



# **An Analysis of Banks' Credit and Agricultural Output in Nigeria: 1980-2014**

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## **ABSTRACT**

Inadequate Capital is considered as one of the major factors affecting Agricultural productivity in Nigeria and both previous and current governments in Nigeria do not seem to have harnessed properly availability of this capital to farmers and the institutions involved in its administration mostly the banking sector. It is on this premise that this research work is based; studied and investigated the relationship between Banks' Credit and Agricultural Sector Performance in Nigeria from 1980 to 2014. From the empirical analysis made using the Ordinary Least Square (OLS), Error Correction Modeling (ECM) and other properties substantiated to know the impact (significance) of Banks' Credit as well as Interest Rate, Foreign Exchange Rate, Government Expenditure on Agriculture & Money Supply on Agricultural output in Nigeria: all the variables were stationary at first difference, there also exists both long run and short run equilibria relationship between the dependent and the independent variables. The study found out that apart from Interest rate that has a negative but significant relationship, Banks' Credit to Agriculture (BCRA), Foreign Exchange Rate (FREX), Government Expenditure on Agriculture (GEXA) and Money Supply (MSPL) have a positive and significant relationship with Agricultural Gross Domestic Product (AGDP). We recommend that government should enact viable policies to enhance its capacity in making more loans and advances available to genuine farmers from commercial banks with less hurdles and unbearable red tapes, encourage the export of agricultural produce to the rest of the world through excise duty waiver and also a staunch and consistent agricultural extension services to both the commercial and rural farmers.

**Keywords:** Banks' Credit to Agriculture, Government Expenditure on Agriculture and Agricultural Output.

## **1. INTRODUCTION**

The structure of the Nigerian economy like other economies of the world is multi-sectoral with each other working in pari passu though seem to be competitive but all for the growth and development of the macro economy. The agricultural and banking sectors are amongst the prominent and very important sectors of every developing economy.

The traditional role of banks (deposit money banks to be precise) in the developing countries involves the whole framework of financial intermediation between deficit spending units and surplus spending units. The banks aim at effectively channeling deposits mobilized from surplus spending units into various sectors of the economy in the form of loans and investment in securities. They act as vital catalyst of Nigeria's economic advancement through the encouragement of savings, provision of capital needed for development, encouragement of trade activities, investment inducement agent, provision of managerial advice to small scale industrialists, help in the development of the much needed capital market and enhance the development of international trade (Ajie 2011 ).

Notwithstanding the above, Anyanwokoro (1996) believes that the two basic traditional functions of commercial banks as financial intermediaries are that of deposit collection and lending. Lending is the heart of banking business as deposits mobilized through savings, current and fixed deposit accounts must be put into productive use to generate income capable of defraying at least the cost of mobilizing and running/operating the banking business as banks are established on the premise of profit maximization.

Carter (1999) expressed that banks are extremely important intermediaries by offering time and saving deposits and lending of liquid and, rendering outlet for saving especially where these facilities are available through a nation-wide of branches. The number of bank branches in the country as at the year 1981 was 862, this increased over the years and at December 2012, there were 5566 branches across the thirty six states and the federal capital territory. This increase is an indication of increased participants (bankers, customers and regulatory agency staff members) in the banking sector.

The importance of Agriculture in the Nigerian economy can never be over-emphasized. According to Ajie and Ewabore (2013), Agriculture is a source of food for consumption by man, foods for animals and raw material for the agro-based industries. Agriculture contributes to the growth of the economy, provides employment opportunities for the teeming population and eradicates poverty. An articulated agricultural revolution and increased value addition activities in the downstream agro-processing sub-sector present a potential platform for effective wealth generation and consequently, sustainable poverty eradication. Food which is a basic necessity of life cannot be obtained without agricultural practice. It is also a key connector to other productive sectors of the economy through the provision of essential raw materials as inputs. Thus, the agricultural sector is fundamental to the overall growth of the economy by its direct impact on the economy and its contributory relationship with other sectors. A well-developed agricultural sector can help reduce the level of unemployment in the country and also increase the country's foreign exchange earnings through export of agricultural produce and reduction of food import bills. In the words of Ogen (2007), the agricultural sector has a multiplier effect on a nation's socio-economic and industrial fabric as a strong and efficient agricultural sector would enable a country to feed its growing population, generate employment, earn foreign exchange and provide raw materials for industries.

Soludo (2006) put it that before and immediately after independence in 1960, agriculture contributed up to 64% to the total GDP, but during the 1970s, the contribution of agriculture to the GDP declined to 48%. The decline continued in 1980 to 20% and 19% in 1985. The uncertainty associated with the oil glut of the 1980s, which has great negative impact on the Nigerian economy, resulted in increased Federal and State government attention toward the development of agriculture. However, during the 1990s, the contribution of agriculture to the GDP increased a bit due to the shift of emphasis to agricultural development. This increment was minimal and was not sustained due to inconsistent government policies, programmes and ineffective implementation.

Agricultural practice in Nigeria can be categorized into two, namely: subsistence and commercial (Mechanized) agriculture. The former involves the use of crude technology and small farm tools. The later involves the use of modern technology which is capital intensive. Subsistence agricultural practice dominates the agricultural sector in Nigeria. In the words of Ogwuma (1985), Nigeria still manifests the typical symptoms of a peasant agricultural system. The farms are dominated by small-scale farmers who are responsible for an estimated 85% to 95% of total production. The banking sector within the period has not really helped matters in making even soft loans available to these small scale farmers. This has not really changed much after almost three decades of Ogwuma's assertion. Feder et al 1985, Eswaran & Kotwal 1990, and Zeller 1999 attest to the important role of credits in increasing agricultural productivity. Qureshi et al (1996) observed that an increase in credit in agriculture will lead to increased food production and farmers income. Muftau (2003) argues that bank credit help in reactivating, expanding and modernizing all types of agricultural enterprises which are considered economically feasible and desirable to the achievements of stated economic goals of self-sufficiency in agricultural production.

Donald Kaberuka (President of African Development Bank) at the 49<sup>th</sup> annual meetings of the bank held in May, 2014 in Kigali emphasized that increasing productivity in agriculture is critical for sustainable development and poverty reduction. At the same instance, Viswanathan Shankar (MD Standard Chattered

Bank Europe) expressed that since the majority of Africans depend on agriculture, investing in the sector is critical to reducing inequality and creating jobs for the teeming population.

According to Central Bank of Nigeria's Statistical Bulletin (2013), the sum of 351.70 and 502.00 million naira were bank credits to Agricultural Sector which yielded 1,887.70 and 1,985.20 in 1970 and 1971 respectively. In 1975, Agricultural output increased to 7,401.60 with banks' credit of 1,671.80; unfortunately the output dropped to 6,838.40 million naira in 1976.

The oscillating and unstable agricultural output in Nigeria has remained the same way till date and that forms major reasons for this study; to investigate and analyze Banks' credit and agricultural sector performance.

## **2.0 LITERATURE REVIEW**

### **2.1 Theoretical Framework**

#### **2.1.1 Loan Pricing Theory**

This theory is of the view that banks are always tempted to set high interest rates in order to earn higher income or maximize profit. Banks should always take cognizance of the problems of adverse selection and moral hazard in trying to earn maximum interest income because it is very difficult to forecast the borrower type at the start of any banking relationship. Setting interest rate too high may induce adverse selection problems because high risk borrowers may develop moral hazard behaviour since they are likely to take on highly risky projects or investments (Olokoyo 2011).

From the reasoning of Stiglitz and Weis, it is usual that in some cases we may not find that the interest rate set by banks is commensurate with the risk of the borrowers.

#### **2.1.2 Theory of Multiple Lending**

This theory is of the view that banks should be more concerned with equity, mergers and acquisitions which increase their lending capacities and they should be less inclined to share lending. This will reduce the need for greater diversification and monitoring. This however, is obtainable in the presence of a well developed equity market.

Banks should be less inclined to share lending (loan syndication) in the presence of well developed equity markets and after a process of consolidation. Both outside equity, mergers and acquisitions increase banks multi-lending capacities, thus reducing their need of greater diversification and monitoring through share lending (Carletti et al. 2009). This theory has a greater implication for banks in Nigeria in the light of the recent 2005 consolidation and recapitalization exercise in the banking industry.

#### **2.1.3 Structural Changes Models.**

Structural-change theory according to Enerst (2014) focuses on the mechanism by which underdeveloped economies transform their domestic economic structures from a heavy emphasis on traditional subsistence agriculture to a more modern, more urbanized, and more industrially diverse manufacturing and service economy. It employs the tools of neoclassical price and resource allocation theory and modern econometrics to describe how this transformation process takes place (Todaro and Smith, 2011).

The two well-known types of the structural-change model are: the "two-sector surplus labour" theoretical model of W. Arthur Lewis and the "patterns of development" empirical analysis of Hollis B. Chenery

#### **2.1.4 Boserupian Theory of Agricultural Development**

As mentioned by Ekeh (2014), this theory was established by Ester Boserup, a Danish Economist. The Boserupian theory states that the increase in the growth and development of Agriculture is determined by the size of the population (labour Force) involved in agricultural practice. This opposes Malthusian theory which stipulates that the size and growth of the population depends on the food supply and agricultural methods; in times when food is not sufficient for everyone, the excess population will die.

Boserup argued that in those times of pressure, people will find ways to increase the production of food by increasing workforce, machinery, fertilizers.

### **2.3 Empirical Review**

Emmanuel (2008) investigated the impact of macroeconomic environment on agriculture growth in Nigeria. Credits to agricultural sector, nominal interest rates on Loans, exchange rate, world prices to agriculture produce, foreign private investment, and government expenditure and inflation rate constitute

the macroeconomic environment in his model using ordinary least square regression framework. A positive and statistically significant relationship was found between the dependent variable (index of agricultural production) and some of the explanatory variables (interest rate, world prices of agricultural produce and government expenditure on agriculture) and negative relationship with inflation and recommended that macroeconomic policies that enhance favorable exchange rates, make agriculture credit available at low interest rate, reduce the rate of inflation, increase foreign private investment in agriculture would not fortify government investment in the sector but would be invaluable in supporting agricultural output growth in Nigeria.

Das et al (2009) investigated the role of direct and indirect agriculture credit in agriculture production in India using dynamic panel date analysis with instrumental variables (Avellano Bond Regression). They found a statistically significant impact of direct agriculture credit on agriculture output and also a positive significant impact of indirect agriculture credit with a year lag on agriculture output and concluded that despite several gaps in the present institutional credit delivery system, agriculture credit is still playing a critical role in supporting agriculture production in India.

Ernest (2010) studied the impact of commercial banks' Lending on the performance of the agricultural sector in Nigeria for the period 1970-2008 using time series data extracted from central Bank of Nigeria (CBN) statistical bulletin and adopting the ordinary least square regression analysis framework. A negative and insignificant relationship were established between agricultural output and commercial bank' Lending agriculture output and interest rate, agricultural output and gross domestic product (GDP and commercial banks' Lending and interest rate and included that an increase in commercial bank' lending to Nigeria's agriculture sector should be encouraged in other to increase agricultural sector share of total gross domestic product.

Ammani (2012) analyzed the between agricultural production and credit (Loans guaranteed by the agricultural credit guarantee scheme fund) in Nigeria from 1981 to 2009 using the ordinary least square regression analysis framework and testing for co-integration among variables with cointegrating Regression Durbin- Watson (CRDW) test method. The researcher found a significant and positive relationship between formal credits and aggregate output of livestock, crop and fishing subsectors and concluded that formal credit is positively and significantly related to the productivity of the crop, livestock and fishing subsectors in Nigeria's agricultural sector.

Obilor (2013) evaluated the commercial banks credit to agriculture or agricultural development in Nigeria for the period 1983-2007. He examined the effect of government fund allocation, commercial banks credit and agriculture product prices on agricultural productivity. His findings show that prices of agricultural produce and commercial banks' to the agricultural sector were not significant while agricultural credit guarantee scheme fund and government fund allocation to agriculture produced a significant positive effect on agricultural productivity.

Imoghele et al (2013) analyzed the impact of commercial banks' credit accessibility and sectoral output performance in Nigeria for the period 1986-2010 using Ordinary least square (OLS) technique and testing for stationary and co-integration (Engle-Granger two step method). The study found that commercial credit supply and other induced variables (human capital, interest rate, inflation rate, board money supply, total government expenditure on agriculture, manufacturing and services sector) has a long run relationship with sectoral output performance i.e. agricultural, manufacturing and service sectors output and recommended the need for adequate provision of infrastructural and institutional mechanism that will encourage banks to finance the real sector of the economy and also boost sectoral output.

Chisasa and Makina (2013) empirically examined the impact of bank credit on agricultural output in South Africa using Cobb Douglas production function for the period 1970-2009. They found a positive and significant impact of bank credit and capital accumulation on agricultural output and concluded that the combined effect of credit and capital accumulation gives a constant return to scale meaning that doubling the two inputs will double agricultural output.

Toby and peterside (2014) analyzed the role of banks in financing agriculture and manufacturing sector in Nigeria, using time series data from 1981-2010 extracted from the central bank of Nigeria statistical bulletin (2010). Using ordinary least square regression framework, they found a significantly wear

correlation between commercial bank lending and the contribution of agriculture to GDP and a significantly positive correlation between merchant bank lending and agricultural sector contribution to GDP. They also found a significantly inverse correlation between commercial bank lending and manufacturing sector contribution to GDP and concluded that the role of banks in financing the agricultural and manufacturing sector in Nigeria is still limited, hence the increase in direct intervention in the industrial sector.

Olarinde and Abdullahi (2014) investigated the impact of macroeconomic policies on agricultural output specifically on crop production in Nigeria using the multivariate Vector Error Correction approach for the series spanning 1978-2011. The study discovered a cointegrating relationship among agricultural output, government expenditure, agricultural credit, inflation, interest and exchange rate, Agricultural output was found responsive to the explanatory variables (government expenditure, agricultural credit, inflation, interest and exchange rate). One standard deviation innovation on government expenditure and interest rate reduces agricultural output thus threatening food security in both short and long- term period according to the impulse response functions and variance decomposition indicating a significant variations in exchange rate and government expenditure.

A careful review of different literatures (both theoretical and empirical) reveal that banks’ credit to the agriculture sector is necessary for improved output performance thereby enhancing economic growth in Nigeria. However in spite of the increased academic interest in the subject under discussion, several issues relating to Banks’ credit and agricultural sector performance remain unsettled.

### **3.0 METHODOLOGY**

#### **3.1 Data Collection and Sources**

The data used in this study are mainly time series secondary data obtained from Central Bank of Nigeria Annual Report and Statement of Account 2014 and other editions, Federal Bureau of Statistics as well as economic statistical websites.

The time series data used for this study are;

- Agricultural Gross Domestic Product (AGDP) for the period 1980 – 2014.
- Banks’ loans/advances to Agriculture (AGCR) in Nigeria covering 1980 – 2014.
- Banks’ lending rate proxied by Interest Rate (INTR) spanning across 1980 – 2014.
- Nigeria’s Foreign Exchange rate (FREX) for the period 1980 – 2014.
- Investment in Agriculture in Nigeria (INVA), 1980 – 2014.
- Government expenditure on Agriculture (GEXA) for the period 1980 – 2014.

These sources were chosen because they are the most authentic sources of reliable data on the Nigerian banking and agricultural sectors.

#### **3.2 Model Specification**

The model of this research work is built or structured to establish the functional relationship between Banks’ credits and Agricultural Sector performance in Nigeria, 1980 - 2014.

The model we tested in this study is a multiple regression stated below:

$$\mathbf{AGDP = F(INTR, FREX, INVA, GEXA, AGCR)}$$

Where,

AGDP = Agricultural Gross Domestic Product

INTR = Banks’ Lending Rate (proxied by interest rate)

FREX = Foreign Exchange Rate

MSPL = Investment in Agriculture

GEXA = Government Expenditure on Agriculture

AGRC = Banks’ Credits to Agriculture

Determining the Mathematical form of the model, we therefore state that;

$$\mathbf{Y = F(X_1 X_2 X_3 X_4 X_5)..... (1)}$$

Where,

F = Functional relationship

Y = Dependent Variable (AGDP)

- X<sub>1</sub> = Interest Rate
- X<sub>2</sub> = Foreign Exchange Rate
- X<sub>3</sub> = Investment in Agriculture
- X<sub>4</sub> = Government Expenditure on Agriculture
- X<sub>5</sub> = Banks Credit to Agriculture

Interest Rate, Foreign Exchange Rate, Investment in Agriculture, Government Expenditure on Agriculture and Banks' Credits to agriculture are the regressors or Independent variables. Because money growths are non-linear, the equation is put in a log-linear form. Re-writing the above equation in its mathematical form as Log-linear model in order to rescale the value including the unknown estimation parameters below;

$$\ln Y = b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 X_4 + b_5 X_5 \dots \dots \dots (2)$$

Where,

Ln = Logarithm

Y = Dependent Variable

b<sub>0</sub> = Functional Intercept

b<sub>1</sub>, b<sub>2</sub> and b<sub>3</sub> = Weight of a unit change in the explanatory variables, that is parameters or co-efficient of X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, X<sub>4</sub> and X<sub>5</sub> respectively.

We further re-write the above equation (2) in the standard form (Econometric form) by introducing the Error term below.

$$\ln Y = b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + U \dots \dots \dots (3)$$

This can also be written as,

$$AGDP = a_0 + a_1 INTR + a_2 FREX + a_3 INVA + a_4 GEXA + a_5 AGCR + \mu \dots (3)$$

Where,

b<sub>1</sub>, b<sub>2</sub>, b<sub>3</sub>, b<sub>4</sub> and b<sub>5</sub> = Estimation parameters

U = Error term or Random term.

H<sub>0</sub>: b<sub>1</sub>=b<sub>2</sub>=b<sub>3</sub>=.....b<sub>n</sub> = 0

Against the alternative hypothesis;

H<sub>1</sub>: not all b's are zero.

If the null hypothesis is true, there is significant relationship between Y (the Regressand) and the Regressors.

The hypothesis are stated as follow:

H<sub>0</sub>: b<sub>1</sub> = b<sub>2</sub> = b<sub>3</sub> = b<sub>4</sub> = b<sub>5</sub> = 0 (that the b's are not statistically different from zero).

H<sub>1</sub>: b<sub>1</sub> ≠ b<sub>2</sub> ≠ b<sub>3</sub> ≠ b<sub>4</sub> ≠ b<sub>5</sub> ≠ 0 (that the b's are statistically different from zero).

#### 4.0 DATA ANALYSIS AND INTERPRETATION OF RESULTS

##### 4.1 Unit Root Test

**Table 4.0: Stationarity Test**

	T Statistic.	Critical values 1%	Critical values 5%	Critical values 10%	Prob.	Order of integration
AGDP	-4.882548	-3.6661	-2.9627	-2.6200	0.000012	I(1)
INT	-5.511028	-3.6661	-2.9627	-2.6200	0.000000	I(1)
FOREX	-3.583208	-3.6661	-2.9627	-2.6200	0.000096	I(1)
INVA	-4.342788	-3.6661	-2.9627	-2.6200	0.000002	I(1)
GEXA	7.764452	-3.6661	-2.9627	-2.6200	0.000000	I(1)
BCRA	-6.590445	-3.6661	-2.9627	-2.6200	0.000000	I(1)

Author's computation Eviews 3.1 Output

The table above presents the summary of unit root tests results gotten at levels, first difference and second difference. The Augmented Dickey Fuller test were conducted on all the variables and the result gotten, showed that agric GDP, interest rate, foreign exchange rate, investment in agriculture, government expenditure on agriculture and banks' credit to agriculture were stationary at first difference as their T Statistic values at first differencing is greater than the critical value at 5%.

**4.1.2 Co-integration Test**

**Table 4.1 Co-integration Test**

Sample: 1981 2013

Included observations: 31

Test assumption: Linear deterministic trend in the data

Series: AGDP INT FOREX MSPL GEXA BCRA

Lags interval: 1 to 1

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.796032	147.0414	114.90	124.75	None **
0.688857	97.75778	87.31	96.58	At most 1 **
0.654501	61.56517	62.99	70.05	At most 2
0.371643	28.61942	42.44	48.45	At most 3
0.257777	14.21536	25.32	30.45	At most 4
0.148244	4.974109	12.25	16.26	At most 5

\*(\*\*) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 2 cointegrating equation(s) at 5% significance level

The result above, showed two cointegrating variables at 5% critical value as the likelihood ratio value of these variables (147.0414) and (97.75778) in table was greater than their 5 percent critical value (114.90) and (87.31). We therefore, reject the null hypothesis and conclude that there exists long run equilibrium relationship between the dependent and independent variables.

**4.2.3 Causality Test**

Null Hypothesis:	Obs	F-Statistic	Probability
INT does not Granger Cause AGDP	31	0.62858	0.54126
AGDP does not Granger Cause INT		0.09002	0.91419
FOREX does not Granger Cause AGDP	31	0.61053	0.55067
AGDP does not Granger Cause FOREX		1.49479	0.24294
MSPL does not Granger Cause AGDP	31	0.46359	0.63412
AGDP does not Granger Cause MSPL		1.45640	0.25147
GEXA does not Granger Cause AGDP	31	0.68075	0.51503
AGDP does not Granger Cause GEXA		2.61797	0.09208
BCRA does not Granger Cause AGDP	31	0.26128	0.77207
AGDP does not Granger Cause BCRA		0.76399	0.47598

There was no bidirectional causality. However, there was unidirectional causality at 5% and 10% significant level moving from AGDP to GEXA,

**Estimation of Result**

**Long run Estimate**

Dependent Variable: AGDP  
 Method: Least Squares  
 Date: 12/23/15 Time: 06:06  
 Sample: 1981 2013  
 Included observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.497151	0.185242	51.26889	0.0000
INT	-0.005743	0.003338	-2.920615	0.0498
FOREX	0.000306	0.000691	0.442854	0.0614
INVA	0.228021	0.026984	8.450236	0.0000
GEXA	0.007218	0.027113	0.266228	0.7921
BCRA	0.061667	0.022166	-2.782007	0.0397
R-squared	0.976998	Mean dependent var		12.01335
Adjusted R-squared	0.972738	S.D. dependent var		0.454403
S.E. of regression	0.075027	Akaike info criterion		-2.178967
Sum squared resid	0.151985	Schwarz criterion		-1.906875
Log likelihood	41.95296	F-statistic		229.3603
Durbin-Watson stat	0.910433	Prob(F-statistic)		0.000000

AGDP = 9.497 - 0.0057INT + 0.0003FOREX + 0.228INVA + 0.0072GEXA + 0.06167BCRA  
 T -Stat (51.26889) (-2.920615) (0.442854) (8.450236) (0.266228)  
 (-2.782007)  
 T-Prob (0.0000) (0.0968) (0.6614) (0.0000) (0.0391)  
 (0.0097)

$R^2 = 0.977$ , Adjusted  $R^2 = 0.972$ , F-statistic = 229.36,  $F_{tab}(6,33) =$  , Prob(F-stat) = 0.000000  
 Durbin Watson = 0.9104

**Model I**

**Constant**

$a_0 = 9.497$ , this reveals the constant factors that affect AGDP in addition to interest rate, Foreign exchange rate, money supply, Government Expenditure and bank credit to agriculture. Therefore if the above listed variables are zero, GDP will be 9.497

**Banks' Lending Rate (Interest Rate)**

$a_1 = -0.00577$ , Interest rate appears with a negative sign and conformed to the apriori expectations. This signifies an inverse relationship with AGDP and shows an increase in interest rate by 1% leads to a decrease in AGDP by 0.977%.

**Foreign Exchange Rate**

$a_2 =$  The coefficient of foreign exchange rate (0.0003) appeared with a positive sign and did conform to expectations. From our analysis, a 1% increase in foreign exchange rate leads to an increase in AGDP by 0.003%.

**Investment in Agriculture**

$a_3 =$  The coefficient of investment in Agriculture (0.228) appeared with a positive sign and did conform to expectations. From our analysis, a 1% increase in money supply leads to an increase in AGDP by 0.228%.



### **Government Expenditure**

$a_4$ = The coefficient of government expenditure in agriculture (0.0072) is positive. The coefficient shows a positive sign showing that a 1% increase in government expenditure in agriculture will lead to an increase in AGDP by 0.0036%.

### **Bank Credit to Agriculture**

$a_5$ = The coefficient of bank credit to agriculture (0.06167) appeared with a positive sign and did conform to expectation. The coefficient shows that a 1% increase in bank credit to agriculture will lead to an increase in AGDP by 0.06167%.

#### **4.3.1 Statistical Evaluation**

The statistical tools used here are co-efficient of determination and adjusted co-efficient of determination for the stated models.

### **4.4 INTERPRETATION OF RESULT BASED ON STATISTICAL TEST OF SIGNIFICANCE**

#### **Test of Goodness of Fit**

The co-efficient of determination ( $R^2$ ) is 0.976 i.e. 97.6%. This simply illustrates that 97.6% of the variation in AGDP are explained by the explanatory variables in the model.

#### **The T-Test**

The test of significance from our result showed that two variables (INVA and INT) were statistically significant for the period under review at 5% level of significance while at 10% level of significance, INF was statistically significant. This is due to the fact that their T probability values of 0.0000, 0.0000 and 0.0226 are all less than 0.05 (5% level of significance), while the T probability value of INT at 0.0580 is less than 0.10 (10% level of significance). We therefore reject the null hypothesis and accept the alternative.

#### **The F Test**

The F Stat test, which shows the significance of the entire regression model from our result, was significant as the Prob(F-statistic) value of 0.000 is less than 0.05 (5% level of significance) which further confirms the value of the  $R^2$ . Also,  $F_{cal}$  which is 229.36 is greater than  $F_{tab}(6,33)$ . Hence F test is significant. Since the F stat test is significant, we reject the null hypothesis and accept the alternative that there exist a significant relationship between AGDP and variables tested in the study. The Durbin Watson value of 0.9104 shows a positive autocorrelation.

#### **Error Correction Mechanism**

The result from the parsimonious model showed the expected and right signs for all variables except money supply. It further revealed that AGDP has a significant relationship with FOREX, INVA, GEXA and BCRA at 5% level of significance. Further, the coefficient of the error correction model bears the correct sign (-0.144786) and is significant. It shows that about 14% recovery rate from the disequilibrium. The  $R^2$  revealed that about 80% variation in agricultural output in Nigeria is explained by the explanatory variables in the model while the F-statistic of 9.516169 also shows that the entire regression model is fit while the Durbin Watson value of 1.908459 tends towards 2 showing no serial autocorrelation.

**Error Correction Mechanism**

Dependent Variable: D(LNAGDP)  
 Method: Least Squares  
 Date: 01/17/16 Time: 10:25  
 Sample (adjusted): 1983 2013  
 Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.048308	0.026166	1.846191	0.0778
D(LNAGDP(-1))	0.175484	0.290339	0.604411	0.5515
D(LNINT(-1))	-0.039069	0.045684	-3.855206	0.0203
D(LNFOREX(-1))	0.024355	0.034584	-4.704220	0.0084
D(LNINVA(-1))	-0.011015	0.087510	-2.925875	0.0409
D(LNGEXA(-1))	0.014172	0.014016	3.011160	0.0325
D(LNBCRA(-1))	0.003928	0.018390	-0.213609	0.8327
ECM(-1)	-0.144786	0.184883	-4.783123	0.0415

  

R-squared	0.795767	Mean dependent var	0.049579
Adjusted R-squared	0.727261	S.D. dependent var	0.045862
S.E. of regression	0.048693	Akaike info criterion	-2.988928
Su squared resid	0.054533	Schwarz criterion	-2.618867
Log likelihood	54.32838	Hannan-Quinn criter.	-2.868297
F-statistic	9.516169	Durbin-Watson stat	1.908459
Prob(F-statistic)	0.041296		

**4.4 DISCUSSION OF RESULTS**

From the properties expatiated and the tests carried out on this research work as aforementioned; the Augumented Dickey Fuller stationarity test showed that all the variables were stationary at first difference as their T-statistic values at first differencing is greater than their critical value at 5%.

The co-integration test showed two co-integrating variables at 5% critical value as the likelihood ratio value of these variables (147.0414) and (97.75778) in table was greater than their 5 percent critical value (114.90) and (87.31). Decision rule being when there is at least one cointegrating variable; we therefore, conclude that there exists a meaningful long run relationship between Agricultural Gross Domestic Product and the explanatory variables.

The Granger causality test shows a unidirectional causality at 5% significant level from AGDP to GEXA. The co-efficient of determination ( $R^2$ ) values of 97.6% and 80% of OLS and ECM respectively show a strong goodness of fit between the dependent and the independent variables.

The Durbin Waston value of 0.91 was corrected by the error correction mechanism making the value to be 1.9 which is approximately 2; indicating no serial auto correlation.

The T-test and the F-test of the two results show that both the individual and general or joint test of the variables in the model are statistically significant.

**5.1 SUMMARY OF FINDINGS**

This study was designed to assess the impact of Banks' credit to Agricultural Output (Sector performance) in Nigeria for the period 1980 – 2014. We introduced the topic and sighted the views upon which some hypotheses were formulated. The impact was assessed through the relationship between

Agricultural Gross Domestic Product (AGDP) and Banks' Credit to Agriculture (BCRA) together with Banks' Lending Rate proxied by Interest Rate (INTR), Foreign Exchange Rate (FREX), Investment in Agriculture (INVA) and Government Expenditure on Agriculture (GEXA).

The study explicitly investigated the relationship between Agricultural sector performance and Banks' credit in Nigeria together with other macro economic variables (Interest rate, Foreign Exchange rate, Investment in Agriculture & Government Expenditure on agriculture). A very reliable econometric tool (Ordinary Least Square –OLS) regression method and error correction modeling were used to check the impact/level of relationship between the dependent variable and each of the independent variables.

That notwithstanding, before the model was estimated; the properties of the variables (parameters) were established in terms of stationarity and long run relationship. The Dickey-Fuller test for stationarity and Johansen co-integration for long run relationship were conducted and the variables were integrated of the same order, especially order one (1). The causality among these variables were equally ascertained using the Granger Causality test. Lastly, the Error Correction Mechanism which checks the short run shock/relationships among variables was also employed.

Having done the very necessary tests and analyses that is required of this research work; the summary of the major findings in the study are stated thus:

Banks' credit to the agricultural sector is rightly signed and significant. This simply means that there exists a positive relationship between Banks' lending and Agricultural output in Nigeria. Thus, implying that banks' credit to the sector over the years has contributed significantly to the growth of agricultural sector in Nigeria.

High interest rates lower agricultural credit demand by farmers thereby reducing agricultural output in Nigeria. In other words, the higher the lending rate, the lower the demand for agricultural loans in Nigeria.

Exchange rate variations also influence and affect Agricultural sector performance in Nigeria. Government expenditure on agriculture and Investment in Agriculture have positive and significant impact on the agricultural output in Nigeria.

Also from the results of the analyses, there exists a long run relationship or equilibrium among the variables.

## **5.2 CONCLUSION**

From the error correction model, several interesting conclusions are drawn.

Firstly, banks' credit has a positive and significant impact on the growth of agricultural sector in Nigeria. This collaborates with other studies on agricultural sector performance such as Ammani (2012), Toby and Peterside (2014), Nnamocha and Eke (2015); and Olarinde and Abdullahi (2014) but differs from Obilor (2013) and Imoghele et al (2013).

Secondly, banks' lending rate (interest rate) has a negative and significant impact on the growth of agricultural sector in Nigeria. This collaborates with other earlier studies such as Olarinde and Abdullahi (2014) but contrary to the findings of Imoghele et al (2013).

Thirdly, exchange rate variations have a significant impact on the performance of the agricultural sector in Nigeria.

Finally, government expenditure and investment in agriculture have a positive relationship and significant impact on Nigeria's agricultural output.

## **5.3 RECOMMENDATIONS**

Sequel to the findings of this study, the following recommendations are made;

### **5.3.1 Recommendations for policy**

First of all, government should enact viable policies to enhance its capacity in making more loans and advances available to farmers from commercial banks with less hurdles unbearable red tapes.

Government should also ensure proper capture of farmers (provision of national data bank of farmers) as this will help in information gathering on the part of banks. This will enable banks identify farmers easily as the cost of information gathering is often times high due to dominance of the agricultural sector by

small scale farmers scattered all over the country with no formal identity or registration. This data will enable banks grant and monitor loans to farmers.

Secondly, providing a national data bank of farmers reduces the cost of administering loans on the part of banks. The high cost of loan administration is transferred easily to farmers in form of high interest rate. This is because banks are established on the premise of profit maximization. Thus, interest rate charged on loan must be adequately high enough to cover the cost of loan administration. If the national data bank is provided and the cost of administering loans is reduced, it will transcend to reduction in interest rate. Interest rate on agricultural loans should be determined by market forces and not by some government directives to peg it below prevailing rates in the market; this should be done to avoid loan diversion (people obtaining agricultural loans with low interest rates and diverting such loans for other purposes). These concessionary interest rates can cause moral hazard problems to farmers. Furthermore, concessionary interest rates in the face of high cost of loan administration and deposit mobilization tend to discourage banks from granting loans to the sector.

Thirdly, the government should encourage the export of agricultural produce to the rest of the world by granting excise duty waiver and also encourage the import of modern farm equipment by granting of import duty waiver to agricultural machines. This will encourage mechanization of our agricultural sector currently dominated by the use of crude implements.

Fourthly, the agricultural export processing zones being established as part of the Agricultural Transformation Agenda of the last administration should be continued and not to be on print and electronic media alone, they should be on ground and be managed by continuous and efficient functioning of these zones.

Also, Government should increase its statutory allocation/subvention to genuine farmers with proper and effective fund management adherence system.

Finally, agricultural extension services should be provided to the farmers so as to keep them abreast of modern techniques of farming (proper use of pesticides, fertilizers, genetically improved seedlings, amongst others). These extension services should be provided by private firms contracted by the government and they should be paid based on services rendered. That is, they get paid only when training is done.

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