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BANK CREDIT AND AGRICULTURAL SECTOR GROWTH IN NIGERIA, 1990-2016: INVESTIGATING THE NEXUS

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Abstract

The study examined the relationship between bank credit and agricultural sector growth in Nigeria using time series data for the period, (1990-2016). Secondary data were used and obtained from Central Bank of Nigeria Statistical Bulletin. Agricultural sector output as proxy for agricultural sector growth and used as the dependent variable; whereas, Broad Money Supply, Credit to the Private Sector, Interest Rate and Inflation Rate as the explanatory variables. The study revealed that all the variables of the study are stationary at first difference. The study showed the existence of at least one co-integrating relationship at 5% level of significance. The study revealed a short-run equilibrium significant relationship between bank credit and agricultural sector growth in Nigeria. There is no causal relationship between bank credit and agricultural sector growth in Nigeria. The study concluded that bank credit has not significantly contributed to agricultural sector growth in Nigeria. The study recommended that for the economy to grow, the private sector should be encouraged in form of concessional and reduced interest rate. Regulatory authorities should stabilize the interest rate which is capable of ensuring price stability and maintaining inflation to a single digit. This may build confidence in the banking institutions and will enable them to introduce innovations to boost agricultural sector output in the economy. The policy makers should adopt vibrant economic policies such as interest rate stability, flexible exchange rate, indigenization and economic diversification which will encourage the banks in financing the sector.

Keywords: Bank, credit, agricultural, sector, growth, Nigeria

INTRODUCTION

The growth and development of the agricultural sector in any modern economy also greatly depends on the efficient and effective performance of the banking system (Afolabi, 2004).Bank credit and agricultural sector growth nexus had been identified as one of the areas in the financial economics literature that can quicken the pace of growth and development in an economy such as Nigeria. This is supported by the empirical works of Akpansung and Babalola (2012), Obamuyi, Edun and Kayode (2013) on bank credit and private sector growth in Nigeria. They conclude that bank credit contributes to agricultural sector growth in Nigeria. This is consistent with the financial intermediation theory by Gurley and Shaw (1967), which explains the role of bank credit in an economy. The theory is supported by the empirical work of Obamuyi, Edun and Kayode (2011) who established a positive significant relationship between that bank credit and agricultural sector growth in Nigeria. This can be achieved through efficient and effective savings mobilization from the surplus units to the deficit units of the sector. Banking institutions are to perform the complementary role to render intermediation services; thus, by extending loan facility to the agricultural sector in Nigeria (Aniekan&Bablola, 2009).

Historically, the agricultural sector has been the mainstay of the nation's economy, especially in the 1970s and the early 1980s (Busari&Olayiwola, 2001). The work of Ayeni (2014) reveals that more than 70% of the population is engaged in agriculture in Nigeria. Hence, the study conducted byIjaija and Abdulraheem (2000) shows that before the discovery of crude oil, agriculture remained the mainstay of the country's economy, contributing as much as 90% of its foreign earnings. Hence, the sector is still seems to be the most reliable one, even though it has been out-performed by the oil and gas sector. Empirical evidence as shown in their various studies conducted by Ogbanje, Yahaya and Kolawole (2012) and Sunny (2013) found a positive significant relationship between bank credit and agricultural sector output in Nigeria. This has also demonstrated the fact that agriculture is the dominant business in the Nigerian economy.

THEORETICAL FRAMEWORK

This study is anchored on the financial intermediation theory by Gurley and Shaw (1967). The theory explains the role of bank credit in an economy. The theory states that the business of financial intermediation in any modern economy is to provide a mechanism to draw financial flows from financially exceeding agents to those having a financial need in the economy. This means that banking institution can influence agricultural sector growth by extending credit to the sector.Recent studies such as Yahaya and Kolawole (2012),Ayeni (2014) and Andabai (2016) reveal that bank credit also promotes the function of financial intermediation in the agricultural sector-led economy. They conclude that the function of financial services had enhanced

agricultural sector growth and development through an effective capital accumulation and investments in the sector.

Ogbanje, Yahaya and Kolawole (2012) observed that the role of bank credit to agricultural sector in stimulating economic growth and development cannot be over emphasized. As a result, this is one of the most important sources of financing firms; especially, in countries where capital markets are not fully developed. The work of Andabai and Bingilar (2015) posits that bank credit is one of the important aspects of financial intermediation that provide funds to economic entities that can put them to the most productive investment in an economy. They conclude that credit availability for consumption and investment are capable of raising the level of private sector output and create employment opportunities in the economy. Hence, banks should finance any positive net present value project if the cost of investment is below the expected returns. Based on these contributions, there is a justification for anchoring this study on endogenous growth model and financial intermediation theory.

EMPIRICAL REVIEW

Ogbanje, Yahaya and Kolawole (2012) evaluated the effect of commercial banks' loan on agricultural Gross Domestic Product (GDP) in Nigeria using time series spanning data (1981-2007). Ordinary Least Square (OLS) method was used for the analysis. Gross Domestic Product, Agricultural Bank Loan, Broad Money Supply, Interest Rate and Inflation Rate were used as variables. The study shows that commercial banks' loan to the agricultural sector significantly and positively affects agricultural Gross Domestic Product in Nigeria. It recommends that improvement in the agricultural sector will add value to the Gross Domestic Product in Nigeria.

Sunny (2013) used a linear regression model to examine the impact of commercial banks' credit on agricultural development in Nigeria using spanning data for a period of 25 years, (1978-2002). Agricultural Production Index, Commercial Bank Credit to the Agricultural Sector, Agricultural Credit Guarantee Scheme and Agricultural Product Price were used as the variables. The study shows a positive relationship between government financial allocation to the agricultural sector and agricultural sector growth. It also found that government fund allocation to the agricultural sector has led to a significant positive growth in agricultural productivity.

Ijaija and Abdulraheem (2000) used regression analysis to investigate the effect of commercial bank credit on the agricultural sector growth in Nigeria using time series spanning data (1980-1996). Bank Credit to Agricultural Sector and Demand Deposit were used as variables for the study. The study shows a positive significant effect on commercial bank credit

on the agricultural sector growth in Nigeria. Ogbonna and Osondu (2013) employ Two-Stage Least Square regression model to ascertain the determinants of supply of funds and agricultural sector growth in Nigeria for a period of 21 years (1992-2012). Minimum Rediscount Rate, Exchange Rate, Liquidity Rate and Index of Agricultural Gross Domestic Product were used as variables. The findings reveal inconsistent relationship between supply of bank funds and agricultural sector growth.

Aliyu and Yusuf (2013) employed a multiple regression analysis to ascertain the impact of private sector credit on the real sector growth in Nigeria over the period of (1986-2010). Gross Domestic Product, Demand Deposit, Credit to the private sector and Lending Rate were used as the variables for the study. The study shows a positive significant impact of bank credit to private sector on the real sector growth in Nigeria. Oladapo and Adefemi (2015) determined the sectoral allocation of bank credit and private sector growth in Nigeria using time series spanning data (1986-2010). The study used six variables namely: Gross Domestic Product, Deposits, Investments, Advances, Profitability and Interest Earning. The study which employed multiple regression analysis shows that only credit allocated to government, personal and professional have significant positive effect on economic growth in Nigeria.

Oladapo and Adefemi (2015) investigated the sectoral allocation of bank credit and private sector growth in Nigeria over the period, 1986-2010. The study used six variables namely: Gross Domestic Product, Deposits, Investments, Advances, Profitability and Interest Earning; using multiple regression analysis. The results show that only credit allocated to government, personal and professional sectors have significant positive effect on private sector growth in Nigeria.

METHODOLOGY

The study applied *ex-post-facto* research design to source requisite information. An *ex-post-facto* research design is a systematic empirical inquiry that requires the use of variables which the researcher does not have the capacity to change its state or direction in the course of the study. Data for this study were sourced from the Central Bank of Nigeria Statistical Bulletin, 1990-2016.The rationale of selecting this time series data is because it covers a major economic reforms such as 2005 banking sector reforms in Nigeria. The variables used for this study are stated as follows: AGSO, CPS, INT, M_2 and INFL. Where: AGSO = Agricultural Sector Output as the dependent variable of the study. Bank credit variables (explanatory variables) include: CPS= Credit to the Private Sector.INT=Prime Lending Rate.M_2=Broad Money Supply. INFL= Inflation Rate.

Model Specification

Model specification is the determination of the endogenous and exogenous variables to be included in the model as well as the a priori expectation about the sign and size of the parameters of the function (Ibenta, 2012). Multivariate linear regression model is used to test the null hypotheses proposed for the study: There is no long-run equilibrium relationship between bank credit and agricultural sector growth in Nigeria, there is no causality between bank credit and agricultural sector growth in Nigeria. Based on these hypotheses, a model is adopted from the work of (Sunny, 2013). The functional model is stated as: AGSO = *f*(CPS, M_2, INT, INFL). Where: **AGSG** = Agricultural Sector Growth as dependent variable. **CPS** = Credit to the Private Sector. **M_2** = Broad Money Supply. **INT** = Interest Rate (Prime Lending Rate). **INFL** = Inflation Rate. The above model is modified in this study by introducing bank credit to the agricultural sector as proxy for credit to the private sector and was used as independent variable.

The modified model is stated as: AGSO = *f*(BCAS, M_2, INT, INFL) .....(1)

The mathematical equation becomes:

$Ln(AGSO) = b_0 + b_1 LnBCAS + b_2 LnM_2 + b_3 INT + b_4 INFL + \mu_t$.....(2)

Where: **AGSG** = Agricultural Sector Growth as dependent variable.**BCAS** = Bank Credit to the Agricultural Sector.**M_2** = Broad Money Supply.**INT** = Interest Rate (Prime Lending Rate).**INFL** = Inflation Rate. b_0 = intercept and b_1, b_2, b_3 and b_4 are the coefficients of the regression equation. μ is the stochastic or error term while Ln is the natural log of the variables. Log transformation is necessary to reduce the problem of heteroskedasticity because it compresses the scale in which the variables are measured, thereby reducing a tenfold difference between two values to a twofold difference (Gujarati, 2004).

ANALYSIS AND DISCUSSION OF FINDINGS

An of observations 27 years of time series data for the period, 1990-2016 were collected from CBN Statistical Bulletin and presented as follows: Time series econometrics techniques were used to test the hypotheses: There is no long-run equilibrium relationship between bank credit and agricultural sector growth in Nigeria. There is no causality between bank credit and agricultural sector growth in Nigeria

Unit Root Test

The Augmented Dickey-Fuller (ADF) is conducted on the variables, to determine whether they are stationary or non-stationary series as presented in table 1.

Table 1: Unit Root Tests Analysis

The ADF Unit Root test for Stationarity							
Variables		(with constant, no trend)		With Constant and Trend		Order of Integration	Decision
		At Level	First Difference	At Level	First Difference		
AGSO		**-3.30472	**-10.35238	**-4.17040	**-10.45640	1(1)	Stationary
CPS		-1.219722	**-4.506493	-2.402723	**-4.664460	1(1)	Stationary
M_2		-1.123973	**-4.074232	-1.388240	**-4.065040	1(1)	Stationary
INFL		2.427345	**-4.2026578	-1.5553829	**-4.352436	I(1)	Stationary
INT		4.653833	4.6578397	1.6253294	1.542462	1(1)	Stationary
Critical values	1%	-3.4289	-3.4353	-4.0412	-4.0505		
	5%	-2.2472	-2.7499	-3.8426	-3.2468		
	10%	-2.1118	-2.8133	-3.5032	-3.1056		

Source: Researcher's Estimation using E-views 8.0

Note: * (**) denotes rejection of hypothesis at 5% (1%) significance level.

Co-integration Test

Having established that all the variables in the model are stationary, the study then moves on to test for long-run relationship between the dependent and the independent variables using the Johansen Co-integration test (Johansen, 1991).

Table 2: Co-integration Test for CMSG, CPS, M_2, INT, INFL

Hypothesized	Max-Eigen		Trace	
No. of CE(s)	Statistic	Critical Value	Statistic	Critical Value
None	35.38812*	33.87687	73.89599*	69.81889
At most 1	21.50345	27.58434	38.50787	47.85613
At most 2	10.87421	21.13162	17.00442	29.79707
At most 3	6.057300	14.26460	6.130209	15.49471
At most 4	0.072908	3.841466	0.072908	3.841466

Trace test indicates 1 co-integrating equation (s) at 5% significant level

Max-eigenvalue test indicates 1 co-integrating equation (s) at 5% significant level

* denotes rejection of the hypothesis at 5% significant level

Source: Author's computation from E-views 8.0

Co-integration Test

Having established that all the variables in the model are stationary, the study then moves on to test for long-run relationship between the dependent and the independent variables using the Johansen Co-integration test (Johansen, 1991).

Table 3: Co-integration among Test for AGSO, CPS, M_2, INT, INFL

Hypothesized	Max-Eigen		Trace	
No. of CE(s)	Statistic	Critical Value	Statistic	Critical Value
None	43.42728*	33.87687	92.04723*	69.81889
At most 1	25.84162	27.58434	48.61995*	47.85613
At most 2	13.13490	21.13162	22.77833	29.79707
At most 3	9.245470	14.26460	9.643427	15.49471
At most 4	0.397957	3.841466	0.397957	3.841466

Trace test indicates 2 co-integrating equation (s) at 5% significant level

Max-eigenvalue test indicates 1 co-integrating equation (s) at 5% significant level

* denotes rejection of the hypothesis at 5% significant level

Source: Author's computation from E-views 8.0

The result in table 3 examines the presence of long-run relationship among bank credit variables (CPS, M_2, INFL and INT) and agricultural sector output. Based on the FPE and AIC lag selection criteria, the lag length adopted for the model is 1 to 2. From the results in table 3, Max-Eigen statistics and Trace Statistics shows one co-integrating equation and two co-integrating equations respectively. Based on both statistics, the study concludes that there is a co-integration among bank credit variables and agricultural sector output in Nigeria. The co-integrating equation derived from the long-run relationship is shown below:

$$\mathbf{AGSO = 27.9058CPS \;\; -0.4830INFL \;\; -31.6791M_2 \;\; + 0.8775INT + 14.9445}$$
$$\mathbf{(8.0057) \quad (0.0669) \quad (8.5607) \quad (0.2846)}$$
$$\mathbf{[3.4857] \quad [-7.2109] \quad [-3.7005] \quad [3.0835]}$$

() is standard error and [] are the t-statistics

This indicates that a positive change in CPS and INT will lead to a positive change in AGSO and vice versa. This implies that a unit increase in CPS will lead to a unit increase in AGSO by 27.91; and, a unit increase in INT will lead to a unit increase in AGSO by 0.88. Following a rule of the thumb, the t-statistics of the coefficients of CPS and INT are above 2. Thus, the study

indicates that there is a positive significant long-run relationship between agricultural sector output and CPS and INT respectively.

Vector Error Correction Mechanism

Given the existence of co-integrating equations in the model employed for this study, it becomes ideal to carry out Error Correction Mechanism (ECM) test in order to determine the short-run dynamics of the relationships. Thus, the Vector Error Correction Mechanism (VECM) was conducted to determine the speed of adjustment between bank credit and agricultural sector growth relationship in Nigeria. Hence, this is to find out whether short-run disequilibrium can be returned to long-run equilibrium trend.

Table 4: Vector Error Correction Mechanism Test for Bank Credit and AGSO

Error Correction:	D(AGSO)	D(CPS)	D(INFL)	$D(M_2)$	D(INT)
CointEq1	-0.012532	-0.002956	1.270582	0.000134	0.103480
	(0.00394)	(0.00513)	(1.25105)	(0.00409)	(0.38090)
	[-3.18087]	[-0.57658]	[1.01562]	[0.03277]	[0.27167]

() is standard error and [] are the t-statistics

Source: Author's computation from E-views 8.0

Table 4 shows the error correction term coefficient as (-0.012532), which is negative and the magnitude lies between 0 and 1. This reveals about 1% of any short-run disequilibrium can be adjusted to long-run equilibrium within a year. Based on the rule of thumb, the t-statistics (-3.18087) is greater or equally to 2. This indicates that the error term is statistically significant. This implies that there is a significant short-run adjustment speed to long-run equilibrium. Thus, the study reveals that bank credit has significant short-run equilibrium relationship with agricultural sector output in Nigeria.

Granger Causality Test

Granger causality test is used to examine the causal direction; that is, which of the variables (dependent and independent variable) influences the relationship between them. The null hypothesis is: Independent variable does not granger cause the dependent variable. The decision rule is to reject the null hypothesis, when the Chi-Square statistics and their corresponding probability values are less than (5%) level of significance. Otherwise, do not reject the null hypothesis.

Table 5: Granger Causality/Block Exogeneity Wald Test for Bank Credit and Agricultural Sector Growth

Variable	Chi-sq	Df	Prob.
CPS	3.834655	2	0.1470
INFL	9.920181	2	0.0070
M_2	2.647668	2	0.2661
INT	4.561202	2	0.1022
All	11.72935	8	0.1637

Note: Dependent variable: AGSO

* denotes significant at 1%, ** denotes significant at 5%; *** denote significant at 10%.

Source: Author's computation from E-views 8.0

The results from table 5 shows that Credit to the private sector (CPS), broad money supply (M_2) and interest rate (INT), respectively, does not granger-cause agricultural sector output in Nigeria. This can be seen from the values of the Chi-square statistics and their corresponding probability values. The total Chi-Square values and the causality among the exogenous variables in the AGSO model is insignificant as reported in table 5. This suggests that all the exogenous variables jointly do not granger causes agricultural sector output (AGSO). Hence, we conclude that bank credit does not have causal relationship with agricultural sector output in Nigeria, but inflation rate has a causal relationship with agricultural sector output.

CONCLUSION

This study indicates that bank credit has no significant relationship with agricultural sector growth in Nigeria. The study reveals a positive significant short-run adjustment speed to long-run equilibrium. This means that economic policies that are geared to increase credit to the agricultural sector have significantly improved the agricultural sector growth within a short period in Nigeria. Hence, bank credit does not have a causal relationship with agricultural sector growth in Nigeria, but inflation rate granger causes agricultural sector growth. This implies that there is a bi-directional relationship between inflation rate and agricultural sector growth. It means that bank credit variables are not statistically significant in explaining agricultural sector output fluctuations in Nigeria. Thus, this will discourage investors in the sector through private sector lending. Thus, this contradicts the work of Ijaija and Abdulraheem (2000), which reveals a positive significant link between commercial bank credit to the agricultural sector and poverty

reduction in Nigeria. Hence, their work conclude that functional policies should be encouraged to re-engineer the agricultural sector in order to tackle poverty in Nigeria.

POLICY IMPLICATIONS AND RECOMMENDATIONS

The study recommends that government should formulate functional policies such as price stability, full employment, exchange rate stability, economic growth and favourable balance of payment in order to cushion short-run economic problems such as inflation rate, interest rate and exchange rate fluctuations in the agricultural sector. The monetary authorities should stabilize the interest rate which is capable of ensuring price stability and maintaining inflation to a single digit. This may build confidence in the banking institutions and will enable them to introduce innovations to boost agricultural sector output in the economy. CBN should reduce the legal reserve and liquidity ratios respectively in order to increase the flow of investable funds which may improve the capacity of banks to extend credit to the sector.

CONTRIBUTION TO KNOWLEDGE

The study was able to adopt a model, expand the existing literature and updated data that will enable researchers and scholars to use it for further studies. The study concludes that bank credit has not significantly contributed to the growth and development of the agricultural sector in Nigeria. The factors responsible for this can be traceable to inadequate provision of financial services by the financial intermediaries, economic and political instability and inability to implement the formulated policies by the regulatory authorities (Central Bank of Nigeria and Federal Ministry of Finance).

SCOPE FOR FUTURE STUDY

The study made the following suggestions for further research:

i. Future investigation could be conducted to know the extent of bank credit to the agricultural sector and private sector growth in Nigeria.

ii. Further research coulduse Generalized Method of Moment (GMM). The non-application of this model may limited knowledge; and therefore, suggest for further investigation.

iii. Finally, the study suggests that the period should be 1980-2016 to accommodate the Structural Adjustment Programme (SAP) in 1986.

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APPENDIX 1: Bank Credit and **Agricultural Sector Growth** in Nigeria (1**990-2016)**

Years	Agricultural SectorGrowth (N' Billions)	Lending Rates (Prime)%	Broad Money Supply (N' Billions)	Inflation Rate %	Credit to the Private Sector (N' Billions)
1990	122.2	25.50	52.86	3.6	33.55
1992	144.7	29.80	111.11	48.8	58.12
1993	217.4	18.32	165.34	61.3	127.12
1994	350.0	21.00	230.29	76.8	143.42
1995	529.0	20.18	289.09	51.6	180.00
1996	940.3	19.74	345.85	14.3	238.60
1997	1,275.8	13.54	413.28	10.2	316.21
1998	1,445.1	18.29	488.15	11.9	351.96
1999	1,600.6	21.32	628.95	0.2	431.17
2000	1,704.8	17.98	878.46	14.5	530.37
2001	1,801.5	18.29	1,269.32	16.5	764.96
2002	2,410.1	24.85	1,505.96	12.2	930.49
2003	2,847.1	20.71	1,952.92	23.8	1,096.54
2004	3,231.4	19.18	2,131.82	10	1,421.66
2005	3,903.8	17.95	2,637.91	11.6	1,838.39
2006	4,753.0	17.26	3,797.91	8.5	2,290.62
2007	5,940.2	16.94	5,127.40	6.6	3,668.66
2008	6,757.9	15.14	8,008.20	15.1	6,920.50
2009	7,981.4	18.99	9,419.92	13.9	9,110.86
2010	9,186.3	17.59	11,034.94	11.8	10,157.02
2011	10,310.7	16.02	12,172.49	10.3	10,660.07
2012	11,593.4	16.79	13,895.39	12	14,649.28
2013	13,413.8	16.72	15,158.62	8.0	15,778.31
2014	14,709.1	16.55	17,680.52	8	17,128.98
2015	13,456.4	17.02	15,158.62	18.4	15,778.31
2016	14,256.9	17.54	17,680.52	19.9	17,128.98

Source: Central Bank of Nigeria Statistical Bulletin, 2016.