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ABSTRACT

The study analyzed the impact of external debt on Nigeria's agricultural production from 1980 to 2016 using secondary data obtained from Central Bank of Nigeria (CBN) statistical bulletin and the World Development Indicators (WDI). Augmented Dickey-Fuller unit root test and the autoregressive distributed lag (ARDL) bound testing approach to co-integration were utilized, to achieve the objectives of the study. Empirical results revealed that the variables were cointegrated, indicating that they exhibited long run relationship, both in the short and the long run. External debt stock (EDS) had a significant positive impact on agricultural production (AGP), indicating that EDS positively impacted agricultural growth. i.e. higher EDS accelerated agricultural growth in the long run. To be precise, a 1 % increase in EDS led to 0.96 % increase in AGP. The remaining variables indicated negative and significant relationships with AGP. The findings further showed that there was no positive impact of EDSP on agricultural production in Nigeria. Government should aggressively pursue the process of diversification of the economy through agricultural production. There is the need to diversify the source of external debt service especially to the non-oil sectors such as agriculture, mines, industry and manufacturing, to reduce the burden and the negative consequences of over dependence on foreign exchange from oil and the volatility in its price on Nigerians.

Key Words: *External debt stock, ARDL bound testing approach, lag length selection, long-run coefficients, error correction term.*

1.0 INTRODUCTION

No government is an island. It would require some form of external support to perform effectively. One major source of external support is foreign borrowing. The motive behind external debt is that countries, especially developing economies, lack sufficient internal financial resources and this activates the need for foreign aid. It is generally the case that developing countries facing a scarcity of capital require external loans to supplement domestic saving. To meet national wants amidst limited resources, nations might resort to borrowing. Borrowing creates debt (Olukunmi, 2007) Debt could be from within a nation's boarder (Internal) or from outside (external). External debt may be defined as debt owed to non-residents and repayable in terms of foreign currency, food or service (World Bank, 2004).

The origin of Nigeria's external debt can be traced to 1958 when US$28 million was contracted from the World Bank for railway construction. Between 1958 and 1977, the need for external debt was on the low side. However, due to the fall in oil prices in 1978 which exerted a negative influence on government finances, it became necessary to borrow to finance projects and correct balance of payment difficulties. The first major borrowing of US$1billion, referred to as Jumbo loan, was contracted from the international capital market (ICM) in 1978, increasing the country's total external debt to US$2.2 billion (Adesola, 2009). The spate of borrowing increased thereafter with the entry of the state governments into external loan contractual obligations. According to the Debt Management Office (DMO 2003), Nigeria's external debt outstanding stood at ₦17.3 billion. In 1986, Nigeria had to adopt a World Bank/International Monetary Fund (IMF) sponsored Structural Adjustment Programme (SAP), with a view to revamping the economy, making the country better-able to service her debt (Ayadi and Ayadi, 2008).

External borrowing has a significant impact on the agricultural growth of a nation up to a point where

high levels of external debt servicing sets in and affects the growth as the focus moves from financing private investment to repayments of debts. Pattilo, Poirson and Ricci (2002) assert that, at low levels, debt has positive effects on agricultural growth. But, above particular points or thresholds, accumulated debt begins to have a negative impact on growth. Furthermore, Fosu (2009) observed that high debt service payments shift spending away from health, educational and social sectors. This obscures the motive behind external borrowing, which is to boost growth and development, rather than to get drowned in a pool of debt service payments which drains national resources due to high interest payments, thereby hindering growth. Gohar and Butt (2012) opine that accumulated debt service payments create a lot of problems for especially the developing nations, because debt is serviced for more than the amount it was acquired and this could slows down economic growth in such nations.

Prior to the discovery of oil in commercial quantity in the years immediately before and after independence, agriculture was the backbone of the economy, contributing about 60 - 65% of GDP. Although its contribution had reduced to 20%, 21%, 36%, 24% and 21%, in 1980, 1990, 2000, 2010 and 2016, respectively, it is the single most important sector in Nigeria, and indeed in some other African countries, providing livelihoods for at least 53 percent of the economically-active labour force (Akpaeti et al, 2014). There have been arguments on whether external debt is a veritable instrument for promoting agricultural growth in debtor nations. Empirical findings in this area have been mixed. This research, therefore, seeks to determine the effect of external debt on agricultural growth in Nigeria.

The main objective of the study is to determine whether external debt has significant relationship with agricultural growth in Nigeria, while the specific objective is to establish the effect of external debt servicing and exchange rate on agricultural growth in Nigeria.

2.0 LITERATURE REVIEW

2.1 CONCEPT OF EXTERNAL DEBT

The act of borrowing creates debt, and this debt may be domestic or external. According to the World Bank (2004), external debt is defined as a debt owed to non-residents repayable in terms of foreign currency, food or service. External debt describes the financial obligation that ties one party (debtor country) to another (lender country). It usually refers to incurred debt that is payable in currencies other than that of the debtor country. Arnone, Bandiera and Presbitero (2005) describe external debt as that part of a country's debt borrowed from foreign lenders including commercial banks, governments or international financial institutions. Ogbeifun (2007) asserts that external debt arises as a result of the gap between domestic savings and investment. As the gap widens, debt accumulates and this makes the country to continually borrow increasing amounts to stay afloat.

Debt crisis occurs when a country has accumulated a huge amount of debt such that it can no longer effectively manage the debt, leading to several crises in the domestic political economy (Adejuwon *et al., 2010*). Mimiko (1997) defines debt crisis as a situation whereby a nation is severely indebted to external sources and is unable to repay the principal of the debt. Likita (2000) defines it as a contractual obligation of owing or accumulated borrowing with a promise to payback at a future date. The Debt Management Office of Nigeria (DMO 2012) highlighted the factors that led to Nigeria's external debt burden to include inefficient trade and exchange rate policies, adverse exchange rate movements, adverse interest rate movements, poor lending and inefficient loan utilization, poor debt management practices and accumulation of arrears and penalties. The effect of external debt on a nation's economy has been a subject of controversy among academics; were of the view that external debt accelerates economic growth (Hameed, Ashraf and Chandhary, 2008).

2.2 CONCEPT OF AGRICULTURAL GROWTH

Agriculture encompasses all aspects of production including horticulture, livestock rearing, fisheries; forestry, etc. It is defined as an art, science and business of producing crops and livestock for economic purposes. Agriculture may also be defined as the biological exploitation of soil for production but, in a broad sense, agriculture is the branch of applied science which deals with production, improvement, protection, processing, marketing, extension, etc. of crops, livestock and fishery, by proper utilization of natural resources. The natural resources are soil, sunlight, air, water, temperature etc.

Growth in agricultural output can fuel growth in the non-agricultural economy through a variety of mechanisms, some directly and others indirectly. Promoting agricultural growth of the rural economy may lead to sustainable increase in employment in rural areas, reducing regional income disparities, stemming pre-mature rural-urban migration, and ultimately, reducing poverty at its very source (Anríquez and Stamoulis, 2007). Agriculture is critical to achieving global poverty reduction targets and it is still the single most important productive sector in low

income countries, often in terms of its share of gross domestic product and almost always in terms of the number of people it employs (IDA, 2009). With 75% of the world's poor population in rural areas and most of them dependent on farming, agriculture must be part of the world economic growth, poverty reduction, and environmental sustainability strategy (UNDP, 2012). In countries where the share of agriculture in employment is large, broad-based growth in agricultural incomes is essential to stimulate growth in the economy. Hence, the ability of agriculture to generate overall GDP growth and its comparative advantage in reducing poverty will vary from country to country (FAO, 2012). The majority of the poor and food insecure populace in Africa live in rural areas, and most of them depend on agriculture for their livelihoods. To support broad-based poverty reduction and food security in Africa, smallholder agriculture must be a central investment focus (Garvelink et al., 2012). The potential of agriculture to generate a more pro-poor growth process depends on the creation of new market opportunities that mostly benefit the rural poor (Hanjra and Culas, 2011).

Despite the myriads of existing literature on the nexus between agriculture and economic growth across the globe and, in particular, Sub-Saharan Africa, there exists mixed empirical result on the relationship between agriculture and economic growth in Nigeria, it is imperative to add value to the existing literature by extending study period and adding other variables in the study. In spite of many years of neglect, the agricultural sector remains significant and, without its sustained development, Nigeria's growth and development aspiration will continue to be a mirage. Therefore, it is important to examine the impact of external debt on agricultural sector in Nigeria.

2.3 THEORETICAL FRAMEWORK

2.3.1 SOLOW GROWTH MODEL AND EXTERNAL DEBT

The Solow growth model is built on a closed economy which makes use of labour and capital as its means of production. Under this scenario, the implication of external debt on growth can be seen through its effect on the domestic saving which, in turn, is used for investment, in a closed model. The general effect of external debt on the Solow growth model can be analyzed by looking at the individual effects of the debt overhang and debt crowding out theories on the model.

According to the debt overhang hypothesis, the government, in an attempt to amortize the accumulated debt, will increase tax rate on the private sector (as means of transferring resources to the public sector). This will discourage private sector investment and reduce government expenditure on infrastructure as the resources are used to pay up huge debt service payments instead of being put into other use. This will lead to a reduction of total (private and public) investment in the economy and a shift downward of both the investment and production function curves in the Solow growth model.

In the case of debt crowding out effect, on the other hand, governments, in a bid to clear their outstanding debts, use their revenue from export earnings and in some cases transfer resources, including foreign aid and foreign exchange resources, to service their forthcoming debt. Those countries that transfer revenue from export earnings which can be used in investment in the economy to avoid huge debt payments will discourage public investment. This, in turn, will decrease economic growth and will shift both the investment and production function curves in the Solow growth model downward (Dereje, 2013).

2.3.3 THE DEPENDENCY THEORY

Momoh and Hundeyin, 1999) see the under-development and dependency of the third world countries as being internally inflicted rather than externally afflicted. To this school of thought, a way out of the problem is for third world countries to seek foreign assistance in terms of aid, loan, investment, etc, and allow undisrupted operations of the Multinational Corporations (MNCs). Due to the underdeveloped nature of most Least Developed Countries (LDCs), they are dependent on the developed nations for virtually everything including technology, aid, technical assistance, etc. This theory is based on the assumption that resources flow from a "periphery" of poor and underdeveloped states to a "core" of wealthy states thereby enriching the latter at the expense of the former. The phenomenon associated with the dependency theory is that poor states are impoverished while rich ones are enriched by the way poor states are integrated into the world system (Todaro, 2003; Amin, 1976). The theory indicates that the poverty of the countries in the periphery is not because they are not integrated or fully integrated into the world system as is often argued by free market economists, but because of how they are integrated into the system.

From this standpoint, a common school of thought is the bourgeoisie scholars who to them, the state of underdevelopment and the constant dependence of less developed countries on developed countries are a result of their domestic mishaps. They believe that this issue can be explained by their lack of close integration, diffusion of capital, low level of technology, poor institutional framework, bad leadership, corruption, mismanagement, etc. The dependent position of most underdeveloped

countries has made them vulnerable to the products of the western metropolitan countries and Breton Woods institutions (Ajayi, 2000).

2.4 REVIEW OF EMPIRICAL STUDIES

Mohammed, (2005) investigated the impact of external debt on agricultural growth of Sudan for a period spanning 1978 – 2001. The study showed that export earnings had a significant positive impact while external debt and inflation had negative impact on Sudan's agricultural growth.

Ayadi and Ayadi (2008) examined the impact of the huge external debt, with its servicing requirements, on agricultural growth of the Nigerian and South African economies. Neoclassical growth model which incorporates external debt, debt indicators, and some macroeconomic variables, was employed and analyzed using both Ordinary Least Square (OLS) and Generalized Least Square (GLS) techniques of estimation. Results revealed that debt and its servicing requirement has a negative impact on the agricultural growth of Nigeria and South Africa.

Hameed *et al*. (2008) analyzed the long run and short run relationships between external debt and agricultural growth in Pakistan. Annual time series data from 1970 to 2003 was examined to determine the dynamic effect of GDP, debt service, capital stock and labour force on the country's agricultural growth. The study concluded that debt servicing burden had a negative effect on the productivity of labor and capital, thereby adversely affecting agricultural growth.

Malik, Hayat, and Hayat (2010) explored the relationship between external debt and agricultural growth in Pakistan for the period 1972 – 2005, using time series econometric technique. The study showed that external debt was negatively and significantly related to agricultural growth and suggested that an increase in external debt will lead to a decline in agricultural growth.

Ogunmuyiwa (2011) examined whether external debt promotes agricultural growth in Nigeria, using time series data from 1970-2007. Results revealed that causality does not exist between external debt and agricultural growth in Nigeria.

Wamboye (2012) evaluated the impact of external debt on long term agricultural growth of fourteen (14) LDCs using unbalanced panel data from 1975 – 2010. Findings indicated that high external debt depressed agricultural growth, regardless of the nature of the debt. In addition, debt relief initiatives were crucial as evidenced in the lower negative debt effects on growth in HIPCs sub sample relative to non HIPCs.

3.0 RESEARCH METHODOLOGY

3.1 DATA AND DATA SOURCE

This research utilized secondary data obtained from Central Bank of Nigeria (CBN) statistical bulletin and World Development Indicators database covering the period 1980 -2016 which formed the basis for analysis. To examine the impact of external debt on agricultural growth in Nigeria, external debt stock (EDS), external debt service payments (EDSP), official exchange rate (EXR) and inflation rate (INFR); proxies for external debt, were the explanatory variables while agricultural production as percentage of GDP i.e. Agricultural GDP (AGP) was the dependent variable.

3.2 MODEL SPECIFICATION

To model the relationship between agricultural growth and external debt, a functional form model is constructed as:

$$AGP_t = f(EDS_t, EDSP_t, EXRT_t, INF_t) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Expressing the above equation in linear estimation form:

$$AGP_t = \beta_0 + \beta_1 EDS_t + \beta_2 EDSP_t + \beta_3 EXCR_t + \beta_4 INF_t + \mu_t \ldots\ldots\ldots (2)$$

Where;

β_0 is the intercept

β_1, β_2, β_3 and β_4 are the coefficients of the explanatory variables and

μ is the stochastic error term.

Following Katircioglu, (2010), equation 2 was further converted into natural log to enable efficient estimation as shown below.

$$\ln AGP_t = \alpha + \beta_1 \ln EDS_t + \beta_2 \ln EDSP_t + \beta_3 \ln EXRT_t + \beta_4 INF_t + \mu \ldots\ldots\ldots (3)$$

Where: lnAGP, lnEDS, lnEDSP, lnEXRT and lnINF represent the natural logs of the variables while μ stands for error term in the long term growth model.

3.3 METHOD OF DATA ANALYSIS

3.3.1 UNIT ROOT TEST

To determine the order of integration of the variables of study, i.e. to check for the presence of unit root in the variables, the Augmented Dickey Fuller (ADF) technique was employed. The null hypothesis is that there is no unit root and the rule is that if the ADF test statistic is greater than the 1%, 5% and 10% critical values, we accept the null hypothesis i.e. the variable

is stationary. However, if the ADF test statistic is less than the 1%, 5% and 10% critical values, we reject the null hypothesis and go ahead to difference i.e. the variable is non-stationary.

i. Decision Rule

Ho: δ = 0, ρ = 1 (presence of unit root, the data is non-stationary)
H_1: δ < 0, ρ ≠ 1 (the data is stationary and does not need to be differenced)

ii. Unit Root Equation

The test was conducted by "augmenting" the preceding three equations by adding the lagged values of the dependent variable, Y_t. The ADF test here consists of estimating the following regression:

$$\Delta AGP_t = \beta_1 + \beta_{2t} + \delta AGP_{t-1} + \sum_{i=1}^{m} + \alpha i \Delta AGP_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots (4)$$

Where εt is a pure white noise error term, t is the time or trend variable and where $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$, $\Delta Y_{t-2} = (Y_{t-2} - Y_{t-3}$ etc. The number of lagged difference terms to include is often determined empirically, the idea being to include enough terms so that the error term in Eq. (4) is serially uncorrelated, so that we can obtain an unbiased estimate of δ, the coefficient of lagged Y_{t-1}.
The other regressors of the equation are as follows:

$$\Delta EDS_t = \beta_1 + \beta_{2t} + \delta EDS_{t-1} + \sum_{i=1}^{m} + \alpha i \Delta EDS_{t-1} + \varepsilon_t$$

$$\Delta EDSP_t = \beta_1 + \beta_{2t} + \delta EDSP_{t-1} + \sum_{i=1}^{m} + \alpha i \Delta EDSP_{t-1} + \varepsilon_t$$

$$\Delta EXRT_t = \beta_1 + \beta_{2t} + \delta EXRT_{t-1} + \sum_{i=1}^{m} + \alpha i \Delta EXRT_{t-1} + \varepsilon_t$$

$$\Delta INF_t = \beta_1 + \beta_{2t} + \delta INF_{t-1} + \sum_{i=1}^{m} + \alpha i \Delta INF_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots (5)$$

3.3.2 COINTEGRATION TEST

Cointegration test is used to check if a long run relationship exists among the variables in a model (Banerjee& Carrion-i-Silvestre, 2015) This was carried out using the autoregressive distributed lag (ARDL) bounds testing to cointegration technique.

I. Decision Rule

Ho: $a_1 = a_2 = a_3 = a_4 = a_5 = 0$ (there is no co-integration among the variables)

H_1: $a_1 \neq a_2 \neq a_3 \neq a_4 \neq a_5 \neq 0$ (there is co-integration among the variables)

If the value of the F-test statistics is below the I(0) we cannot reject Ho. However, if the F value is higher than the I(1) bound, then we reject Ho and accept the H_1, indicating that there is co-integration among the variables of study.

3.3.2.1 LAG Length for the ARDL Model

If a long-run relationship exists between the underlying variables, while the hypothesis of no long-run relations between the variables in the other equations cannot be rejected, then ARDL approach to cointegration can be applied. Finding the appropriate lag length for each of the underlying variables in the ARDL model is very important because we want to have Gaussian error terms (i.e. standard normal error terms that do not suffer from non-normality, autocorrelation, heteroskedasticity etc, etc.). To select the appropriate model of the long run underlying equation, it is necessary to determine the optimum lag length (k) by using proper model order selection criteria such as: the Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC), Hannan-Quinn Criterion (HQ) or Likelihood Ratio Criterion (LR). To use annual time series data, inclusion of time trend in the equation will produce better-approximated outcomes (Pesaran et al., 2001).The values of AIC, SBC and LP for model 4.3 are given by:

$$AICp = -n/2(1+\log 2\pi) - n/2 \log \delta 2 - P$$
$$SBCp = \log(\delta 2) + (\log n/n)\, P$$
$$HQC = \log \delta + (2 \log\log n/n)\, P$$
$$LRp,p = n(\log[\Sigma p] - \log[\hat{}\Sigma p]) \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Where δ2 is Maximum Likelihood (ML) estimator of the variance of the regression disturbances, ^Σp is the estimated sum of squared residuals, and n is the number of estimated parameters, $p = 0,1,2\ldots\ldots P$, where P is the optimum order of the model selected.

The model with the smallest AIC, SBC and HQC estimates or small standard errors and high R^2 performs relatively better. The estimates from the best performing model become the long run coefficients. It is appropriate to embark on further analysis if it is determined that there is long-run relationship between the underlying variables to avoid spurious regression.

The ARDL model was estimated with the variables in their levels (non-differenced data).

3.3.3 AUTOREGRESSIVE DISTRIBUTED LAG TEST

This study employed the Autoregressive Distributed Lag (ARDL) bounds testing approach to cointegration proposed by Pesaran, Shin and Smith (2001) to estimate the relationship between external debt and agricultural growth. The ARDL approach offers some desirable statistical advantages over other co-integration techniques. While other co-integration techniques require all the variables to be

integrated of the same order, ARDL test procedure provides valid results where the variables are integrated of different orders or are mutually cointegrated, and provides very efficient and consistent estimates in small and large sample sizes (Pesaran, Shin & Smith, 2001). This approach, therefore, becomes relevant to this study as some series are I(0) while others are I(1).

The generalized ARDL (p, q) model is specified as:

$$Y_t = \gamma_{0i} + \Sigma_{i=1}^{p}\delta_i Y_{t=l} + \Sigma^{q}_{i=0}\beta_i X_{t=l} + \mu_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots(7$$

Where **Y** is a vector and the variables in (**X**) can be purely I(0) or I(1) or cointegrated; β and δ are coefficients; γ is the constant; i=1, k; p, q are optimal lag orders; μ is a vector of error terms unobservable zero mean white noise vector process (serially uncorrelated or independent).

3.3.3.1 Cointegration model/equation.

Bounds test methodology takes its starting point in the auto-regressive distributed lag model (ARDL) of order (p, q_1, q_2, q_3, q_4) model with the five variables in this study. Hence, the ARDL model of the study takes the form:

$$\Delta \ln AGP_t = a_0 + a_1 \ln AGP_{t-i} + a_2 \ln EDS_{t-i} + a_3 \ln EDS_{t-i} + a_4 \ln EXRT + a_5 In \ln INF_{t-i} + \beta 0 + \Sigma^{p}_{t=1}\beta_1 \Delta \ln AGP_{t-i} + \Sigma^{q}_{t=1}\beta_2 \Delta \ln EDS_{t-i} + \Sigma^{q}_{t=1}\beta_3 \Delta \ln EDSP_{t-i} + \Sigma_{t=1}\beta_4 \Delta \ln EXRT_{t-i} + \Sigma_{t=1}\beta_5 \Delta In \ln INF_{t-i} + \mu \ldots\ldots\ldots (8)$$

The test involved conducting F-test for joint significance of the coefficients of lagged variables for the purpose of examining the existence of a long-run relationship among them.

3.3.3.2 Short-Run Estimation from Error Correction Model

The error correction model for the estimation of the short-run relationships is specified as; $\Delta \ln AGP_t = \beta_0 + \Sigma_{t=1}\beta_1 \Delta \ln EDS_{t-l} + \Sigma_{t=1}\beta_2 \Delta \ln EDSP_{t-l} + \Sigma_{t=1}\beta_3 \Delta \ln EXRT_{t-l} + \Sigma_{t=1}\beta_4 \Delta INF_{t-l} + kECM_{t-l} + \mu \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(10)$

Where;

$KECM_{t-1}$=residual of the long run

A negative and significant ECM_{t-1} coefficient, (*k*), implies that any short-term disequilibrium between the dependent and explanatory variables will converge back to the long-run equilibrium relationship.

3.4 STATISTICAL CRITERIA

The statistical criteria are determined by statistical theory and aimed at evaluating parameters of the model. Under the criteria, we test for the goodness of fit, the individual significance of each regressor using the t-test, and the significance of the regression model using the F-test.

3.5 ECONOMETRIC CRITERIA

The econometric criteria determine the reliability of the statistical criteria, and in particular, the standard errors of the parameter estimates. Econometric tests were used for empirical verification of the model. The tests were for autocorrelation, normality, heteroscedasticity and stability.

To validate the stability of the estimates, the CUSUM test, the histogram normality test and the Breusch-Godfrey serial correlation LM tests were applied.

4.0 DATA PRESENTATION AND ANALYSIS

4.1 UNIT ROOT RESULT

The study employed the Augmented Dickey Fuller test (ADF) unit root test to identify the order of integration of the variables under consideration. The result of the unit root test is presented in Table 4.1.

Table 4.1
Unit Root Test Result

Variables	Order of Integration	Critical Values			ADF Statistics	Prob.
		1%	5%	10%		
Δ(AGP)	I(1)	-3.639407	-2.951125	-2.614300	-6.219001	0.0000
Δ(EDS)	I(1)	-3.632900	-2.948404	-2.612674	-4.827672	0.0004
(EDSP)	I(0)	-3.636784	-2.945842	-2.611531	-4.252022	0.0019
Δ(EXRT)	I(1)	-2.632688	-1.950687	-1.611059	-4.068291	0.0002
Δ(INF)	I(1)	-2.632688	-1.950687	-1.611059	-6.119881	0.0000

Source: (Author's computation using E-views 9

1. Δ=Difference operator 2. I(d)=Number of times of integration
3. Level=10%, 5%, 1% levels of significance

Result of the unit root test shows that external debt service payment (EDSP) was integrated of order zero i.e. I(0), whereas, other variables were stationary at first difference i.e. I(1). The mixture of order of integration among the series validates ARDL approach to co-integration as more appropriate to be applied for the study.

To test for co-integration, it is also paramount to determine the optimal lag. The lag is selected rightly such that the error terms in the equation are not serially correlated. Result of the optimal lag selection criteria is presented on table 4.2.1

Table 4.2.1
Optimal Lag Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	6.926172	NA	0.052221	-0.116738	0.110006	-0.040445
1	17.32421	17.01498	0.029596	-0.686316	-0.414224	-0.594765*
2	17.59054	0.419659	0.031018	-0.641851	-0.324410	-0.535041
3	19.63727	3.101118	0.029208	-0.705289	-0.342500	-0.583222
4	19.85942	0.323121*	0.030750*	-0.658147*	-0.250008*	-0.520821

Note: *indicates lag order selected by the criterion

From table 4.2.1, the LR, FPE, AIC and the SC showed that the optimum lag is lag 4. Result of the bound test approach to cointegration is presented on table 4.2.2

Table 4.2.2
Bound Test Cointegration Result

Model	F-statistics	Lag	Level of significant	Bound test critical values(constant level)	
				I(0)	I(1)
F(lnAGP,lnEDS,inEDSP,lnEXRT,lnINF)	6.247149	4	10%	2.45	3.52
			5%	2.86	4.01
			2.5%	3.25	4.49
			1%	3.74	5.06

Source: (Author's computation using E-views 9)

Cointegration test result on table 4.2.2 reveals that there exists long run relationship among the variables of study as the calculated F-statistics (6.247147) is greater than the upper bound critical value at all significance levels, thereby indicating that, we can safely reject the null hypothesis of no cointegration among AGP, EDS, EDSP, EXRT, and INF. Result of the estimated long run coefficients is presented on table 4.3.1

Having found a long run relationship between our series, we estimated the long run model (Eq.9) to obtain the long run coefficients whose results are presented on Table 4.3.

Table 4.3.1
Estimated Long Run Coefficient Results

Dependent Variable, AGP				
Regressors	Coefficient	Std. Error	t-Statistic	Prob.
LEDS	0.962132	0.255202	3.770085	0.0017
LEDSP	-0.199860	0.160386	-1.246122	0.2307
LEXRT	-0.224536	0.055938	-4.014007	0.0010
LINF	-0.537291	0.162595	-3.304470	0.0045
C	-12.886092	5.021978	-2.565940	0.0207

Source: (Authors computation using E-views 9)

The results denote that external debt stock (EDS) coefficient is positive and statistically significant at 5 % indicating that (EDS) has significant positive impact on agricultural growth. i.e. a unit increase in (EDS) leads to 0.96 % increase in agricultural growth hence, higher (EDS) accelerates agricultural growth in the long run. External debt service payment (EDSP), on the other hand, has been found to have negative and insignificant impact on agricultural production in the long run, which implies that (EDSP) does not significantly determine agricultural growth in the long run. The results further indicate that exchange rate (EXRT) coefficient is negative and statistically significant at 5% indicating that EXRT has significant negative impact on agricultural production; i.e. a unit increase in EXRT leads to 0.19% decrease in agricultural production thus implying that, an increase in EXRT would lead to a slight decrease in agricultural growth in the long run. Also, the result indicates that inflation rate (INF) has significant negative impact on agricultural production i.e. a unit increase in (INF) would lead to 0.54% decrease in agricultural production which implies that as inflation rate increases, agricultural production decreases. Result of the short run estimates of the error correction model is presented on table 4.3.2 below.

Table 4.3.2
Short run Estimates from ECM

Dependent variable AGP				
Regressors	Coefficient	Std. Error	t-Statistic	Prob.
D(LEDS)	-0.127940	0.163999	-0.780125	0.4467
D(LEDS(-1))	-0.129771	0.202007	-0.642411	0.5297
D(LEDS(-2))	0.069808	0.187263	0.372780	0.7142
D(LEDS(-3))	-0.314036	0.120273	-2.611030	0.0189
D(LEDSP)	-0.124263	0.064862	-1.915802	0.0734
D(LEDSP(-1))	-0.064539	0.059037	-1.093197	0.2905
D(LEXRT)	-0.340546	0.109953	-3.097196	0.0069
D(LEXRT(-1))	-0.312357	0.099913	-3.126277	0.0065
D(LINF)	-0.092707	0.049514	-1.872340	0.0796
D(LINF(-1))	0.107498	0.061349	1.752241	0.0989
D(LINF(-2))	0.116283	0.055555	2.093101	0.0526
ECM(-1)	-0.592810	0.137735	-4.303984	0.0005

R^2= 0.849852 Adjusted R^2=0.699704 F-statistic= 5.660092 Prob(F-statistic) = 0.000614

Source: (Authors computation using E-views 9)

The short-run results presented in Table 4.3.2 indicate that exchange rate has significant negative impact on agricultural production which implies that, an increase in exchange rate with 1% would lead to decrease in agricultural production by 0.29% in the short run. Also, the lag values of exchange rate and external debt stock indicate a significant negative impact on agricultural production leading to 0.31% decrease in agricultural production as a result of 1% increase in D(LEXRT(-1) and 0.31% decrease in agricultural production as a result of 1% increase in D(LEDS(-3)) respectively. Also, inflation rate has an insignificant and negative impact on agricultural production thereby indicating that (INF), (EDS) and (EDSP) do not significantly determine economic growth in the short run in the case of Nigeria.

The R^2 and the adjusted R^2 are 84% and 70% respectively implying that about 84% of the proportion of total variation in agricultural production is explained by the explanatory variables, while only 16% of the variation is caused by the error term in the model. The P-value of the F-statistics is less than 5% (i.e. 0.00614<0.05). This means the F-statistics is significant we therefore reject the null hypothesis and conclude that the explanatory variables are jointly significant in influencing the dependent variable AGP. The error correction term depicts a fast speed of adjustment towards the long-run equilibrium at 59%. Being negative, less than one and significant, the coefficient of the error term confirms the co-integration relationship among the variables. Results of diagnostic tests are presented on table 4.4 below.

Table 4.4
Diagnostic Test

SN	TYPES OF TEST	X^2	PROBABILITY
A	Autocorrelation	0.4481	0.7764
B	Hetroscedasticity	0.3029	0.3313
C	Normality	1.421523	0.491270
D	Stability	Stable	Stable

Level: 1%, 5% and 10% levels of significance respectively.

A: Langrange multiplier test of residual serial correlation
B: Ramsey's RESET test using the square of the fitted values
C: Based on a test of skewness and kurtosis of residuals
D: Based on the regression of squared residuals on squared fitted values

The results reveal that the model passed serial correlation, normality and heteroscedasticity tests as we could not reject their respective null hypotheses.

Furthermore, as recommended by Pesaran and Pesaran (2001), the study employed the cusum and cusumSQ tests for stability of the model along the sampled periods. The plots illustrated in Figure 1 & 2 show that the residuals lie within the critical bounds at 5% level of significance, which connotes the stability of the model.

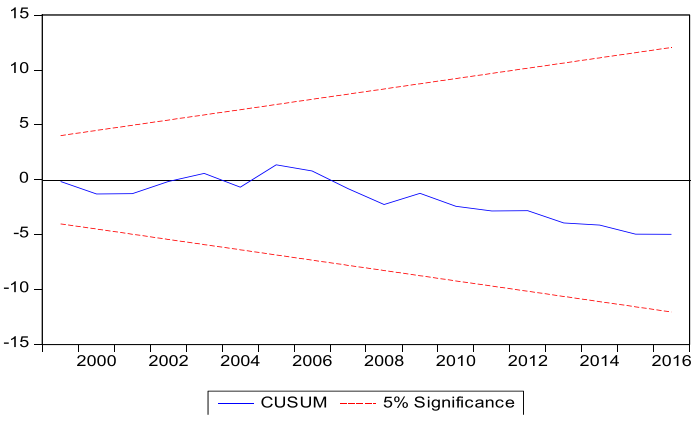

Fig. 1
Cusum Stability Test Result

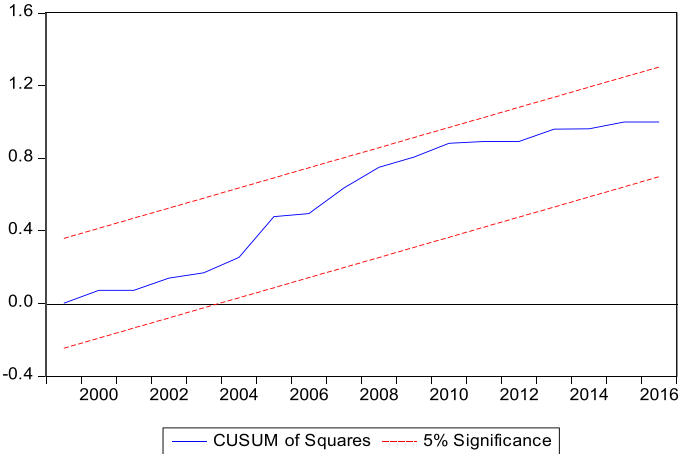

Fig. 2
Cusum of Squares

4.5 DISCUSSION OF FINDINGS

The discussions of findings were done in line with objectives of the study.

Objective 1: To establish the impact of external debt on Agricultural growth in Nigeria.

Our findings indicate that external debt had a positive significant relationship with agricultural growth in the short run and a negative relationship with agricultural growth in the long run. This means that in the short run, as debt increases, agricultural growth increases while the reverse holds in the long run. The a priori expectation is that debt would enhance agricultural growth in line with the postulate of Keynesian theory. Instead, debt had negative impact on agricultural growth. This is in line with the

findings of Atique and Malik (2012), Patilloet al (2004), and Ezeabasili et al (2011). However, this was in contrast to the views of Amooteng and Amoako(1996), Iya et.al (2013),; and Sulaiman and Azeez (2012) who found that external debt had a positive relationship with economic growth. But as Momodu, (2012) asserts,the positive correlation of debt and agricultural growth could be due to good debt utilization and management as seen in Asian Tigers – Malaysia, Singapore, Indonesia and Taiwan.

Objective 2: To determine the effect of external debt servicing on Agricultural growth in Nigeria.

It was found that debt service payment had a negative relationship with agricultural growth which is in line with the result of most other researches as seen in the works of Kasidi and Said (2013), Amootang and Amoako (1996), Momodu (2012) and Ezeabaili et al (2011). This means that an increase in debt service payments leads to a reduction in agricultural growth. Debt servicing could be described as proboscis of a mosquito for sucking out blood from its victim. It is a tax on unearned income/resources. It is so in that a debtor nation has to service its debt with attendant depletion of resources which may result in debt overhang and uncertainty. Uncertainty occasioned by excessively large debt makes the macro environment (interest rate, exchange rate and inflation) unstable with disastrous economic consequences such as scarce investment, reduced access to international financial market and capital flight.

Objective 3: To determine the impact of exchange rate on agricultural growth in Nigeria.

The result shows that exchange rate had a negative relationship with agricultural growth. This means that an increase in exchange rate brings about a decrease in agricultural growth. This is in line with the findings of Slottje et al (2000), Eme and Johnson (2012). Furthermore, Eme and Olugboyega (2012) found that there is no evidence of a strong direct relationship between changes in exchange rate and GDP growth.

5.0 CONCLUSION AND RECOMMENDATION

In view of our findings, the following recommendations should be considered to ensure effective and efficient management of Nigeria's external debt towards achieving growth in the agricultural sector.

Government should aggressively pursue the process of diversification of the economy through increased agricultural production and promotion of other non-oil sectors.

There is the need to diversify the source of external debt service especially to the non-oil sectors such as agriculture, mines, industry and manufacturing to reduce the extreme burden and the negative consequences of over dependence on foreign exchange from oil and the volatility in its price on Nigerians.

Anti-corruption agencies like Economic and Financial Crimes Commission (EFCC), Independent Corrupt Practices and other Related Offences Commission (ICPC) and Code of Conduct Bureau should be strengthened and the laws establishing them reviewed by government to make them more functional and efficient. This will reduce the incidences of misappropriation and embezzlement of funds from external debt.

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