The Impact of Domestic Debt on Agricultural Output in Nigeria (1985-2014)

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ABSTRACT

This paper investigated the impact of domestic debt on agricultural output in Nigeria using annual time series data spanning 1985-2014.The study employed the Augmented Dickey-Fuller test, Johansen co-integration test, Error Correction Method (ECM) and Granger causality test. Findings of the Johansen Co-integration test revealed that there exists a long-run relationship between agricultural output, domestic debt, public agricultural expenditure and interest rate. The results of the parsimonious ECM model showed that domestic debt has a significant positive impact on agricultural output, and public agricultural expenditure has an insignificant positive impact on agricultural output. However, interest rate has a significant negative impact on agricultural output in Nigeria. The R^2 value (0.630968) and the statistically significant f-value (7.523083) indicated that domestic debt, public agricultural expenditure and interest rate are major and significant determinants of agricultural output growth in Nigeria. The error correction term revealed that about 32% of all lasts period's disequilibrium in the model is removed in the current period. Also, the Granger Causality test revealed that causation flows from domestic debt, public agricultural expenditure and interest rate to agricultural output in Nigeria and not the other way round. It is therefore ascertained that domestic debt contributes significantly to agricultural output growth and is one mean through which the public can finance agricultural output growth in Nigeria. Public agricultural expenditure plays no significant role in enhancing the level of agricultural output while interest rate crowds out private investment in the agricultural sector and leads to a fall in agricultural output in Nigeria. Hence, the accumulation of domestic debt should be encouraged since it contributes to agricultural output growth in Nigeria and macroeconomic policies should be targeted towards maintaining a low rate of interest as it would contribute to agricultural output growth in the country.

Key words: Economic Growth, Agriculture, Domestic Debt, Public Expenditure on Agriculture, Interest Rate.

1. INTRODUCTION

1.1. Background to the Study

Over the years, several studies have focused on understanding the association between agriculture and economic growth, yet there is some disagreement. While some researchers have argued that agriculture should be the foundation of economic growth (Gollin, Parente & Rogerson, 2002; Thirtle, Lin & Piesse, 2003), others claim that the linkages agriculture has with other sectors are too weak and its innovative structures are inadequate for promoting economic growth (Ranis and Fei, 1961; Jorgenson, 1961). The relationship between agriculture and development, especially in sub-Saharan Africa, cannot be overemphasized. Reducing poverty, improving nutrition and general well-being of

the population hinges critically on the performance of the agricultural sector as this would imply improving the standard of living of citizens of the country. Agriculture plays an important role in the overall economic development of a country, to the extent that a country that is able to achieve a 4% annual growth rate in agriculture would record an improvement in technology, and an increase in agricultural production is capable of reducing food import bills which in the long-run can translate to a favourable terms of trade (World Bank, 2006).

Economic growth will be almost impossible to achieve without developing the agricultural sector because 70% of the population in Nigeria is employed in the sector. Furthermore, the importance of agriculture to the Nigerian economy is evident in the nation's natural endowments in production factors such as: extensive arable land, water, human resources, and capital. Exploring the nation's productive advantage in this sector is the fastest way to stimulate growth in the economy (FMARD, 2012).

For the sector to be developed, the government of Nigeria depends on borrowing (externally or internally) for actualizing its agricultural and river basin development projects. Domestic debt is one method through which the government of Nigeria finances deficits and carry out Agricultural development projects. Developing countries are faced with increasing difficulty in obtaining external finance to drive the nation's development efforts, the nation rely solely on domestic debt (Ola & Adeyemo, 1998). Domestic debts are debt instruments issued by the federal government and denominated in local currency.

Over the years, the government has put in place certain policy measures and programmes with a view of increasing the contribution of agriculture to economic development, even as far as accumulating enormous domestic debt. However, the federal government expenditure on agriculture as a ratio of total federal government expenditure portrait a gloomy future for the sector's development in the country. Available statistics from the CBN shows that the federal government expenditure on agriculture were low except for the following years; 1999, 2008, 2011 and 2013 (Muftau and Gafar, 2003; CBN, 2014). Despite these huge sums of money allocated to the sector during these years, there was little or no improvement in agricultural production. For instance, agricultural real growth rate was 7% in 1999, 18% in 2008, 7% in 2011 and 6% in 2013 as compared with the growth rate of 14%, 14%, 42% and 12% in 1998, 2007, 2010 and 2012 respectively (CBN, 2014). The reason for the poor performance of the sector may be that successive governments only

used the policies and programmes to mismanage or embezzle public funds to the total neglect of food production.

The outstanding level of government domestic debt has grown tremendously from N0.023 billion at inception in 1960 to N,1.111 billion in 1970. In 1980 it stood at N8.23 billion when compared to the level of external debt which moved from N0.094 billion 1960 to N0.175 billion in 1970 and further to N1.86 billion in 1980 (Asogwa & Ezema, 2005). Asogwa et al. (2005) further observed that it was in 1986 at the inception of the structural adjustment programme that the level of external debt for the first time became larger than the level of domestic debt. Ever since then, the stock of external debt has consistently been larger than domestic debt. In 1986, the total government outstanding domestic debt which was N28.4 billion increased progressively to N477.7 billion in 1995, reduced in 1996 and started rising again in 1997. Domestic debt stock fell significantly from N4.13 trillion in 2007 to N2.32 trillion in 2008, and thereafter, has been on the increasing rate (CBN, 2014).

The federal government reliance in borrowing from the banking system to finance its large and unsustainable fiscal deficits has hindered the attainment of macroeconomic stability and sustainable economic growth in Nigeria. In addition, this has crowded out the private sector from the credit market, thereby stalling investment and total output growth. It is against this background that this study will seek to assess the impact of domestic debt on agricultural output in Nigeria. The objective of this study is to examine the influence of government domestic borrowing on agricultural output in Nigeria. Therefore, the significance of its findings provides a basis which may aid policy makers in proffering solutions to problems that may arise from the accumulation of domestic debt as it affects agricultural output in Nigeria.

This paper is organized into five sections: section one comprises the introductory background of the study. Section two covers the literature review and theoretical framework. Section three gives information about the research methodology while section four deals with presentation, interpretation and discussion of results. Section five covers the summary of findings, policy recommendations and conclusion.

2. LITERATURE REVIEW

2.1 Definition of Concepts

Domestic Debt: According to Ozurumba and Kanu (2014), domestic debts refer to the portion of a country's debt borrowed from within the confines of the country. These loans are usually obtained from the central bank of Nigeria, deposit money banks, discount houses and other non bank financial houses.

Domestic Debts are debts that originate from within the geographical region of a country, which are contracted through debt instruments such as treasury bills, treasury certificates and treasury bonds. Others are development stocks, FGN bonds and Promissory notes.

Agriculture: According to Anyawu, Oyefusi and Dimowo (1997) agriculture involves the cultivation of land, raising and rearing of animals for the purpose of production of food for man, feed for animals and raw materials for industries. It involves cropping, livestock and forestry, fishing, processing and marketing of these agricultural products. Essentially it is composed of crop production, livestock, forestry and fishing. Agricultural Output is the final produce of agriculture. For example, crop yields, food for man, animal, diary, raw materials for industries and all the final goods that are marketable in the local and international markets and also the portion that counts in the nation's Gross Domestic Product (GDP). The most direct contribution of agriculture to economic growth, according to Irz, Lin, Thirtle and Wiggins (2001) is increase in incomes of farmers and therefore their purchasing power. Results of several studies, including Irz et al. (2001) and Thirtle et al. (2003), show that an increase in agriculture growth results in an increase in the income level of the poorest of the population. Also results from cross-country regressions among developing countries show that $1 increase in GDP results in significantly more poverty reduction when the growth is in agriculture rather than other sectors (Lipton, 2012). This sectoral growth increases the incomes and therefore purchasing power of farmers resulting in a vibrant domestic market for other sectors, hence growth in the economy.

2.2. Empirical Literature Review

There are scanty literatures on the impact of domestic debt on agricultural output, though several studies abound in literature on domestic debt but have focused more on its effect on economic growth and development. Charles, Ashok and Hiroki (2012) examine the factors affecting the choice of debt by farm firms and households using the Probit model with data from the Agricultural Resource Management Survey (ARMS). The results indicate that farm debt has a positive relationship with the size of the farm firm.

Tostlebe (1957) in his study of agricultural capital formation and financing identifies the importance of internal finance in agricultural investment finance especially in periods of contraction. Stock (1984) examining the Western agrarian unrest of the period 1865 to 1920 concludes that the problem of heavy debt service burdens in periods of low farm prices and the associated risks of foreclosure figured significantly in movements of agrarian unrest prior to the world war I.

Ogunbiyi and Okunlola (2015) investigated whether domestic debt impact on real sector growth in Nigeria with particular emphasis on the agricultural and industrial sector growth using time series data covering a period of 34 years (1980–2013). Agricultural growth was proxied by Agriculture GDP while industry growth was proxied by industry GDP. The ADF unit root, and Vector Auto Regression (VAR) analysis technique were employed in their estimation. The study concludes based on the findings that in an advent of consistency and project tied borrowing, real sector will experience growth and development.

Ozurumba and Kanu (2014) examine the impact of the different components of domestic debt on economic growth of Nigeria using multiple regression technique, and discovered that in the short-run, FGN Bond proved to have a positive significant relationship with economic growth, while development stock maintained a significant negative relationship. In the long-run, Treasury Bills and the lagged value of GDP variables were positively significant.

Adofu and Abula (2010) investigate the empirical relationship between domestic debt and economic growth in Nigeria. Using OLS regression technique with time series data spanning 1986–2005, the study explored the relationship between domestic debt and economic growth in Nigeria. The findings

of the study reveal that several factors responsible for rising domestic debt in Nigeria are high budget deficit, low output level, increased government expenditures, high inflation rate and narrow revenue base. The analysis shows that domestic debt has affected the growth of the economy negatively and recommends that government domestic borrowing should be discouraged and that increasing the revenue base through its tax reform programmes should be encouraged.

Peter, Denis and Chukwuedo (2013) examine the relationship between government domestic debt and economic growth of Nigeria using unit root and co-integration test. Findings of the study show that domestic debt and credit have a significant and direct relationship with GDP and that debt servicing has inverse relationship with GDP and also government expenditure has a direct but insignificant relationship with GDP. The implication of the findings concludes that domestic debt should be invested in productive sector of the economy and more specifically in the real sector and further productivity gain will be achieved in the improvement on capital project expenditure.

Onyeiwu (2012) examines the relationship between domestic debt and economic growth in Nigeria using Ordinary Least Squares Method (OLS), Error Correction and parsimonious models to analyze quarterly data between 1994 and 2008. Result of this study found that domestic debt holding of government is far above a healthy threshold of 35 per cent of bank deposit. This portends a crowding out effect on private investments. The study affirmed that the level of debt has negative effect on economic growth in Nigeria. The study recommended that government should maintain a debt-bank deposit ratio below 35 per cent, increase its usage of tax revenue to finance developmental projects and to divest itself of all projects the private sector can handle, while providing enabling environment for private sector investors and most importantly improved infrastructural facilities.

Anyawu and Erhijakpor (2004) analyze the growth effects of the current domestic debt outstanding as a ratio of GDP and the growth effects of the past domestic debt accumulation, using Nigerian time series data for the period, 1970-2003. The results show that current domestic debt outstanding as a ratio of GDP has a significant negative effect on economic growth, due largely to high implicit domestic interest rates. On the other hand, past domestic debt accumulated positively and significantly affects economic growth, thus rejecting the domestic debt overhang hypothesis. The study recommends the need for Nigeria to open and improve foreign access to holdings of domestic

debts so as to strengthen competition and hence reduce financial costs with the accompanying introduction of financial technology and innovation that will in turn result in higher market efficiency.

Obi and Nurudeen (2009) investigate the effects of fiscal deficits and government domestic debt on interest rates in Nigeria by applying a Vector Auto-regression approach for the period of 1981 to 2006. The interest rate in the model is a function of the fiscal deficit and government domestic debt. The findings of the study show that fiscal deficits and government domestic debt have positive impact on interest rates. The authors suggest that the government should decrease its unnecessary spending and should increase the revenues.

Damian and Chukwunonso (2014) investigate the empirical issues pertaining to the structure and composition of domestic debt and its impact on private investment in Nigeria. The study employed multiple regression models using secondary data from 1970 to 2012. The study found that domestic debt has a significant negative impact on domestic private investment in Nigeria. Results also show that domestic debt has a significant negative impact on foreign private investment in Nigeria with exchange rate and debt servicing having positive effect on foreign private investment in Nigeria. The study concludes that domestic debt if unchecked crowds-out private investment in Nigeria.

2.2. Theoretical Framework

The Keynesian theory of public borrowing was adopted as the theoretical framework of this study. The Keynesians view fiscal policy as the best policy that brings about growth in any economy since it acts in the interest of the general public. According to Keynes, when the government embark on domestic borrowing to finance its expenditure, unemployed funds are withdrawn from the private pockets and as such the consumption level of the private individuals is unaffected. This funds when injected back into the economy by the government leads to a multiple increase in aggregate demand causing an increase in output and employment. Hence, public domestic borrowing can be used to influence macroeconomic performance and also influence the output of the real sectors (such as the agricultural sector) of the economy. On the other hand, the indirect effect of domestic borrowing is its effect on investment. The transmission mechanism through which domestic borrowing affects growth is its reduction in the amount of loanable funds, which puts an upward pressure on the rate of interest. With the assumption that investment is a function of interest rate and the relationship is negative, a higher rate of interest crowds out (reduce) private investment. This reduction in private investment

has been called the partial crowding out of deficit financing. It is partial because the amount of crowding out of private investment is less than the amount of government debt issue. The reduction in private investment results to a fall in aggregate demand, output and employment (Jhingan, 2010).

Hence, the increase in the cost of borrowing as a result of the government accumulation of domestic debt has the potential of crowding out agricultural investment which in turn results to reduced agricultural output. This is because an increase in the cost of domestic borrowing reduces the ability of farmers to take domestic loan for their farm businesses and therefore reduces investment in agriculture which leads to overall fall in agricultural output.

3. RESEARCH METHODOLOGY

3.1. Data Types and Sources

In examining the impact of domestic debt on agricultural output between the period of 1985-2014, this work solely relied on secondary type of data collection, which was gotten from the Central Bank of Nigeria statistical bulletin and annual reports, 2014.

3.2. Data Estimation Technique

To avoid spurious regression due to the problem of non-stationarity of data, the Augmented Dickey Fuller test was used to check for the presence of a unit root in the variables i.e whether the variables are stationary or not and to what degree. After testing for the stationarity of the variables, the next step was to test for co-integration. This test was used to check if long-run relationship exists among the variables in the model and was carried out using the Johansen technique. In the short-run, deviations from the long-run relationship established could occur due to shocks to any of the variables. In addition, the dynamics governing the short-run behaviour of the model are different from those in the long-run. Due to this difference, the short-run interactions and the adjustments to long-run equilibrium are important because of the policy implications. The Error Correction Model (ECM) was therefore used to correct or eliminate the discrepancy that occurs in the short-run. It was used to test the speed of adjustment from short-run to long-run equilibrium. The coefficient of error-correction variable gives the per centage of the discrepancy between the variables that can be eliminated in the next time period. The apriori expectation is that the ECM coefficient must be negative and significant. The higher the ECM the more the speed of adjustment. Finally, the granger causality test was used

to check for causality between the variables. That is to test if the past of the explanatory variables contains information that can be used to predict the future of the dependent variable.

3.3. Model Specification

In order to capture the influence of domestic debt on agricultural output in Nigeria, a multiple regression model is used with agricultural output proxied by agricultural gross domestic product, as the dependent variable, while domestic debt, public agricultural expenditure and interest rate are treated as independent variables. The model is therefore given below.

The functional form of the model is as follows:

$$AGDP = f(DDS, PXA, INR) \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad 3.1$$

The stochastic form of the model is:

$$AGDP = \beta_0 + \beta_1 DDS + \beta_2 PXA + \beta_3 INR + \mu \quad - \quad - \quad - \quad - \quad - \quad 3.2$$

Where: AGDP = Agricultural Gross Domestic Product

DDS = Domestic Debt Stock

PXA = Public Agricultural Expenditure

INR= Interest Rate

The log-linear form of the model is:

$$LOGAGDP = \beta_0 + \beta_1 LOGDDS + \beta_2 LOGPXA + \beta_3 INR + \mu \quad - \quad - \quad - \quad - \quad 3.3$$

β_1 = Constant term

β_1, β_2 and β_3 are the coefficients of the parameter estimates

μ = Error term/stochastic variable

LOG = Natural Log of the variables

Our apriori expectations are:

β_1 and $\beta_2 > 0$, and $\beta_3 < 0$.

Justification of Chosen Variables

Agricultural output proxied with agricultural gross domestic product reflects the total produce of the agricultural sector in the economy in a given period of time usually one year.

Domestic debt stock is used as a proxy for capturing the total domestic debt accumulation of the economy over a given period. The apriori expectation is a positive relationship between agricultural output and domestic debt stock, i.e. the higher the domestic debt stock, the higher the agricultural output.

Public agricultural expenditure is the total amount spent by the public on the agricultural sector over a period of time. An increase in the level of agricultural expenditure is expected to bring about an increase in the level of agricultural output of the economy. Hence, public agricultural expenditure is expected to have a positive relationship with agricultural output, i.e. the higher the level of public agricultural expenditure, the higher would be the level of agricultural output.

Interest rate is used as a proxy to capture money market minimum rediscount rates. The apriori expectation is a negative relationship between agricultural output and interest rate.

4. RESULT PRESENTATION AND ANALYSIS

4.1 Descriptive Analysis

The descriptive analysis contains the measures of central tendency which include mean, mode, median as well as measures of variation and other statistical characteristics of the variables.

Table 4.1: Summary Statistics

	LOGAGDP	LOGDDS	LOGPXA	INR
Mean	7.197158	6.420448	1.107715	13.57300
Median	7.468791	6.739276	1.900662	13.50000
Maximum	9.799161	8.975127	4.180522	26.00000
Minimum	3.644001	3.330385	-3.912023	6.130000
Std. Dev.	1.959013	1.728566	2.471054	3.989253
Skewness	-0.413155	-0.367016	-0.637537	0.819086
Kurtosis	1.921505	2.088311	2.226101	4.575444

Jarque-Bera	2.307423	1.712475	2.780916	6.457043
Probability	0.315464	0.424757	0.248961	0.039616
Sum	215.9147	192.6134	33.23144	407.1900
Sum Sq. Dev.	111.2942	86.65032	177.0771	461.5100
Observations	30	30	30	30

Source: Author's Computation from E-views 4.1.

Mean is the average value of the series which is gotten by dividing the total value of the series by the number of observations. From table 4.1 above we see that the mean for LOGAGDP, LOGDDS, LOGPXA and INR are 7.197158, 6.420448, 1.107715 and 13.57300 respectively.

Median is the middle value of the series when the values are arranged in an ascending order. From the table the median for LOGAGDP, LOGDDS, LOGPXA and INR are 7.468791, 6.739276, 1.900662 and 13.50000 respectively.

Maximum and minimum are the maximum and minimum values of the series in the current sample. The maximum and minimum values for LOGAGDP, LOGDDS, LOGPXA and INR are 9.799161 & 3.644001, 8.975127 & 3.330385, 4.180522 & -3.912023 and 26.00000 & 6.130000 respectively.

Standard Deviation is a measure of spread or dispersion in the series. From the table above the standard deviation for LOGAGDP, LOGDDS, LOGPXA and INR are 1.959013, 1.728566, 2.471054 and 3.989253 respectively.

Skewness is a measure of asymmetry of the distribution of the series around its mean. The skewness of a normal distribution is zero. Positive Skewness implies that the distribution has a long right tail and negative Skewness implies that the distribution has a long left tail. From the above table we observe that only INR has positive Skewness and as such, INR has a long right tail, whereas LOGAGDP, LOGDDS and LOGPXA have negative Skewness therefore they have long left tails.

Kurtosis measures the peakedness or flatness of the distribution of the series. If the Kurtosis is above three, the distribution is peaked or leptokurtic relative to the normal and if the Kurtosis is less than three, the distribution is flat or platykurtic relative to normal. From table 4.1 above only INR exceeds three, therefore it is peaked or leptokurtic, while LOGAGDP, LOGDDS and LOGPXA are below three, therefore they are flat or platykurtic.

Jarque-bera is a test statistic to test for normal distribution of the series. It measures the difference of the skewness and kurtosis of the series with those with normal distribution. From the table above the Jarque-bera for LOGAGDP, LOGDDS, LOGPXA and INR are 2.307423, 1.712475, 2.780916 and 6.457043 respectively.

4.2. The Unit Root Test Results

The test result of the Augmented Dickey-Fuller statistic for all the time series variables used in the estimation are presented in table 4.2 below.

Table 4.2: Test for Stationarity

Variable	**ADF Statistic Levels**	**Critical Value at 5%**	**ADF Statistic First Difference**	**Critical Value at 5%**	**Order of Integration**
LOGAGDP	-2.614619	-2.971853	-3.154669	-2.971853	1(1)
LOGDDS	-1.400422	-2.967767	-4.223294	-2.971853	1(1)
LOGPXA	-2.540658	-2.976263	-7.486306	-2.971853	1(1)
INR	-2.861810	-2.967767	-5.646993	-2.976263	1(1)

Source: Author's Computation from Unit Root Test (ADF)

The result of the ADF test statistics show that the four variables viz; LOGAGDP, LOGDDS, LOGPXA and INR were not stationary in their level form but were stationary after the first difference. The null hypothesis of the presence of unit root in the series was rejected as indicated by the values of their calculated ADF statistics which were higher than their critical values (in absolute terms) at the 5% level. In this direction, we say that their series are integrated of the order one, that is 1(1).

4.3. Johansen Co-integration Test:

Having confirmed the stationarity of the variables, we proceeded to examine the presence or non presence of co-integration among the variables i.e. long-run relationship among the variables. The co-integration test was carried out using the Johansen technique and it produced the following results:

Table 4.3.1: Test for Johansen Co-integration Using Trace Statistic

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	5 Per cent Critical Value
None **	0.686311	57.03281	47.21

At most 1	0.370361	24.57095	29.68
At most 2	0.262765	11.61789	15.41
At most 3	0.104234	3.082128	3.76
*(**) denotes rejection of the hypothesis at the 5% (1%) level Trace test indicates 1 co-integrating equation at both the 5% and 1% level			

Source: Author's Computation from E-views 4.1.

Table 4.3.2: Test for Johansen Co-integration Using Max-Eigen Value

Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	5 Per cent Critical Value
None **	0.686311	32.46186	27.07
At most 1	0.370361	12.95306	20.97
At most 2	0.262765	8.535760	14.07
At most 3	0.104234	3.082128	3.76
*(**) denotes rejection of the hypothesis at the 5% (1%) level Max-eigen value test indicates 1 co-integrating equation at both the 5% and 1% level			

Source: Author's Computation from E-views 4.1.

The Trace statistic and the Max-Eigen statistic indicated one co-integrating equation at the 0.05 and 0.01 level. The results of the Johansen Co-integration tests above strongly rejects the null hypothesis of no co-integration, i.e. no long-run relationship between the dependent and the explanatory variables in favour of at least one co-integrating vector. This implies that there exists a long-run relationship between the dependent variable, agricultural output and the explanatory variables, domestic debt, public expenditure on agriculture and interest rate.

4.3 Error Correction Model (ECM)

The coefficients of the explanatory variables in the error correction model measure the short-run relationship of the dependent variable and the explanatory variables. When conducting error correction technique, an over parameterized model is usually expressed to deal with the problem of misspecification in the model. This is followed by the parsimonious model, which is derived after some stepwise elimination of relatively insignificant parameters in the over-parameterized model.

Table 4.3: Result of the Over Parameterized Agricultural Output Model in Nigeria (ECM 1)

Dependent Variable: D(LOGAGDP)				
Variable	**Coefficient**	**Standard Error**	**t-Statistic**	**Prob.**
C	0.106361	0.053067	2.004273	0.0634
D(LOGAGDP(-1))	0.182444	0.178351	1.022950	0.3225
D(LOGDDS)	0.154326	0.123595	1.248640	0.2309
D(LOGPXA)	0.051194	0.029686	1.724487	0.1052
D(INR)	-0.003898	0.005633	-0.692059	0.4995
D(LOGDDS(-1))	0.382853	0.118288	3.236624	0.0055
D(LOGPXA(-1))	0.067010	0.037387	1.792335	0.0933
D(INR(-1))	-0.021765	0.006529	-3.333792	0.0045
D(LOGDDS(-2))	-0.404738	0.170033	-2.380343	0.0310
D(LOGPXA(-2))	0.050999	0.025337	2.012837	0.0624
D(INR(-2))	-0.001108	0.005527	-0.200384	0.8439
ECM(-1)	-0.561810	0.169574	-3.313073	0.0047
R-squared	0.838457			
Adjusted R-squared	0.719992			
F-statistic	7.077694			
Prob(F-statistic)	0.000378			
Durbin-Watson stat	1.905675			

Source: Author's Computation from E-views 4.1.

The R^2 of the over-parameterized model presented above indicated that all the explanatory variables in the model accounts for 83.8457% of the systematic variation in LOGAGDP while the remaining 16.1543% is accounted for by the variables captured in the error term. The f-statistical value of 7.077694 with the probability value of 0.000378 indicated that the whole model is significant. The error correction term i.e. ECM(-1) is negative and statistically significant at the 5% level. Its coefficient of -0.561810 implies that the speed at which the short run equation converges to equilibrium in the long- run is high.

We however simplify the error correction model by estimating a parsimonious model (ECM 2) which is developed from the over-parameterized model (ECM 1).

Table 4.3: Result of the Parsimonious Agricultural Output Model in Nigeria

Dependent Variable: D(LOGAGDP)				
Variable	**Coefficient**	**Standard Error**	**t-Statistic**	**Prob.**
C	0.110334	0.044730	2.466689	0.0219
D(LOGAGDP(-1))	0.166652	0.170401	0.977996	0.3387
D(LOGDDS(-1))	0.363228	0.131007	2.772595	0.0111
D(LOGPXA(-1))	0.008625	0.034294	0.251494	0.8038
D(INR(-1))	-0.014333	0.006463	-2.217614	0.0372
ECM(-1)	-0.318300	0.122816	-2.591679	0.0166
R-squared	0.630968			

Adjusted R-squared	0.547097
F-statistic	7.523083
Prob(F-statistic)	0.000300
Durbin-Watson stat	1.101721

Source: Author's Computation from E-views 7.1.

The results from parsimonious model show that LOGDDS has a significant positive impact on LOGAGDP, while LOGPXA has an insignificant positive impact on LOGAGDP conforming to our apriori expectations. A unit increase in LOGDDS and LOGPXA leads to 0.363228 and 0.008625 units increase in LOGAGDP respectively. Meanwhile, INR has a significant negative impact on LOGAGDP and conforms to our apriori expectation. A unit increase in INR consequently leads to 0.014333 units decrease in LOGAGDP.

The value of the coefficient of determination (R^2) of 0.630968 indicates that the exogenous variables in the ECM 2 equation, LOGDDS, LOGPXA and INR explains over 63% of the systematic variations in LOGAGDP while the remaining 37% variations in LOGAGDP are explained by factors outside the model captured in the stochastic term (μ). Taking into consideration the degree of freedom, the Adjusted $\bar{R}^2$ dips down a little to 0.547097. This confirms the goodness of fit of the model.

Furthermore, the f-statistical value (7.523083) is highly statistically significant at the 5% level going by its probability value of 0.000300. This implies that LOGDDS, LOGPXA and INR taken together, have significant linear relationship with the dependent variable, LOGAGDP. The Durbin-Watson statistic of 1.101721 is indicative of the presence of a positive serial autocorrelation in the model.

The error correction term for changes in LOGAGDP is highly significant at the 5% level with the appropriate negative sign, indicating that the adjustment is in the right direction to restore the long-run relationship. It's coefficient of -0.318300 means that the present value in LOGAGDP adjusts rapidly to previous changes in LOGDDS, LOGPXA and INR specifically by about 32%.

4.4 Granger Causality Test

This is used to check for causality between the variables. The rule of thumb states that if the probability value of the F-statistic is between 0 and 0.05 there is a causal relationship, otherwise, there is no causal relationship. The result of Pairwise Granger's causality between the variables as above is provided in the table below.

Table 4.4: Granger Causality Test Results

Pairwise Granger Causality Tests
Date: 03/10/16 Time: 22:50
Sample: 1985 2014
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Probability
LOGDDS does not Granger Cause LOGAGDP	27	4.16344	0.01915
LOGAGDP does not Granger Cause LOGDDS		1.14362	0.35566
LOGPXA does not Granger Cause LOGAGDP	27	3.64645	0.03021
LOGAGDP does not Granger Cause LOGPXA		1.32111	0.29537
INR does not Granger Cause LOGAGDP	27	4.35344	0.01627
LOGAGDP does not Granger Cause INR		1.91624	0.15948

Source: Author's Computation from E-views 4.1.

For the period under review (1985- 2014), result of the Granger causality test indicated that causation flows from domestic debt, public agricultural expenditure and interest rate to agricultural output and not the other way round. This implies that past values of domestic debt, public agricultural expenditure and interest rate contains information that can be used to predict future values of agricultural output in Nigeria.

4.6. Policy Implication of Findings

Findings of the study revealed that domestic debt stock has a significant positive impact on agricultural output in Nigeria. It implies that domestic debt accumulation significantly contributes to agricultural output growth in Nigeria.

Public agricultural expenditure has an insignificant positive impact on agricultural output. The implication of this result is that public agricultural expenditure plays no significant role in enhancing the level of agricultural output in Nigeria.

Interest rate was found to have been significantly and negatively related to agricultural output. This proves the fact that interest rate crowds out private investment in agriculture and leads to a fall in agricultural output in Nigeria.

The error correction term for changes in agricultural output is highly significant at the 5% level with the appropriate negative sign indicating a stable short-run dynamism of the model. This implies that about 32% of all lasts period's disequilibrium in the model is removed in the current period. Also the Granger

Causality test revealed that causation flows from domestic debt, public agricultural expenditure and interest rate to agricultural output in Nigeria.

5. SUMMARY, RECOMMENDATIONS AND CONCLUSION

5.1. SUMMARY

This study has empirically examined the impact of domestic debt on agricultural output in Nigeria using annual time series data spanning 1985-2014. Agricultural output (proxied by AGDP) was regressed on domestic debt stock (DDS), public agricultural expenditure (PXA) and interest rate (INR). The study employed the Augmented Dickey-Fuller test, Johansen co-integration test, Error Correction Method (ECM) and Granger causality test. Findings of the Johansen Co-integration test revealed that there exists a long-run relationship between agricultural output, domestic debt, public agricultural expenditure and interest rate. The results of the parsimonious ECM model showed that domestic debt has a significant positive impact on agricultural output, and public agricultural expenditure has an insignificant positive impact on agricultural output. However, interest rate has a significant negative impact on agricultural output in Nigeria. The R^2 value (0.630968) and the statistically significant f-value (7.523083) indicated that domestic debt, public agricultural expenditure and interest rate are major and significant determinant of agricultural output growth in Nigeria. The error correction term revealed that about 32% of all lasts period's disequilibrium in the model is removed in the current period. Also the Granger Causality test revealed that causation flows from domestic debt, public agricultural expenditure and interest rate to agricultural output in Nigeria and not the other way round.

5.2. Recommendations

The following recommendations were made based on the findings of the study:

i. The accumulation of domestic debt should be encouraged since it contributes to agricultural output growth in Nigeria.

ii. Macroeconomic policies should be targeted towards maintaining a low rate of interest as it would contribute to agricultural output growth in the country.

iii. Public expenditure on agriculture should be made significant by the government allocating momentous sums to the agricultural sector and establishing effective

monitoring agencies to ensure that the amount allocated to the agricultural sector is actually and judiciously spent.

iv. The government should desist from borrowing short term loans to finance long term projects.

v. Public domestic borrowings should be channeled to the real sectors of the economy, specifically the agricultural sector; this would help increase agricultural productivity and the productivity of the nation.

5.3. Conclusion

From the findings of this study, it can be ascertained that domestic debt contributes significantly to agricultural output growth and is one mean through which the public can finance agricultural output growth in Nigeria. Public agricultural expenditure plays no significant role in enhancing the level of agricultural output while interest rate crowds out private investment in the agricultural sector and leads to a fall in agricultural output in Nigeria.

REFERENCES

Adofu, I. and Abula, M. (2010). Domestic Debt and the Nigerian Economy. *Current Research Journal of Economic Theory, 1*(2), 22-26.

Anyanwu, J. C. and Erhijakpor, A. E. O. (2004). *Domestic Debt and Economic Growth: The Nigerian Case*. Research Gate. Retrieved from: http://www.researchgate.net/publication/263662283

Anyawu, J. C., Oyefusi, A., O. and Dimowo, F. A. (1997). *The structure of the Nigerian economy*. Anambra, Nigeria: Joanee Educational Publishers Ltd.

CBN (2014). *Half year economic report.* Retrieved from: http://www.cenbank.org/Out/2014/RSD/2013%20Half%20Year%20Economic%20Report_Final.pdf

CBN (2014). *Statistical Bulletin*, December 2014. Retrieved from: http://statistics.cbn.gov.ng/cbn-onlinestats

Charles, B., Ashok, K. M. and Hiroki, U. (2012). *Capital Structure in Modern American Agriculture: Evidence from a National Survey*. Selected Paper prepared for presentation at the Agricultural & Applied Economics Association's 2012 AAEA Meeting, Seattle, Washington.

Damian, K. U. and Chukwunonso, S. E. (2014). Domestic Debt and Private Investment in Nigeria. *International Journal of scientific Research and Education, 8*(2), 2321-7545.

DMO (2014). *Annual Reports and statement of account*. Retrieved from: www.dmo.gov.ng

FMARD (2012). *Nigeria fertilizer strategy report*. Abuja, Nigeria: Africa Fertilizer Summit, Federal Ministry of Agriculture and Rural Development.

Gollin, D., Parente, S. and Rogerson, R. (2002). The Role of Agriculture in Development. *The American Economic Review, 92*(2), 160-164.

Jorgenson, D. (1961). The Development of a Dual Economy. *The Economic Journal, 71*(282), 309-334.

Jhingan, M. L. (2010). *Macroeconomic theory* (12th ed.). New Delhi: Vrinda publications Ltd.

Lipton, M. (2012). *Learning from others: Increasing Agricultural productivity for human development in sub-Saharan*. United Nations Development Programme, Regional Bureau for Africa. Retrieved from. http://web.undp.org/africa/knowledge/WP-2012-007-Lipton-Agriculture-Productivity.pdf

Muftau, A. I. and Gafar, T. I. (2003). *The impact of Agricultural finance on Agricultural output in Nigeria.* New Delhi: Serials Publications.

Ogunbiyi, S. S. and Okunlola, F. A. (2015) Domestic Debt and Real Sector Growth: A Var Approach. *International Journal of Banking and Finance Research, 5*(1), 1-14.

Ola, C. S. and Adeyemo, J. (1998). *Public finance in Nigeria.* Lagos, Nigeria: CSS Publishing Company.

Onyeiwu, C. (2012). Domestic Debt and the Growth of Nigeria Economy. *Research Journal of Finance and Accounting, 5*(3).

Ozurumba, B. A. and Kanu, S. I. (2014). Domestic Debts and Economic growth in Nigeria. *Journal of Economics and Sustainable Development 1*(5).

Ranis, G. and Fei, J. (1961). A Theory of Economic Development. *The American Economic Review, 51*(4), 533-565.

Stock (1984). Real Estate Mortgages, Foreclosure and Mid Western Agrarian Unrest. *Journal of Economics and History, 44*, 89-105.

Tostlebe, A. S. (1957). *Capital in Agriculture: Its Formation and Financing since 1970*. Princeton, N. J.: Princeton University Press.

Thirtle, C., Lin, L. and Piesse, J. (2003). *The impact of research Led Agricultural productivity growth on poverty reduction in Africa,* Asia and Latin America. Durban: Contributed paper for the 25th conference of the International Association of Agricultural Economists.

World Bank (2006). *Poverty reduction and growth: Virtuous and vicious circles*. Washington D.C.: World Bank.