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Financial Intermediation and Agricultural Output in Nigeria: An Impact Analysis of Deposit Money Banks' Credit

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Abstract: The study examined the impact of deposit money banks' credit on agricultural output in Nigeria from 1981 to 2014.Secondary data for the study was obtained from Central Bank of Nigeria. The ordinary least square method was used for data analysis. Unit root was used to test for data stationarity, while Variance Inflation Factor (VIF) and Heterosckedasticity white Test were used for data diagnosis. Findings of the regression analysis revealed that deposit money banks´ credit significantly and positively affected agricultural output while the result for Deposit Money Banks' lending rate (DMBLR) shows that DMBLR has an inverse and insignificant impact on Agricultural output (AQ). Also the trend in the Deposit Money Banks' credit to the agricultural sector has contained in the CBN bulletin increased considerably within the period under study. There was, however, a sharp decline in loan stock in 2007. Thus, the study concludes that Deposit Money banks' credit is a viable source of finance for sustainable growth in the agricultural sector. The study therefore recommends that Deposit Money banks' should increase the volume of credit facilities to the agricultural sector to sustain food production for the teeming population of Nigeria; they should however concentrate on the real farmers. Also the cost of Deposit Money banks' credit facilities should be subsidized or be reduced to a single digit lending rate for agric. businesses and should have a longer moratorium to ensure effective performance of both agricultural output and the credit facilities.

Keywords: Deposit Money Banks', Credit, Lending Rate, Agricultural Output

1. Introduction

The significance of the agricultural sector to human existence generally cannot be over emphasized in an emerging economy such as Nigeria. This is in consonance with the fact that Nigeria as a country, is highly endowed with abundant natural resources including land and labour with its large percentage of the populace been rural based depends to a large extent on agriculture for a living [1], [2].

This underscore the contribution of agriculture to overall development of the economy especially in emerging economies which is apparent in the provision of increased food supplies, provision of gainful employment, provision of capital and capital formation, increasing foreign exchange and increase in the welfare of the citizens through wealth creation among others [3]. It is pertinent to state however that, the Nigerian agricultural sector has been seemingly if not totally neglected with the discovery of oil. This is evident in the sharp decline in the contribution of agricultural sector to the gross domestic product (GDP) from 64% in 1960 to 35% in 1988 and presently, the agricultural sector in Nigeria contributes less than 30% to GDP, with crop production accounting for an estimated 85% of this total, livestock 10% with forestry and fisheries contributing the remaining 5% [4], [5]. In the wake of the declining trend in agricultural sector's contribution to the GDP as a result negligence in terms of finances leading to insignificant contribution to the overall GDP Vis-A-Vis poor output, there is every need for concerted efforts to enhance productivity in the agricultural sector. This accentuate the importance of deposit money banks credits as a means for improving farm capital investment in Nigeria, with which there may be little or no progress in the sector to adequately fulfill its expected roles in our current economic realities [6], [7].

In view of the above, [4] posit that the role of deposit money banks' in financial intermediation which facilitates the linkage between mobilization and use of resources should be effectively and efficiently utilized as this will lead to an enhanced agricultural output. Thus, there should be resolute efforts to harness the enormous resource from surplus sector for increased agricultural output. [4] further hypothesized that the three main factors that contribute to agricultural growth are increased use of agricultural inputs, technological change and technical efficiency which agricultural credit or funding appears to be an essential input along with modern technology for higher productivity. This is perhaps because finance coordinates all the other factors of production.

Nonetheless an important aspect that has emerged in last decades is that credit is not only obtained by the small and minor farmers for survival but also by the large scale farmers for enhancing their income and also maximizing output. This clearly indicates the apparent importance of financial resources to the agricultural sector for enhanced productivity. Consequently, having recognized the potential of the agricultural sector which is aptly described in theoretical literature as a sector with enormous prospect that could solve the problem of unemployment, poverty and poor revenue generation for the various tiers of government intensive efforts have so far been made by various stakeholders including the government, the private sector and individuals to pull resources to the agricultural sector for a more robust productivity [8]. Nevertheless, such efforts have, however, seems not to have transmitted into the real growth in agriculture output. This is evident in the fact that since the late 1970s, the growth of the agricultural sector has been low as well as volatile even in the face of increase credit to this sector in Nigeria. In the wake of these views lies a fundamental issue, that what is the nature and amount of Deposit Money banks' credit to the agricultural sector, does Deposit Money Banks credit significantly impact on agriculture output. The critical analysis becomes imperative given the fact that the impact and access to Deposit Money banks' credit to the agricultural sector has implication for overall macroeconomic variables of poverty reduction, job and wealth creation as a result of income generation which is of critical consequence in an emerging economy like Nigeria. Therefore this research seeks to study the impact of Deposit Money Banks' credit on the agricultural output performance in Nigeria.

2. Literature Review

Deposit money banks' credit extended to different economic agents is aptly regarded as bank loans and advances which facilitate the financial intermediation process between the deficit and surplus units that enhances productivity leading to large scale output with a positive impact on economic growth [9].

[10], postulated that Deposit Money Banks credit is a key conduit for financial intermediation in the economy. This also strongly support the financed lead growth hypothesis, which hypothesizes that financial sector play a key role in channeling savings into productive investment, particularly in the formal sectors of the economy. This vital role of Deposit Money bank credit in generating growth within an economy has also been widely acknowledged for instance [11], established that banking sector facilitate technological innovation through their intermediary role. This role emphasizes efficient allocation of savings through identification and funding of entrepreneur with best chances of successfully implementing innovative product and production techniques which are tools to achieving real economic performance which agriculture plays a vital role.

[12], [13], [14] noted that the banking sector help to make credit available by mobilizing surplus fund from depositors who have no immediate needs of such funds and consequently channel it in form of credit to investors who have brilliant ideas on how to create additional wealth in the economy but lack the necessary capital to execute the ideas. Supporting the above assertion [9] states that business firm obtained credit to buy machinery and equipment, farmers obtained credit to purchase farm input such as fertilizers, seeds, farm buildings and the government obtained credit to fund various kinds of government expenditure either recurrent or capital expenditure. In view of the foregoing, the agric. business which is capital intensive requires adequate funding to enable support the Nigerian economy for enhanced welfare of the citizenry. Hence the need to ensure that financial institutions channel more funds to this sector for maximum output performance.

[15] described agricultural sector as the most important sector of the economy which holds a lot of potential for the future economic development of the nation as it had done in the past. He further posited that it is a well-known fact that before the discovery of oil in Nigeria, agriculture accounted for over 60% of its Gross Domestic Product (GDP) as well as being a major source of foreign exchange earnings. It provided food and employment for the teeming population and raw materials for the growing industries. [16] stated that from the standpoint of occupational distribution and contribution to the GDP, agriculture was the leading sector in the 1960s. Also, this is apparent in other emerging economies, like Malaysia, Brazil etc.

Since agriculture served as the engine of growth of the overall economy of the emerging economies, the various successive Nigerian governments and financial institutions in Nigeria have attempted to bridge the funding gap in the agricultural sector through the establishment of various funding and credit programmes. Some of the measures to improve the flow of credit to the agricultural sector include among others the agricultural guarantee scheme of the central bank of Nigeria (CBN), mandatory requirement of Deposit money Banks to prepare Special Agricultural Credit Plans (SACP) with priority allocation of credit to the agric. sector. Under the SACP, the banks were required to fix self-set targets for achievement the flow of credit to agricultural sector has increased significantly [17].

2.1. The Nexus Between Deposit Money Bank Credit and Agricultural Output in Nigeria

Deposit money banks' are monetary institution with the primary objective of servicing the economy through their financial intermediation function; this is normally carried out through the acceptance of deposits from the surplus public and consequently lending the deposit as credit especially to agricultural and other sectors which is expected to increase agricultural output and increase famers' income. Agricultural credit could also be viewed as funds granted by banks, government to farmers/agro allied practitioners which will be paid back in the future to assist them in carrying out their agricultural practices with improved inputs for increased output, [2]. They posited that agricultural credit/loans from bank reactivates, expands and or modernizes all types of agricultural enterprises which are considered economically feasible and desirable to the achievement of stated goal of increased agricultural output and with a direct bearing on the quality of life.

However, even as the significance of agricultural loans/credit from banks cannot be overemphasized. [18], [19] are of the opinion that agricultural credit practice in Nigeria perhaps cannot guarantee increased agricultural productivity. They emphasized the absence of a sustainable platform which otherwise should guarantee proper devotion of the credit facilities to farming by all major stakeholders towards ensuring that increased agricultural output is a major source of concern. In resolving the aforementioned challenge the CBN opined that credit/loans granted to farmers by banks to purchase inputs should be paid directly to the suppliers who should furnish the bank with evidence of delivery. According to them, this must be done to avert diversion of funds which is common in Nigeria thus, stagnating all efforts made towards increasing agricultural output in Nigeria. To [5] the problem of diversion of funds meant for the agricultural sector has given rise to an emergent worry over time regarding the need for effective and adequate financing for agriculture in Nigeria with the aim of enhancing productivity.

As identified earlier, agriculture is not only source of food for the over 170million population of Nigeria but also the major supplier of the raw material and labour force to manufacturing and other service sectors, hence no strategy of economic development can be realized without sustained and broad based agriculture development in Nigeria [10]. As stated in the foregoing, Nigeria having been endowed with diversified climate and soil, hardworking man power that earned our farmers the competitive edge over other competitors in international market the agriculture performance of Nigeria (e.g. agricultural productivity, production, consumption, exports, diversification and quality of agricultural products) still remains below as compare to developed and emerging economies of the world. Agriculture as the main stay, of the Nigerian economy is total in disarray due to a number of problems. These problems include lack of proper technology, improved agronomic practices, crop management techniques, timely availability of water and modern inputs, marketing and supportive infrastructure, raising production cost, volatile year to year prices and supply of credit exerting a great negative effect on agricultural performance [21], [22] and [20].

In addition to the above [22] Summit that majority of our farm community consists of subsistence farmer who does not have access to high quality seeds, sufficient fertilizers and improved farm implements due to the lack of finances available to them. It is pertinent to state that apart from lack of finance which is one of the main reasons for low per acre productivity in our agricultural sub-sector there is an urgent need to educate the rural populace on the need to inculcate international best practice and the use of improved seedling.

2.2. Deposit Money Banks' Credit to the Agricultural Sector in Nigeria

The analysis of the Deposit Money Banks' loans to the agricultural sector as contained in the CBN bulletin showed that the loan advanced to agricultural sector rose from N590.6 million in 1981 to N4, 221.4 million in 1990. This represents 614.76 percent increase in 10 years. The increase is desirable so as to increase capital injection into the sector to facilitate agricultural production to feed the increasing population of Nigerians. Furthermore, Deposit Money Banks' loans to the sector rose from N5,012.7 million in 1991 to N146,504.5 million in 2000, representing a tremendous increase of 2,822.67 percent in another 10 years. By 2007, Deposit Money Banks' Credit to agricultural sector increased to N149,578.9 million. This analysis revealed that Deposit Money Banks' in Nigeria practically expressed great concern for the development of agricultural development, since credit unavailability is one of the major constraints to agricultural development in Nigeria.

It is however quite worrisome that the global acceptable funding to the agricultural sector in Nigeria has not been achieved even in the face of concerted efforts of the government, the financial institutions and other key stakeholders thereby affecting agricultural output in Nigeria. This is confirmed by the capital allocation to agriculture, which according to the available statistics as contained in the CBN bulletin was on an average of 4.74 percent from 1970-1980. However, from 1980-2000, it rose to 7.00 percent and 10 percent from 2001- 2007 though revealing an increase, but however still falls short of FAO recommendation of 25 percent. The ratio of agricultural expenditure to total finances to the sector from 1970- 1980 was on average of 2.66 percent see [25]. It rose to 8.34 percent from 1981-1984; however by 2000, it reduced to a ridiculous value of approximately 2 percent and was 2.10 percent in 2007. This fell short of the Maputo resolution that government of member states of African Union (AU) to allocate at lead 10 percent [4], [8].

2.3. Theoretical Framework

Agriculture Based Economic Development Theory propounded by [24], postulate that agricultural–based strategy for economic development requires a technical,

institutional and financial- incentive change that will raise the productivity of small farmers. Wiggins explains that agricultural financial incentives can play a dual role in the process of economic development. Firstly, it will produce more food and also produce many great jobs needed. For the Structural Change theory, postulated by Nobel laureate W. Arthur Lewis in the mid 1950's and latter modified, formalized and extended. The theory focuses on the mechanism by which underdeveloped economies can transform their domestic economic structures from a heavy emphasis on traditional subsistence agriculture to a more modern and more advanced agricultural practice through heavy financial support in order to attain industrial breakthrough. The extended version of the theory added that the full benefits of agricultural development cannot be realized unless government support systems are created to provide the necessary incentives, economic opportunities and most importantly access to needed credit and inputs to enable small farmers to expand their output and raise their productivity.

2.4. Empirical Evidence

Several empirical studies on the on agricultural financing and output have been reviewed. For instance, [14], [20], [1], [8], [3], [4]. [23] and [17] studied impact of various financial resources available to the agriculture on agricultural output and found that, for efficient and optimum production of agricultural resources key attention must be given to the finance which is the life wire or a coordinator of all other factors of production.

3. Methodology

The study covers the entire Nigerian economy. Nigeria has total land area of 923,768 km2, three- quarters of which are arable. It is located on the west coast of Africa and lies between latitude 4oN and 14oN and longitude 3oE and 15oE of the meridian. The country is bordered on the west by the Republic of Benin, on the north by Niger Republic, in the east by the Republics of Chad and Cameroun, and in the south by the Gulf of Guinea [8], [25]. The country has a total population of 140,431,790 according to 2006 national population census (National Population Commission, 2009). The study utilised data from secondary source. The data were obtained from the Statistical Bulletin of the Central Bank of Nigeria. Both descriptive and inferential statistics are used for data analyses and presentation.

3.1. Data Analysis Techniques

The study used of regression model (OLS) for the analyses of data collected. Furthermore, the Augmented Dicker-Fuller (ADF) unit root test was used to examine the stationarity of the data since they are time series in nature. Serial Correlation LM Test and White Test of Heteroskedasticity were carried out to ensure that the data for this study was fit for the model.

3.2. Model Specification

$$AQ = f\ (DMBC + DMBLR)$$

Stochastically the model is expressed as thus:

$$AQ = \beta o + \beta_1 X_1 + \beta_2 X_2 + \mu$$

Where:

X_1 = Deposit Money Banks Credit to the Agricultural Sector (DMBC)

X_2 = Deposit Money Banks' Lending Rate (DMBLR)

μ = Error term

βo = Intercept

$\beta 1$ = estimation coefficient

4. Results and Discussion

4.1. Unit Root Test

In order to determine the stationarity properties of the variables used in the study, the Augmented Dickey Fuller Test was performed. The unit root results which indicate the order of integration of each of the variables is presented in table (1) below:

Table 1. *Unit Root Test for the Test of Data Stationarity for AQ, DMBCA. and DMBLR.*

Variable	ADF Value @test statistic	Mackinnon Critical value @ 5%	Order of Integration
AQ	-4.291480	-2.963972	1(0)
DMBC	-4.033530	-2.960411	1(0)
DMBLR	-3.843103	-2.960411	1(0)

Source: Author's computation 2016.

Dikker Fuller Test result in the table above revealed that, all the variables are stationary at level and are integrated at order zero. This implies that, no long run information is lost thus, the application of ordinary least squares in the estimation process is therefore appropriate and not likely to yield spurious estimates.

4.2. Diagnostic Test

To ensure that the data for this study was fit for the model, three diagnostic tests were carried out on the data. These include the Breusch-Godfrey serial correlation test, and the Heterosckedasticity white test which test whether the estimated variance of the residuals from a regression are dependent on the values of the independent variables.

Table 2. *Diagnostic Test for Serial Correlation Test and Heterosckedasticity white Test.*

Type of Test		Serial Correlation LM Test	Heterosckedasticity White test
Model	F-stat	11.55185	2.940860
	P-value	0.0002	0.0311

Author's computation 2016

4.2.1. Correlation Coefficient for Serial Correlation

The result of the Breusch –Godfrey serial correlation as contained in table (2) above indicates that there is no serial correlation in the model with an F-statistic of 11.55185and a prob. of 0.002 which is statiscally significant at 5% level.

4.2.2. Heteroscedasticity White Test

The white test is a statistical test that establishes whether the residual variance of a variable in a regression model is constant (i.e Homoskeasticity). In cases where the White test is statistically significant, heteroscedasticity may not necessarily be the cause, but specification errors. In other words, the White test can be a test of heteroscedasticity or specification of error or both. Consequently result in table (2) above revealed that, the null hypotheses of the presence of heteroscedasticity for the White tests in model is rejected. This is because the result shows an F-statistic of 2.940860 and a prob. value of 0.0311for the model which is statistically significant at 5% alpha level (p-value < 0.05). The conclusion is that, the presence of heteroscedasticty is minimal if not completely absent in the model there by satisfying the classical OLS assumption of homoscedasticity (constant variances). It therefore implies that, the application of OLS on these models will yield Best Linear and Unbiased Estimates (BLUE).

4.2.3. Variance Inflation Factor (VIF)

Table 3. *Variance Inflation Factor (VIF).*

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
DMBC	0.000361	2.843729	1.001634
DMBLR	0.369424	3.206514	1.001634
C	5.450774	335.4855	1.001452

Author's computation 2016

In order to ensure that the results are very robust, the Variance Inflation Factor (VIF) diagnostic test was performed to detect multicollinearity, is as indicated in the able above.

The Variance Inflation Factor (VIF) measures the impact of Collinearity among the variables in a regression model. The Variance Inflation Factor (VIF) is always greater than or equal to 1. There is no formal VIF value for determining presence of multicollinearity. Values of VIF that exceed 10 are often regarded as indicating multicollinearity, but in weaker models values above 2.5 may be a cause for concern (A. Kouisoyiannis, 1977: Gujarati and Sangeetha, 2007).

This study adopts the "Rule of thumb" of 10, which shows the appropriateness of fitting of the model of the study with the dependent variable. In addition the tolerance values are consistently smaller than 0.7, this further substantiates the absence of multicollinearity. The two measures for testing multicollinearity indicate that there is no multicollinearity problem in the model. Therefore it is used for analysis.

4.3. Regression Analysis

Following the result of the ADF and the Diagnostic test above, the study adopts the technique of ordinary least squares for the regression analysis. This is based on the premise that, all the variables in the data set are stationary and can yield best linear unbiased estimates.

Table 4. *OLS present the result for the Impact of DMBC ON AQ.*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DMBC	0.299294	0.018993	15.75792	0.0000
DMBLR	-0.194747	0.607803	0.320412	0.7510
C	3.052352	2.334689	1.307391	0.2014
R-squared	0.895462	Mean dependent var		6.521137
Adjusted R-squared	0.888253	S.D. dependent var		2.156994
S.E. of regression	0.721053	Akaike info criterion		2.272852
Sum squared resid	15.07761	Schwarz criterion		2.410265
Log likelihood	-33.36563	Hannan-Quinn criter.		2.318400
F-statistic	124.2060	Durbin-Watson stat		1.639480
Prob(F-statistic)	0.000000			

Author's computation 2016
R^2 = 0.895462, Adjusted R^2= 0.888253, D.W = 1.63, F-Statistic=124.2060, Prob. (F-Stats) = 0.000000.

The regression result in the table above revealed that, only deposit money banks credit (DMBC) to the agricultural sector passed the t-test at the 5% level of significance while the result for DMBLR shows otherwise. The results also showed that all the variables are positive and correctly signed. The positive impact of deposit money banks credit to the agricultural sector showed that, (DMBC) has a positive relationship with agricultural output (AQ). A unit change in DMBC affects agricultural output (AQ) by 0.299294. The result also shows that Deposit Money Banks' Lending Rate (DMBLR) has an inverse relationship with AQ, which is consistent with the a priori expectation. The coefficient of this variable is not significant at 0.05significance level. The magnitude of the coefficient is 0.2692, and by implication, one per cent increase in interest rate will lead to -0.194747 per cent decrease in agricultural output. The insignificant nature of this variable means that high lending rate will exert an adverse effect on agricultural output.

Also the result further revealed that DMBLR has a t-value of 0.320412 and P-Value of 0.7510, indicating that all things been equal, DMBLR will insignificantly inversely affect AQ at 75.1% confidence level. An adjusted R^2 of 0.89 showed that 89 percent of the systematic variations in the agricultural output is influenced by the effect of Deposit Money banks Credit to the agricultural sector (DMBC) while 11% is accounted for by other factors. The robustness of this result is further buttressed by an F-statistic of 124.2 while the Durbin-Watson Statistic of 1.63 clearly indicated the rear absence of autocorrelation. An estimated probability values (Prob. (F-stats) of 0.0000 is significant enough to conclude that, the

model has performed well. The coefficient of constant was 3.052352 which determine the value of AQ given a unit increase or decrease in any of the independent variables, while all other variables are rendered zero. The result of the regression analysis for the test of hypotheses shows that Deposit Money credit to the agricultural sector in Nigeria for the period under study had significant and positive impact on agricultural output at 5% level. This findings are also in line with the a priori expectation of this study that (B1>0) and the empirical evidence of [8], While DMBLR has a coefficient of 0.194747 at a t-statistic value of 0.320412 and a p-value of 0.7510 indicating that DMBLR in Nigeria has insignificant impact on AQ at 5% level. This findings are also in consonance with the a priori expectation of this study that (B2>0).

Test of Hypothesis

The null hypotheses of study which states that; "There is no significant impact of Deposit Money Bank's credit and DMBLR on agricultural output in Nigeria were tested at 5% level of significance.

Considering result of regression analysis for the test of hypotheses in table (4) indicates that DMBC in Nigeria for the period under study has a significant and positive impact on AQ Therefore the null hypothesis is rejected. However in case of DMBLR, the null hypothesis is accepted.

5. Conclusion

The study examined the impact of deposit money bank's credit on agricultural output in Nigeria from 1981 to 2014. The found that within the period under review, there was substantial increase in Deposit Money banks' credit to the agricultural sector. Thus, Deposit Money banks' credit is a great and viable means of finance for growth in the agricultural sector in Nigeria even though the growth rate in agricultural output was far from being proportionate. Even so, the ordinary least square method showed that Deposit Money banks' credit to the agricultural sector significantly and positively affected agricultural output in Nigeria. Also the lending rate of Deposit Money Banks had an inverse relationship with AQ.

Policy Recommendation

In view of the findings of the research, the study recommended as thus:

Thus, Deposit Money banks' credit is a great and viable means of finance for growth in the agricultural sector

1 Deposit Money banks' should increase the volume of credit facilities granted to the agricultural sector to increase and sustain food production which will also create jobs for the teeming unemployed population in Nigeria.
2 Deposit Money banks' credit should be targeted at the real farmers and not the political farmers'.
3 Deposit Money banks' credit facilities should be subsidized or be reduced to a single digit Lending rate for agric. businesses and should have a longer moratorium to ensure effective performance of both agricultural output and the credit facilities.
4 Effective monitoring, supervision and training of farmers should be ensured.

Appendix

Table A1. *Raw Data for DMBCA, AQ & DMBLR.*

YEAR	DMBCA	AQ	DMBLR
1981	590.6	19.52	7.75
1982	786.6	22.56	10.25
1983	940.4	26.44	10.00
1984	1,052.1	33.78	12.50
1985	1,310.2	38.24	9.55
1986	1,830.3	39.93	10.50
1987	2,427.1	57.58	17.50
1988	3,066.7	86.58	16.50
1989	3,470.5	120.06	26.80
1990	4,221.4	122.23	25.50
1991	5,012.7	144.70	20.01
1992	6,978.9	217.42	29.80
1993	10,753.0	350.05	18.32
1994	17,757.7	528.95	21.00
1995	25,278.7	940.30	20.18
1996	33,264.1	1,27.75	19.74
1997	27,939.3	1,445.15	13.54
1998	27,180.9	1,600.58	18.29
1999	31,045.7	1,704.58	21.32
2000	41,028.8	1,801.48	17.98
2001	55,846.1	2,410.05	18.29
2002	59,849.7	2,847.11	24.85
2003	62,102.8	3,231.44	20.71
2004	67,738.6	3,903.96	19.18
2005	48,561.5	4,752.98	17.95
2006	49,393.4	5,940.24	16.94
2007	149,578.9	6,757.87	15.14
2008	106,353.8	7,981.40	18.99
2009	135,701.3	9,186.40	17.59
2010	128,406.0	13,040.89	16.02
2011	225,205.3	14,037.83	16.69
2012	316,364.0	15,816.00	16.51
2013	343.7	16,816.55	17.09
2014	478.9	18,018.61	16.28

Source: CBN Bulletin 2012 and 2014 Editions.

Table A2. *Unit Root Test.*

Null Hypothesis: AQ has a unit root				
Exogenous: Constant				
Lag Length: 1 (Automatic - based on SIC, maxlag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.291480	0.0203
Test critical values:	1% level		-3.670170	
	5% level		-2.963972	
	10% level		-2.621007	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(AQ)				
Method: Least Squares				
Date: 24/03/16 Time: 14:45				
Sample (adjusted): 1981 2014				
Included observations: 33 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
AQ(-1)	-0.014242	0.011028	-1.291480	0.2075
D(AQ(-1))	0.476728	0.162713	2.929868	0.0068
C	0.204597	0.088006	2.324812	0.0278
R-squared	0.306075	Mean dependent var		0.212934
Adjusted R-squared	0.254673	S.D. dependent var		0.139396
S.E. of regression	0.120344	Akaike info criterion		-1.302288
Sum squared resid	0.391031	Schwarz criterion		-1.162168
Log likelihood	22.53432	Hannan-Quinn criter.		-1.257462
F-statistic	5.954561	Durbin-Watson stat		1.750368
Prob(F-statistic)	0.007206			

Null Hypothesis: DMBC has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.033530	0.0286
Test critical values:	1% level		-3.661661	
	5% level		-2.960411	
	10% level		-2.619160	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(DMBC)				
Method: Least Squares				
Date: 24/03/16 Time: 14:56				
Sample (adjusted): 1981 2014				
Included observations: 33 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DMBC(-1)	-0.055196	0.053405	-1.033530	0.3099
C	1.011525	0.594174	1.702404	0.0994
R-squared	0.035525	Mean dependent var		0.521331
Adjusted R-squared	0.002268	S.D. dependent var		1.994953
S.E. of regression	1.992690	Akaike info criterion		4.279189
Sum squared resid	115.1536	Schwarz criterion		4.371704
Log likelihood	-64.32743	Hannan-Quinn criter.		4.309347
F-statistic	1.068184	Durbin-Watson stat		2.047690
Prob(F-statistic)	0.309898			

Null Hypothesis: DMBCLR has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.843103	0.0268
Test critical values:	1% level		-3.661661	
	5% level		-2.960411	
	10% level		-2.619160	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(DMBCLR)				
Method: Least Squares				
Date: 24/03/16 Time: 15:07				
Sample (adjusted): 1981 2014				
Included observations: 33 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DMBCLR (-1)	-0.525619	0.162073	-3.243103	0.0030
C	2.011069	0.618527	3.251385	0.0029
R-squared	0.266152	Mean dependent var		0.008237
Adjusted R-squared	0.240847	S.D. dependent var		0.220159
S.E. of regression	0.191824	Akaike info criterion		-0.402141
Sum squared resid	1.067092	Schwarz criterion		-0.309625
Log likelihood	8.233181	Hannan-Quinn criter.		-0.371983
F-statistic	10.51772	Durbin-Watson stat		1.809700
Prob(F-statistic)	0.002972			

Table A3. *OLS Regression Result.*

Dependent Variable: AQ				
Method: Least Squares				
Date: 24/03/16 Time: 15:09				
Sample: 1981 2014				
Included observations: 33				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DMBC	0.299294	0.018993	15.75792	0.0000
DMBLR	-0.194747	0.607803	0.320412	0.7510
C	3.052352	2.334689	1.307391	0.2014
R-squared	0.895462	Mean dependent var		6.521137
Adjusted R-squared	0.888253	S.D. dependent var		2.156994
S.E. of regression	0.721053	Akaike info criterion		2.272852
Sum squared resid	15.07761	Schwarz criterion		2.410265
Log likelihood	-33.36563	Hannan-Quinn criter.		2.318400
F-statistic	124.2060	Durbin-Watson stat		0.639480
Prob(F-statistic)	0.000000			

Table A4. *Diagnostic Tests.*

Breusch-Godfrey Serial Correlation LM Test:				
F-statistic	11.55185	Prob. F(2,27)		0.0002
Obs*R-squared	14.75577	Prob. Chi-Square(2)		0.0006
Test Equation:				
Dependent Variable: RESID				
Method: Least Squares				
Date: 24/03/16 Time: 15:13				
Sample: 1981 2014				
Included observations: 33				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DMBC	-0.002189	0.014488	-0.151060	0.8811
DMBLR	0.588454	0.489198	1.202896	0.2395
C	-2.207095	1.872544	-1.178661	0.2488
RESID(-1)	0.759892	0.188385	4.033709	0.0004
RESID(-2)	-0.065010	0.195954	-0.331760	0.7426
R-squared	0.461118	Mean dependent var		2.43E-16
Adjusted R-squared	0.381283	S.D. dependent var		0.697405
S.E. of regression	0.548569	Akaike info criterion		1.779594
Sum squared resid	8.125055	Schwarz criterion		2.008615
Log likelihood	-23.47350	Hannan-Quinn criter.		1.855508
F-statistic	5.775927	Durbin-Watson stat		1.924598
Prob(F-statistic)	0.001714			

Heteroskedasticity Test: White				
F-statistic	2.940860	Prob. F(5,26)		0.0311
Obs*R-squared	11.55990	Prob. Chi-Square(5)		0.0413
Scaled explained SS	8.217626	Prob. Chi-Square(5)		0.1446
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 24/03/16 Time: 15:14				
Sample: 1981 2014				
Included observations: 33				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	31.77907	33.45690	0.949851	0.3509
DMBC	0.006612	0.368564	0.017939	0.9858
DMBC^2	-0.010246	0.005732	-1.787522	0.0855
DMBC* DMBCLR	0.033954	0.089032	0.381363	0.7060
DMBLR	-14.69922	17.14504	-0.857345	0.3991
DMBLR ^2	1.701676	2.194970	0.775261	0.4452
R-squared	0.361247	Mean dependent var		0.471175
Adjusted R-squared	0.238410	S.D. dependent var		0.629854
S.E. of regression	0.549668	Akaike info criterion		1.808356
Sum squared resid	7.855506	Schwarz criterion		2.083181
Log likelihood	-22.93369	Hannan-Quinn criter.		1.899453
F-statistic	2.940860	Durbin-Watson stat		0.708191
Prob(F-statistic)	0.031057			

Variance Inflation Factors			
Date: 24/03/16 Time: 15:15			
Sample: 1981 2014			
Included observations: 33			
Variable	Coefficient Variance	Uncentered VIF	Centered VIF
DMBC	0.000361	2.843729	1.001634
DMBLR	0.369424	3.206514	1.001634
C	5.450774	335.4855	1.001452

Definitions, Acronyms, Abbreviations

DMBC: Deposit Money Bank's Credit
DMBLR: Deposit Money Bank's Lending Rate
AQ: Agricultural output

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