230	0.0219
D(DDS(-1))	0.981130	0.132386	7.411117	0.0000*
D(DDS(-2))	-1.530290	0.324373	-4.717688	0.0002*
D(EDS(-1))	0.020469	0.048723	0.420103	0.6797**
D(EDS(-2))	0.086095	0.047205	1.823850	0.0858**
D(GDI(-1))	0.104322	0.031851	3.275338	0.0045*
D(GDI(-2))	0.154345	0.028688	5.380123	0.0000*
D(INT(-1))	-12.43328	6.771007	-1.836253	0.0839**
D(INT(-2))	-7.830699	5.996577	-1.305861	0.2090*
ECM(-1)	-0.417108	0.173145	-2.409008	0.0276*