



Cost of Funds Deregulation on Agricultural Investments in Nigeria: An Analysis

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ABSTRACT

The study examined agricultural investments in the light of deregulating the cost of funds. Factors that determine aggregate credit volume to the sector within the costs of funds regulated and deregulated periods and; the growth level in agricultural credit within the deregulated period were the specific objectives. Secondary data were used, sourced from Central Bank of Nigeria (CBN) and the National Bureau of Statistics (NBS). Data were analyzed using Co-integration technique and Real Credit Growth Rate Model. The Co-integration results showed that in the long-run, average interest lending rate and budgetary allocation were key variables on aggregate credit volume to agricultural sector. In the short-run, savings mobilized by financial institutions, the average lending rate, previous year's average saving rate, inflation rate and government budgetary allocation to the sector were the significant variables on credit volume to agriculture. The result of the real credit growth rate within the deregulated period was 8.91%. Arising from this, therefore, the study recommended a complete unbundling of the markets as it will ensure funds availability for investments in the sector.

Keywords: Agricultural investments, cost of funds, deregulation, Nigeria.

JEL Classifications: G11, Q14

1. INTRODUCTION

Nigeria's agricultural sector is a key sector in economic development of the country. With a share contribution of 20.85 percent to the Gross Domestic Product (GDP) in 2017 (NBS, 2017), it is incumbent to increase investments in the sector if it must continue to employ majority of Nigerians (more than 70 percent), supply the raw materials for industries and feed the nation. The sector's investment drive according to Ogbonna and Osondu (2015), is however, hinged on financial flow from the financial sector. Fasua (2017), observed that, this flow is dependent on the cost of funds. According to Pandey (2010), if the cost of fund is high, investment is low and vice versa. Any capital invested in the business whether borrowed or owned has an opportunity cost by using it in one particular fashion or by sacrificing the opportunity to use it in other ways. This opportunity cost is represented by the potential return from the best of these

other uses, expressed as a percentage of the amount invested (Warren, 1997). This cost of funds is simply the interest rate which is determine by the demand and supply of money. According to Fasua (2017), the market determines what cost it is willing to receive and the same market determines the cost that borrowers are willing to accept. This is one of many determinants, as risk of non-repayment (default risk premium), loss of purchasing power, liquidity premium, and policy rate are equally very key in borrowing cost determination.

In Nigeria, before 1986, the market minimally controlled the funds cost rate. Policy analysts were of the view that allowing market forces could spell doom. However, policy constraints overtime have not been well directed, as the cost of borrowing increased with each passing day and the targeted audience hardly benefited. For instance, one of the most popular instruments of credit policy in Nigeria has been to subsidize the cost of borrowing to farmers.

The reason for this is the belief that the demand for credit by small farmers is highly sensitive to the cost of borrowing. This belief is probably wrong as these farmers are hardly serviced, and such subsidies are skewed to large-scale or other businesses with quick turnover.

Prior to the introduction of Structural Adjustment Programme (SAP) in Nigeria in 1986, the Nigerian financial sector was characterized by rigid exchange and interest rate controls, and mandatory sectoral allocation of bank credit; all of which engendered distortion and inefficiencies that resulted to low direct investment (Amassoma et al., 2011). The introduction of SAP led to some financial deregulations like Interest and exchange rates, and liberalization of agricultural loan terms. However, as a reversal policy, the government in 1994, expressly introduced some measure of regulation into interest rate management owing to wide variations and unnecessarily high rate. This, too, was not sustained and in October 1996, the rates were partially deregulated with the banks given freedom to determine the structure of cost of funds in consultation with their customers. The Central Bank of Nigeria (CBN) however, retained its discretionary power to intervene in the money market to ensure orderly developments in the rates, and since 1997, the policy has not changed.

It is worthy to note that under a deregulated system, the market plays a vital role in determining the cost of funds, deposits and loans through consultation between the banks and customers. According to Afolabi et al. (2005), ceiling the cost of funds by government, creates highly concentrated market structure leading to monopolistic or oligopolistic tendencies as well as promoting inefficiencies which caused distortions in the economy. McKinnon (1973) and Fry (1989), demonstrated that the traditional monetary transmission mechanism occurs through interest rate channels, which affect interest rates, cost of borrowing, levels of physical investment and aggregate demand. Equally emphasized was the fact that the cost of funds encourage loans in form of external finance.

Financial deregulation as noted by Ifeanyi and Chukwu (2014), represents a policy response, encompassing a package of measures to remove all undesirable state imposed constraints on the free working of the financial market. It is based on the assumption that “markets know best” and hence take sufficient account of the regularly repeated lessons that financial markets can fail. These measures include the removal of ceilings, loosening of deposit and credit controls. One notable thing of a deregulated market is that, it opens the door way of lending and as a result increase investments. It is arising from this that the following objectives were set;

- i. To ascertain factors that determine aggregate credit volume to agriculture within the cost of funds regulated and deregulated periods
- ii. Estimate the growth rate level in agricultural credit within the deregulation period and implications for investments in the sector.

2. THEORETICAL FRAMEWORK

Cost of capital is the opportunity cost of making a specific investment. It is the rate of return that could have been earned by

putting the same money into a different investment with equal risk. Thus, the cost of capital is the rate of return required to persuade the investor to make a given investment. The required rates of return are market determined. They are established in the capital markets by the actions of competing investors. The demand and supply forces work in such a way that equilibrium rates are establish for various securities. Thus, opportunity cost of capital is given by;

$$I_o = \frac{C_1}{(I + k)} + \frac{C_2}{(I + k)^2} + \dots + \frac{C_n}{(I + K)^n}$$

Where I_o is the capital supplied by investors in period O (it makes a net cash inflow to the firm), C_n are returns expected by investors (they represent cash outflows to the firm) and K is the required rate of return or the cost of capital (Pandey, 2010).

Investment on the other hand, refers to capital expenditure on consumer durable and plants/machinery. Thus, investment focuses on the purchase of real tangible assets which are used in the production of goods and services for the future as opposed to present consumption (Anyanwu and Oaikhenan, 1995). And fixed, inventory and replacement are the different types, with fixed investment focus being on purchase of newly produced capital goods such as production machinery, newly built structure, office equipment, etc. Inventory investment deals with changes in stock of finished products and raw materials; investment directed at replacing worn out capital goods resulting from their use in the production process is replacement investment. It is worthy to note that in discussing investment, emphasis usually is placed on firm's expenditure on durable equipment and structure.

However, investment behaviour of firms is better understood by putting into perspective investment theories. The accelerator theory for instance, points that investment is a function of changes in income and output. It explains net investment in terms of growth in aggregate demand. Two versions of this theory can be distinguished; the fixed accelerator and the flexible accelerator. The former assumes a fixed ratio of current desired capital stock to current output while the latter incorporates time lags in the adjustment process between the level of output and the level of capital stock.

The marginal efficiency theory of investment is traceable to the work of John Maynard Keynes. The theory sees investment decision as a function of internal rate of return generated by investing in a particular asset and the prevailing market rate of interest.

The profits and residual theory regards profits and particularly undistributed profits, as a source of internal funds for financing investment. According to this theory, investment depends on profits and profits, in turn, depend on income, if total income and total profits are high, the retained earnings of firms are also high and vice versa. One weakness of the accelerator theory is that alternative financing arrangement in investment decision making is ignored. Yet, determinants such as availability, sources and cost of funds are key in investment decisions. Indeed, the simple accelerator theory thrives on the assumption that both the capital output ratio and the amount of funds required for investment are independent of the cost of capital.

Duesenberry's accelerator theory integrates the profits theory and the accelerator theory where investment depends on income, capital stock, profits and capital consumption allowance. The theory is built on the following propositions.

- i. Gross investment starts exceeding depreciation when capital stock grows
- ii. Investment exceeds savings when income grows
- iii. The growth of income and the growth of capital stock are determined entirely by the ratio of capital stock to income.

The financial theory of investment was developed by James Duesenberry as well. It is known as the cost of capital theory of investment. Accelerator theories assume that the market rate of interest represents the cost of capital to the firm which does not change with the amount of investment it makes. Essentially, it implies that unlimited funds are available to the firms at the market rate of interest. In other words, the supply of funds to the firm is very elastic. In reality, however, an unlimited supply of funds is not available to the firm in any time period at the market rate of interest. As more and more funds are required by it for investment spending, the cost of funds rises. To finance investment spending, the firm may borrow in the market at whatever interest rate funds are available.

The Jorgensons' neoclassical theory is based on the assumption that investment behaviour rest on the optimal capital stock. That is, investment decision is dependent on the firm's capacity to maximize its present value subject to a variety of market and non market constraints (Jhingan, 2010).

Tobin proposed the Q theory of investment which links a firm's investment decision to fluctuation in the stock market. Essentially, the theory is based on the market value of a firm's financial assets to their replacement cost. In other words, when a firm finances its capital for investment by using shares in the stock market, its share prices reflect the investment decisions of the firm. Therefore, if the market value of existing asset is denoted by MVA, and the asset replacement cost as CRA, the Q-theory is symbolically expressed as;

$$Q = MVA / CRA$$

3. REVIEW OF EMPIRICAL LITERATURE

3.1. Effect of Cost of Funds Deregulation on Agricultural Investments

Ifebuolili (2014) examined the impact of interest rate deregulation in enhancing agricultural productivity in Nigeria. Data for the study were analyzed using ordinary least square method. The results of the study showed that cost of funds deregulation had insignificant and positive impact on agricultural productivity in Nigeria. The study concludes that the contribution of interest rate or cost of funds deregulation was insignificant in the growth of Agricultural productivity in Nigeria. Tunji et al. (2012) examined the effect of interest rate deregulations on banks deposit mobilization in Nigeria. Ordinary Least Square (OLS) Regression method was used to analyze the relationship between interest rate and deposit mobilized over a period of 26 years (1985 to 2011).

The study found that there was a positive relationship between the independent and dependent variables, indicating that interest rate had a major influence on deposit mobilization.

Ifeanyi and Chukwu (2014) studied the Nexus of Interest Rate Deregulation and Economic Growth in Nigeria. Data were analyzed using Ordinary Least Square Regression. The result showed that the coefficients of Interest rate, Investment, Trade openness, Real exchange rate and inflation, contributed positively to the level of growth in Nigerian economy. Okoh and Nkechukwu (2014) studied the nexus of interest rate deregulation and economic growth in Nigeria using OLS method to analyze the data. Results revealed that deregulated interest rate had significant positive effect on economic growth. Similar study by Amassoma et al. (2011) on the Nexus of interest rate deregulation, lending rate and agricultural productivity in Nigeria, observed a decline in exchange rate implying that, a reduction in the cost of imported agricultural inputs, led to consequential increase in agricultural output. Idoko et al. (2012), assessed the impact of interest rates deregulation on economic growth in Nigeria. The study adopted both descriptive and analytical methods. Using an autoregressive model, GDP growth rate (G) was regressed against lending rate (LR), savings rate (SR), Inflation rate (IF), exchange rate (X), financial deepening (FD) and lagged G (G-1) for two separate periods; the regulated era (1970-1986) and deregulated era (1987-2009). The results showed that deregulated interest rate (represented by LR) had an insignificant impact on economic growth. Christopher et al. (2012) also assessed the impact of interest rates deregulation on economic growth in Nigeria. The research used time series data, sourced mainly from Central Bank of Nigeria (CBN) bulletin and World Bank data base. Data were analyzed using OLS method. Four separate models were estimated to capture the relationship between Real Deposit Rate (RDR) and Total Savings (TS) (Model 1), Real Lending Rate (RLR) and investment (INV) (Model 2), INV and economic growth (Model 3), and RLR and economic growth (RGDP) (Model 4) for both the deregulated era (1987-2009) and the regulated era (1964-1986). The study revealed that RDR does not have any significant impact on total savings before and after the deregulation era. RLR also had no significant impact on investment before and after the deregulation era. Investment had a positive and significant impact on economic growth before and after the deregulation of interest rate. And RLR had no significant impact on economic growth before and after deregulation. Ene et al. (2015) studied the effect of Interest Rates Deregulation on the Performance of Deposit Money Banks in Nigeria. OLS regression method was used in analyzing the data. Findings from the study revealed that deregulated interest rates had positive and significant impact on the ROA of deposit money banks. The study also showed that, as interest rates increase, the Rate of Return (ROA) also appreciates. The study further revealed that deregulated interest rates had positive and significant relationship with the loans and advances of deposit money banks.

Adofu et al. (2010) studied the changes in Agricultural production since the deregulation of interest rates in 1986 using ordinary least square method. The study found that interest rate deregulation had significant and positive impact on Agricultural productivity in Nigeria. The empirical analysis also suggested that interest rate

played a significant role in enhancing economic activities and that monetary authorities should ensure appropriate determination of interest rate level that will break the double - edge effect of interest rate on savers and local investors. Enyioko (2012), showed that interest rate policies significantly improved the performance of banks in the area of Return on Assets(ROA). He used secondary data for the study and analysed the data using regression and error correction methods.

Iliyasu (2019), used regression analysis to study the impact of lending interest rate on agricultural activities for real and nominal values from 1999-2016 and noted that, interest rate had a strong significant but negative relationship on the sector. Ali et al. (2017), studied the effects of interest rates on farmers' access to agro-credit in Kaduna, Nigeria using survey research methodology and concluded that age, farmers' level of education, interest rate, credit worthiness and farm income were very key in sourcing for credit and increasing investments in agriculture.

3.2. Level of Growth Rate in Agricultural Credit Before and After Deregulation Period

Empirical studies in Nigeria are divided on the effect of interest rate deregulation on economic growth. The anti-deregulation researchers posit that interest rate deregulation does not have significant positive effect on growth and economic wellbeing of the citizenry (Udoka and Anyingang, 2012; Obute et al., 2012; Itodo, Eche and Kamo, 2012 and Abogan et al., 2014). According to Obute et al. (2012), the deregulation exercise has remained incomplete in the system and as such, deregulation of interest rates is still tied to the monetary policy rate. Accordingly, the situation has negatively affected efficient allocation of funds and economic productivity. However, the pro-interest rate deregulation researchers posit that interest rate has positive effect on economic growth. These researchers include Obamuyi (2009); Adofu et al. (2010); Amassoma et al. (2011); Obokoh et al. (2011); Ezeanyejì (2014) and Okoh and Nkechukwu (2014). Most of these studies used only the lending rate to proxy for interest rate deregulation. Specifically, Onyishi et al. (2015) examined the effects of interest rate deregulation on agricultural finance and growth in Nigeria and showed that there was a significant differential effect on the aggregate credit volume to agricultural sector between the regulated and deregulated regimes. The study also showed that interest rate was an important determinant of aggregate credit volume to the agricultural sector in Nigeria especially during the deregulated period but; monetary authorities should ensure appropriate determination of interest rate level. A study by Udoka and Anyingang (2012) also showed that there was a difference in agricultural credit growth rate before and after the deregulation of interest rate.

4. METHODOLOGY

4.1. Study Area

The study area is Nigeria; it has a geographical area of 923,768 square kilometers and a population of 167 million people (NPC, 2011). Nigeria is located between latitudes 4° 16 and 13° 53 North and longitudes 2° 40 and 14° 41 respectively. It is located within the tropics and therefore experiences high temperatures

in the greater part of the year. The mean temperature for the country is 27°C, with a climate varying from very wet around the coastal area with annual rainfall greater than 3500 mm, and less than 600 mm around the Sahel Region in the Northwest and North eastern parts. (NEEDS, 2005). Nigeria is distinguished by the diversity of the ecosystem; an advantage of growing a wide range of crops. The main staple food crops produce includes yam, cassava, rice, maize, sorghum, millet and livestock such as poultry, cattle, goats, etc.

4.2. Data Collection and Analysis

Secondary data were used in the study and were collected from Central Bank of Nigeria (CBN) statistical bulletins and annual reports, National Bureau of statistics (NBS) annual report etc; the data used were from 1981-2017 period. Data collected were on savings rate, credit volume, budgetary allocation, interest rate, inflation rate, loan to agricultural sector, savings mobilized, exchange rate and GDP. Collected data were analyzed using co-integration, Real credit Growth Rate Model, and multiple regression analysis.

4.3. Model Specification

4.3.1. Model for objective I

The factors that determine aggregate credit volume of agricultural investment within the cost of funds regulated and deregulated periods are given as:

$$Y_t = b_0 + b_1 X_{1t} + b_2 X_{2t} + b_3 X_{3t} + b_4 X_{4t} + \dots + b_8 X_{8t} + e_t \quad (1)$$

Where Y_t = aggregate credit volume to agricultural investment in time t (N)

X_{1t} = average interest lending rate or cost of funds in time t (ratio/%)

X_{2t} = aggregate interest lending rate or cost of funds in time t (ratio/%)

X_{3t} = savings mobilized by financial institutions in time (N)

X_{4t} = average inflation rate in time t (ratio/ %)

X_{5t} = government budgetary allocation to agriculture (N)

X_{6t} = credit to private sector (agric. and non agric) in time t (N)

X_{7t} = direct investment into Nigeria's economy in time t (N)

X_{8t} = average exchange rate in time t (ratio/ %)

b_0 = intercept

$b_1, b_2, b_3, \dots, b_8$ = coefficients of the variable

e_t = error term in time t.

The study adopted the Engle and Granger (1987) two-step Co-integration technique. Step one involved a preliminary analysis to find the order of integration of data series; Ordinary Least Square (OLS) regression was thereafter carried out to estimate the equation for the aggregate economy, where the integration could be found. These are the stationary (unit root) and Co-integration test respectively. In the second stage, the residual obtained in the long run Co-integration regression was used as explanatory variable to specify a dynamic error correction model, which was estimated through OLS regression.

4.3.1.1. Unit root test

In order to avoid spurious results emanating from non-stationarity of data series, the data were tested using the Augmented Dickey-Fuller unit root test. The Augmented Dickey-Fuller unit root test was carried out under the null hypothesis $\delta = 0$, against the alternative hypothesis of $\delta \neq 0$

This is specified by the model below:

$$\Delta Y_t = \alpha + \delta Y_{t-1} + \sum \gamma \Delta Y_{t-j} + e_t \tag{2}$$

Where:

- Y = series to be tested
- ΔY_t = first difference of Y_t
- δ = test difference coefficient
- j = lag length chosen for ADF
- e_t = white noise
- t = time or trend variable.

Here the significance of δ was tested against the null that $\delta = 0$. Thus, if the hypothesis of non-stationarity cannot be rejected, the variables were differenced until they became stationary, that is until the existence of a unit root is rejected. Co-integration was thereafter tested.

4.3.1.2. Co-integration analysis: ARDL bounds test

The Autoregressive Distributed Lag (ARDL) Co-integration test, otherwise called the Bounds Test developed by Pesaran et al. (2001) was used to test for the Co-integration relationships among the series in the model. This was performed by conducting a Wald test (F-test version for bound-testing methodology) for the joint significance of the lagged levels of the variables. Once Co-integration was established, the conditional ARDL (p, q1, q2, q3, q4), the long-run model for Y_t can then be estimated as:

$$\begin{aligned} \text{Ln}Y_t = & \beta_0 + \sum_{i=1}^p \alpha_i \text{Ln}Y_{t-i} + \sum_{i=0}^{q1} \alpha_2 \text{Ln}X_{1t-i} \\ & + \sum_{i=0}^{q2} \alpha_3 \text{Ln}X_{2t-i} + \sum_{i=0}^{q3} \alpha_4 \text{Ln}X_{3t-i} + \sum_{i=0}^{q4} \alpha_5 \text{Ln}X_{4t-i} \\ & + \sum_{i=0}^{q5} \alpha_6 \text{Ln}X_{5t-i} + \sum_{i=0}^{q6} \alpha_7 \text{Ln}X_{6t-i} + \sum_{i=0}^{q7} \alpha_8 \text{Ln}X_{7t-i} \end{aligned} \tag{3}$$

This involves selecting the orders of the ARDL (p, q1, q2, q3, q4, q5, q6, q7) model in the eight variables using Akaike Information Criterion (Akaike, 1973)

4.3.1.3. Error correction model

The ECM is specified as follows:

$$\begin{aligned} \Delta \text{Ln}Y_t = & \delta_0 + \sum_{i=1}^p \Delta \delta_i \Delta \text{Ln}Y_{t-i} + \sum_{i=0}^{q1} \delta_2 \Delta \text{Ln}X_{1t-i} + \sum_{i=0}^{q2} \delta_3 \Delta \text{Ln}X_{2t-i} \\ & + \sum_{i=0}^{q3} \delta_4 \Delta \text{Ln}X_{3t-i} + \sum_{i=0}^{q4} \delta_5 \Delta \text{Ln}X_{4t-i} + \sum_{i=0}^{q5} \delta_6 \Delta \text{Ln}X_{5t-i} \\ & + \sum_{i=0}^{q6} \delta_7 \Delta \text{Ln}X_{6t-i} + \sum_{i=0}^{q7} \delta_8 \Delta \text{Ln}X_{7t-i} + \rho \text{ECM}_{t-1} + \mu_t \end{aligned} \tag{4}$$

From equation (4), δ_0 is the drift; $\delta_1 - \delta_7$ represents the short-run dynamics coefficients of the model's convergence to equilibrium. ECM_{t-1} is the Error Correction Model. ρ is the coefficient of the Error Correction Model which measures the speed of adjustment to obtain equilibrium in the event of shocks to the system.

4.3.2. Model for objective ii

The Real Growth Model modified from the study of Sa (2007), was used to estimate the level of growth rate in agricultural credit in Nigeria before and after the deregulated period. It is given as;

$$P_t = 100 \left(\frac{\frac{C_t}{I + \pi_t}}{\frac{C_{t-1}}{I + \pi_t}} - 1 \right)$$

Where: C_t = volume of credit in time t
 C_{t-1} = previous year volume of credit, π_t = inflation rate of a country in time t

5. RESULTS AND DISCUSSION

5.1. Impact of Cost of Funds Deregulation Policies on Nigeria's Agricultural Growth

The study examined the effect of cost of funds or interest rate on agricultural growth in Nigeria from 1981 - 2017. The results of the study obtained showed that, deregulation had (has) significant and positive impact on agricultural growth in Nigeria within the period under study. This implies that a unit increase in the cost of funds or interest rate will Increase agricultural productivity by 1088.82 (Table 1). This result is in line with studies by Onyishi et al. (2015) and Ifeanyi and Chukwu (2014), whose results showed that interest rate deregulation had a significant positive relationship with growth of Agricultural

Table 1: Impact of cost of funds deregulation policies on Nigeria's agricultural growth

Variable	Co-efficient	Standard error	t-statistic
Constant	-1586.912	2435.950	-0.65
Cost of funds or interest rate	1088.816	355.67	3.061**
R ²	0.22		
Adj R ²	0.19		
F-statistics	9.37***		

Computed from CBN data, 2017. Statistical significant levels ***=1%, **=5%; *=10%

Table 2: Results of ADF test

Variable	ADF (stat)	Variable (1 st diff)	ADF (stat)	Order of integration
Y	-0.7014	ΔY	-6.2026***	I(1)
X ₁	2.0279	ΔX_1	-4.3804***	I(1)
X ₂	-0.8585	ΔX_2	-5.5078***	I(1)
X ₃	-0.1957	ΔX_3	-4.443***	I(1)
X ₄	-3.6918***	ΔX_4		I(0)
X ₅	-1.1359	ΔX_5	-7.8709***	I(1)
X ₆	-0.0751	ΔX_6	-4.2520***	I(1)
X ₇	-1.2812	ΔX_7	-8.0421***	I(1)
X ₈	-1.9345	ΔX_8	-5.0035***	I(1)

Source: Computed from CBN data, 2017. *** Significant level at 1% (-3.6463)

productivity in Nigeria. Theories explaining cost of funds or interest rate deregulation suggest that, this phenomenon will promote required resource inflow into agriculture to enable it achieve expected contributions to national development. Nevertheless, the results of this research did not agree with the study of Idoko et al. (2012) and Ifebuolili (2014). In their study, interest rate deregulation had no significant impact on the growth of Agricultural productivity in Nigeria.

5.2. Factors that Determine the Aggregate Credit Volume of Agriculture Within the Cost of Funds Regulated and Deregulated Periods

5.2.1. ADF test for stationarity (unit root test)

Table 2 explains the summary statistics of ADF test. The results of the test indicated that only one variable was stationary at level 1(0), while others were stationary at first difference 1(1). Specifically, average interest lending rate (X_1). Average interest savings rate (X_2). savings mobilized by financial institutions (X_3), government budget allocation (X_5), credit to private sector (X_6), direct investment into Nigeria's economy (X_7) and aggregate credit volume to agriculture (Y) were all stationary at first difference, while the average inflation rate (X_4) was stationary at level 1(0). The findings of the study provided the justification of ARDL Approach.

5.3. Bounds Test for Co-integration

Table 3 interprets the findings of Wald-test (F-Statistics) for long-run relationship. As indicated on the table below, the calculated F-statistics (3.81) is significantly higher than the upper bound critical value at a 5 and 1 percent level of significance. This implies that the null hypothesis of no Co-integration is rejected at 5 and 1 percent significance level. Therefore a co-integrating relationship among the variables is confirmed.

5.4. Long-run Estimates of the Aggregate Credit Volume of Agriculture Within the Cost of Funds Regulated and Deregulated Periods

The long-run estimates showing the aggregate credit volume of agriculture within the interest rate or cost of funds regulated and deregulated periods is presented in Table 4. The results show that average interest lending rate (X_1) and government budget allocation (X_5) were the significant variables that had a long-run effect on the aggregate credit volume to agriculture. The coefficient of interest rate or cost funds was negative (-1.0708) and statistically significant at 5%. It implies also that an increase in the cost of funds will reduce the aggregate credit volume of agriculture. Conversely, government budget allocation had a positive coefficient (0.8284), and significant effect on aggregate credit volume of agriculture at 1%. This implies that an increase in government budget allocation will increase the aggregate credit volume to agriculture. The result obtained is in line with that of Onoja et al. (2013).

5.5. Short-run Estimates of the Aggregate Credit Volume of Agriculture Within the Cost of Funds Regulated and Deregulated Periods

The short-run result of aggregate credit volume to agriculture within the cost of funds regulated and deregulated periods is presented in Table 5. The coefficient of the error correction term (-0.9164) is negative and statistically significant at the 1 percent

Table 3: Results of bound test for co-integration

Critical value	Upper bound	Lower bound
5%	3.15	2.11
1%	3.77	2.62

Computed F-statistic: 3.81, Critical Values at $K = 8-1=7$ are cited from Pesaran et al. (2001)

Table 4: Long-run estimate of aggregate credit volume of agriculture within the cost of funds regulated and deregulated periods

Regressor	Coefficient	SE	Z-ratio
$\text{Ln}X_1$	-1.0708**	0.3976	-2.6936
$\text{Ln}X_2$	1.1668	0.6808	1.7140
$\text{Ln}X_3$	1.0822	1.2100	0.8943
$\text{Ln}X_4$	0.3343	0.2466	1.3555
$\text{Ln}X_5$	0.8284***	0.2362	3.5059
$\text{Ln}X_6$	-0.2070	1.3127	-0.1577
$\text{Ln}X_7$	-0.0461	0.2767	-0.1666
$\text{Ln}X_8$	-0.1618	0.2093	-0.7733
C	2.1185	10.4687	0.2024

Source: Computed from CBN data, 2017

Table 5: Short-run estimates of the aggregate credit volume to agriculture within the cost of funds regulated and deregulated periods

Regressor	Coefficient	SE	z-ratio
$\Delta \text{Ln}X_1$	-0.3632	0.1732	-2.0965*
$\Delta \text{Ln}X_2$	-0.1876	0.3089	-0.6072
$\Delta \text{Ln}X_3(-1)$	-0.6283	0.3475	-1.8078*
$\Delta \text{Ln}X_3$	3.8764	0.7017	5.5240***
$\Delta \text{Ln}X_4$	0.3615	0.1201	3.0086***
$\Delta \text{Ln}X_5$	0.5164	0.1144	4.5137***
$\Delta \text{Ln}X_6$	-1.0829	0.5861	-1.8474*
$\Delta \text{Ln}X_{6(-1)}$	-2.1282	0.4778	-4.4548***
$\Delta \text{Ln}X_7$	-0.1052	0.1696	-0.6200
$\Delta \text{Ln}X_8$	-0.1589	0.2416	-0.6574
$\text{ECM}_{(-1)}$	-0.9164	0.1138	-8.0459***

Source: Computed from CBN data, 2017. $\text{Cointeq} = \text{LN}Y - (-1.0708 * \text{LN}X_1 + 1.1668 * \text{LN}X_2 + 1.0822 * \text{LN}X_3 + 0.3343 * \text{LN}X_4 + 0.8284 * \text{LN}X_5 - 0.2071 * \text{LN}X_6 - 0.0461 * \text{LN}X_7 - 0.1618 * \text{LN}X_8 + 2.1186)$. Significant levels ***=1%, **=10%

level. The negative and significant coefficient is an indication of co-integrating relationship between aggregate credit volume to agriculture and its explanatory variables. The magnitude of the coefficient implies that 92% of the disequilibrium caused by previous year's shocks converges back to the long-run equilibrium in the current year; meaning that the adjustments is high to correct to the long term equilibrium. The result showed that average interest lending rate, previous year's average savings rate, savings mobilized by financial institutions, average inflation rate, government budget allocation to agriculture and credit to private sector were the significant variables that had a short-run impact on aggregate credit volume to agriculture within the regulated and deregulated periods. Specifically, the coefficient of savings mobilized by financial institutions (3.8764), average inflation rate (0.3615) and government budget allocation to agriculture (0.5164) were positive and statistically significant at 1%, respectively. These suggest that an increase in savings mobilized by financial institution, average inflation rate and government budget allocation to agriculture will have a positive effect on aggregate credit volume to agriculture. Furthermore, average interest lending rate

(-0.3632). previous year's average savings rate(-0.6283) and credit to private sector all have a negative but significant effect on aggregate credit volume to agriculture within the regulated and deregulated periods at various levels of significance. This denotes that aggregate credit volume of agriculture increases with a decrease in average interest lending rate, previous year's average savings rate and credit to private sector (-1.0829). The findings of this study are in line with that of Chinyere and Gabriel (2016), who obtained a negative short-run relationship between interest rate and investments in Nigeria. Similarly, Ene et al. (2015), obtained a direct relationship between cost of funds and performance rate of the banks in the short run.

5.6. Diagnostic Tests

The regression for the underlying ARDL equation fits very well and also passes the diagnostic tests against serial correlation; functional form misspecification, non-normal errors and heteroscedasticity as presented in Table 6.

5.7. Level of Real Credit Growth Rate to Agriculture in Nigeria Within the Deregulation Period and Implications for Investments in the Sector

The level of real credit growth rate to agriculture in Nigeria is shown in Table 7. Usually, the real growth rate takes into account the inflation rate at a given time, and this study considered this in estimating the level of real growth rate. By estimates, agricultural credit growth rate increased in real terms at 8.91% in the period under consideration. This indicates that, during this period, financial institutions and government credit agencies, supplied the sector with this percentage of credit. The result obtained from the study is higher than that of Onyishi et al. (2015), who had a value of 0.01% for credit growth between 1970-2011. More so, the findings show that agricultural GDP contribution to Nigeria economy had positive relationship with credit volume to agriculture. It also indicates that a 1% increase in agricultural credit would lead to 0.0014% increase in agriculture's GDP contribution to Nigerian economy. The result of this study affirm similar study by Onyishi et al. (2015), that cost of funds deregulation has positive effect on economic growth.

Table 6: ARDL-VECM Model diagnostic test

LM test statistic			
Serial correlation	2(1)=3.6194 [0.1571]	Normality	2(2)=1.9614[0.3750]
Functional form	2(1)=1.7641 [0.184]	Heteroscedasticity	2(1)=6.8093[0.9859]

Source: Computed from Eviews Results

Table 7: Level of real credit growth rate in agriculture in Nigeria (1981-2017)

Items	Rate/Model
Real credit growth rate	8.91
Agriculture GDP contribution and Credit volume relationship model	$=1.4 \times 10^{-3}x + 1185.19$

Source: Computed from CBN data, 2017, where Y= agriculture GDP contribution to Nigerian economy; X = credit volume to agriculture

Arising from this, therefore, attracting investments to the sector in the short and long run is predicated on unbundling the costs of funds, increasing government budgetary allocation and mobilization of savings by financial institutions. It therefore, implies that the financial theory by James Duesenberry holds sway in this circumstance, as its centred on increasing investments through unlimited funds availability at the market rate of interest. Consequently, to grow and to sustained the sector, the markets must be completely deregulated.

6. CONCLUSION

Increasing agricultural investments in Nigeria is dependent on many factors, principal among which is the deregulation of the cost of funds. This will not only affect the lending rate, but will encourage many farmers to borrow. On the other hand, budgetary allocation to the sector and savings habit of farmers will not only stimulate growth but will build up capital formation for the sector's sustainability.

The study examined Agricultural Investments in the light of deregulating the cost of funds. Factors that determine aggregate credit volume to the sector within the costs of funds regulated and deregulated periods and; the growth level in agricultural credit within the deregulated period were the specific objectives. The Co-integration results showed that in the long-run, average interest lending rate and budgetary allocation were key variables on aggregate credit volume to agricultural sector. In the short-run, savings mobilized by financial institutions, the average lending rate, previous year's average saving rate, inflation rate and government budgetary allocation to the sector were the significant variables on credit volume to agriculture. The result of the real credit growth rate within the deregulated period was 8.91%. Arising from this, therefore, the study recommended a complete unbundling of the markets as it will ensure funds availability for investments in the sector.

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