

Exchange rate volatility and bank lending to agricultural sector in Nigeria

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Abstract

This study has focused on the volatility of exchange rate and bank lending to the agricultural sector in Nigeria. This study was confronted by the volatility of the naira exchange rate and its impact on agricultural credit in an economy which relies on imported inputs, machinery and formal credit for agriculture. The purpose of the study was to examine the impact of exchange rate volatility on bank lending to the agricultural sector in Nigeria. The financial intermediation theory, credit rationing theory and bank lending channel theory are the basis of this study. The type of research design used was expost facto while the type of data used was time series with number of observations of 39 years (1986-2024). The data were collected from the secondary sources primarily from the official macro-economic and financial data. Descriptive statistics, Augmented Dickey-Fuller unit root test, ARCH model and GARCH model were used as the method of data analysis. The level of significance was 0.05. The results of the GARCH indicated that the exchange rate had positive and significant influence on the bank lending to agriculture while the ARCH and GARCH terms indicated that there was volatility persistence. The results suggested that exchange rate instability had an impact on agricultural lending behaviour in Nigeria. The study concluded that one of the important conditions for sustainable financing of agriculture was the stable exchange rate. The study recommended for a foreign exchange credit window for Agriculture with targeted approach to alleviate the burden of input costs and agriculture credit. This study has made contribution to knowledge as it has discovered direct relationship between exchange rate volatility and agricultural bank lending.

Keywords: Exchange rate volatility; Bank Lending; Agricultural Sector; GARCH model; Nigeria.

1. Introduction

Exchange rate volatility is the constant and unpredictable fluctuations of the exchange rate of a country's currency vis-à-vis other countries' currencies. In Nigeria, due to the overdependence of oil, foreign exchange scarcity, inflationary pressure, import dependence and periodic exchange rate reforms, exchange rate volatility has continued to worsen. According to Central Bank of Nigeria [CBN] (2023) and World Bank (2023), foreign exchange market unification in 2023 was targeted at enhancing the transparency and price discovery process; however, it exposes the productive sectors to sharper exchange rate adjustment mechanism and exorbitant import cost. This volatility culminates to macroeconomic uncertainties, credit risk assessment and ultimately impacts the lending decision of deposit money banks to sectors with unsteady cash flow in banking sector (Sikiru & Salisu, 2025).

Financial intermediation is an effective mechanism of providing bank loans to agriculture which help in food production, employment and rural income and economic diversification. Credit is one of the major sources of agricultural financing in Nigeria with majority of the farmers and agribusinesses accessing it for various reasons such as seedlings, agrochemicals, fertilizers, mechanisation, storage and transportation and irrigation. However, the impression created about banks is that lending to this sector is considered risky owing to climatic shocks, lack of collateral, poor infrastructure, fluctuation of prices, long production cycle etc. (Ogadi, 2023; Sikiru & Salisu, 2025). Recent studies have

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revealed that commercial bank credit is still important in the agricultural output but, the effectiveness of the credit is dependent on macro-economic stability and the ability of the borrowers to pay back the loans in the face of changes in costs (Okafor, 2020; Obialor, 2025).

The impact of exchange rate volatility on bank lending to agriculture is through the cost, risk and profitability channels. The majority of the farm inputs and farm machines are imported leading to naira depreciation, consequently, farm operating margin is reduced and production cost increased. This has a negative impact on borrowers' repayment capacity, and can improve the potential of non-performing loans in banks' agricultural loans portfolio. Meanwhile, the volatility leads to uncertainty in input and output prices, availability of foreign exchange in the banks, which makes them reluctant to provide term term loans to the agriculture sector. Therefore, even with the prioritisation of agriculture in policies, a change in the exchange rate can result in less formal credit available in the agriculture sector (Femi-Olagundoye, 2024; Udo, Abu, & Ochoche, 2024).

However, the Nigerian scenario is more important as agriculture is perceived as the sector that holds the key to food security and non-oil diversification. Whereas, the banking sector is perceived as the sector that holds the key to mobilising credit for productive investment. However, the naira has experienced a series of devaluations and the high interest rates and inflationary pressure has been a challenge in financing agriculture. Hence, it is crucial to analyse the volatility of the exchange rate and bank lending to agricultural sector in Nigeria to determine if foreign exchange instability is hampering the ability of banks to lend to the agricultural sector and if macroeconomic reforms are facilitating or inhibiting agricultural credit delivery.

The literature on exchange rate volatility in Nigeria has been largely focused on the effect of exchange rate volatility on agricultural production, agricultural export, inflation, economic growth and economic sectoral performance (Femi-Olagundoye, 2024; Udo et al., 2024). Likewise, studies on agricultural financing have mostly focused on the role of commercial bank credit in agricultural productivity and economic development (Obialor, 2025; Okafor, 2020). While these studies have helped to enrich the understanding of the impact of exchange rate volatility on agriculture and the impact of agricultural credit, they have not paid much attention to the direct effect of exchange rate volatility on bank lending to agriculture. Thus, how exchange rate volatility is transmitted to banks' credit supply to agricultural borrowers is not well understood. Moreover, most of the previous studies are done on the basis of total credit to the domestic sector or private sector with no distinction of credit to agriculture. This aggregation hides sector-specific reactions and it is difficult to detect the response of agricultural lending to exchange rate changes in comparison to other sectors of the economy (Ogadi, 2023; Udo et al., 2024). Further, most of the available evidence was produced prior to the recent foreign exchange market reforms and exchange rate unification policy implemented in Nigeria that impacted the exchange rate environment and lending conditions (CBN, 2023; World Bank, 2023). Clearly, in this context such literature is absent and there is a need for its inclusion. This study therefore, examines the relationship between exchange rate volatility and bank lending to the agricultural sector in Nigeria.

2. Literature Review

2.1. Conceptual Framework

2.1.1. Exchange Rate Volatility

Exchange rate volatility is the instability, fluctuation or unpredictability of the value of a currency with respect to another currency in a period of time. It is a reflection of the size of the exchange rate deviation from the normal development because of macroeconomic shocks, foreign exchange demand and supply, inflation differentials, interest rate changes, trade imbalances, capital inflows, political uncertainty and speculative pressures. The volatility of exchange rate is expected to be more pronounced in the developing economies as a result of less diversification of foreign exchange markets, fluctuations in commodity prices, external debt burden and policy uncertainty (Dornbusch, 1976; Sikiru & Salisu, 2025).

The macro-economic challenge that the exchange rate volatility in Nigeria has been a challenge is the fact that Nigeria is a crude oil dependent country, import dependent, lack non-oil export capacity and weak foreign exchange management system. The effect of the exchange rate fluctuation on domestic price, price of imported input, investment decision, production planning and stability in the financial sector in Naija. Volatile exchange rates will create difficulties for economic agents in forecasting the future cost and returns and will result in a decline in the confidence of long-term investment. The recent evidence in Nigeria suggests that the exchange rate has effects on the productive sectors as it makes production more expensive, lowers the investment incentives, and makes the financial market uncertain (Femi-Olagundoye, 2024; Joy, 2025). The exchange rate volatility for banks is important as it affects borrowers' repayment of

loans and risk of lending. A sudden fall in the value of the domestic currency makes the imported machines, fertilisers, chemicals etc., better seeds etc., more expensive. This can have a detrimental impact on the profitability of agricultural borrowers, and lead to a higher risk of loan default. This may cause banks to become more cautious in lending, to demand more collateral, to charge a higher interest rate, or to cut back on loans to sectors they think will be affected by exchange rate fluctuations. Thus, exchange rate volatility is not only a monetary phenomenon, but also a credit-risk factor that can impact the bank lending to agriculture, (Udo et al., 2024; Sikiru & Salisu, 2025).

Bank Lending to Agriculture Sector

Bank lending to agriculture is the credit facilities provided by the deposit money banks and other financial institutions to the farmers, agro-processors, agricultural co-operatives, input suppliers and agribusiness enterprises for production, processing, storage, transportation, marketing and investment purpose. Agricultural credit could be short, medium or long term depending on the need for which it is required, e.g., seasonal, farm expansion, mechanization, irrigation, storage or agro-industrial development. Bank credit to agriculture is very important in the developing economies since many farmers in developing economies are not saving enough to undertake productive investments (Gurley & Shaw 1960; Okafor 2020). Agriculture is still the key sector in Nigeria for food security, job creation, poverty alleviation, rural development and economic diversification. But, the availability of formal credit, high interest rate, low value of collateral, poor infrastructure in rural areas, climatic risks and price volatility in the sector are constraints. Therefore, it is expected that the funding gap will be filled with commercial bank loans to enable the agricultural operators to access better technology, boost their production, enhance productivity and value chain development. The empirical evidence reveals that credit, when available, cheap and well utilized, can have a positive impact on agricultural output when it is used to finance agriculture (Obialor, 2025; Udo et al., 2024).

Although it is important, banks tend to view agricultural lending as risky as agricultural production is susceptible to natural, market, institutional and macro-economic uncertainties. These risks include weather conditions, pest control, lack of insurance, lack of storage facilities, volatile commodity prices and poor repayment mechanisms. The sector is also at high risk level due to the volatility of the exchange rate, many of the inputs used in agriculture are import dependent. Farmers are affected by the naira depreciation, as they have to pay more to produce and banks are also affected by the increased risk of default. Thus, aside from the availability of loanable funds, the perception of the banks on the macroeconomic stability, borrowers' credibility, profitability of the agricultural sector and prospects of credit recovery all impact the level of lending to agriculture (Femi-Olagundoye, 2024; Joy, 2025).

2.2. Theoretical Framework

2.2.1. Financial Intermediation Theory

The first theory behind the study is the financial intermediation theory which is related to Gurley and Shaw (1960). The theory explains how financial institutions are used to transfer money from surplus economic units to deficit economic units for productive purpose. This is carried out by banks as they receive deposits, screen borrowers, engage in credit risk assessment, monitor and control funds utilization and investment in the sectors that need investment funds. In this context, financial intermediation in the form of bank loans to the agricultural sector is a fundamental aspect of financial intermediation as agriculture requires credit for production, processing, mechanisation, storage and marketing (Gurley & Shaw, 1960; Okafor, 2020).

Financial intermediation theory can be used in this study because it provides an explanation regarding the role of banks as a financial intermediary in transferring financial resources to the agricultural sector. But the intermediation function is conditioned on the macro-economic stability. The volatility of the exchange rate may make banks think that agricultural borrowers are riskier since the depreciation could lead to increased prices of imported inputs and a decrease in the ability to repay. This could lead to a decrease in credit to agriculture. Therefore, the theory is in line with the fact that exchange rate volatility can impact the intermediation role of banks which in turn can impact lending to the agriculture sector (Femi-Olagundoye, 2024; Udo et al., 2024).

2.2.2. Bank Lending Channel Theory

The third theory is the bank lending channel theory which is related to the general credit channel of monetary transmission theory proposed by Bernanke and Blinder (1988). The theory can be used to gain insight into the effects of monetary and macroeconomic factors on banks' lending capacity and willingness. Banks are passive financial institutions and it is suggested that banks should be sensitive to the liquidity position, interest rates, the stance of monetary policy, credit risk and macroeconomic uncertainty when making their lending activities. Hence, the macroeconomic environment may impact on the real sector via the bank credit channel (Bernanke & Blinder, 1988; Kashyap & Stein, 2000).

The relevance of bank lending channel theory is that exchange rate volatility can impact the bank lending decision via liquidity channel, risk channel and profitability channel. The volatility of the exchange rate in Nigeria can lead to inflationary pressures, impact the import prices, influence the cash flow of borrowers and change banks' credit risk perception of the sector. In the period of exchange rate uncertainty, the banks could cut down agricultural loans as the agricultural borrowers are very sensitive to imported inputs and exchange rate fluctuations. Thus, this theory can be applied to understand how the volatility of the foreign exchange market can be passed on to the agricultural sector via banks' credit supply (Sikiru & Salisu, 2025; Joy, 2025).

2.3. Empirical Review

Nambie and Dadzie (2026) studied the effect of trade realignment, exchange rate volatility and financial depth on financial stability in Sub-Saharan Africa. A panel of 40 Sub-Saharan African countries was included in the study from 2000 to 2024. A panel vector error correction model was estimated to estimate cointegration relationships and short run dynamics of financial stability, trade realignment, exchange rate volatility, gross domestic product, inflation and financial depth. The results indicate that the LR relationship is very strong between the financial stability and the explanatory variables and deviations from the equilibrium are corrected in the LR. Lagged impacts of exchange rate volatility, trade realignment, financial depth, GDP growth and inflation are related to financial stability.

Chibuzor et al. (2026) studied the causality relationship between foreign exchange rate volatility and bank performance in Nigeria. The study is based on ordinary least square technique which is one of the techniques in econometrics. The augmented Dickey Fuller test was used in the study to check for unit root. The result showed that there is a negative relationship meaning that interest rate is not in line with the a priori expectation and real exchange rate has a positive relationship with ROE.

Ibrahim et al., (2026) investigated the effect of exchange rate volatility on the financial performance of consumer goods listed companies in Nigeria during the 2019 – 2024 period. Descriptive statistics, correlation analysis, diagnostic tests and multiple regression techniques were used in the analysis of the data to determine the relationships between variables. The results indicated that the volatility of the exchange rate and money supply have significant effect on financial performance of the firms, the volatility of the exchange rate has negative effect on financial performance in terms of ROA and money supply has positive effect on financial performance of the firms. But the insignificant negative effect was due to credit allocation.

The study by Uwaeme et al. (2026) investigated the impact of exchange rate volatility on the productivity of the real sector of the Nigerian economy (agriculture and industrial sectors) from 1991 to 2024. The autoregressive distributed lag technique was applied in the study after the unit root and bounds test of cointegration to show that there is dynamic and asymmetric relationship between the exchange rate and the productivity of the sectors. The results showed that the long run relationships between the movements of the exchange rate and productivity in the sector were stable. The long run impact of depreciation of the exchange rate was positive and significant on agricultural productivity, industrial productivity and the asymmetric effect was more in industrial sector.

Akinyemi and Uthmman (2026) studied the impact of Exchange Rate Volatility on the Performance of Multinational listed Companies in Nigeria. Created two different models of volatility, one depending on sensitivity to operating profit and the other on firm values and regressed each to two financial performance measures. The samples were taken from multinational companies and 154 observations were taken. Two longitudinal models were tested for appropriateness with the outcome variables being Tobin's Q and Return on Assets and were tested with preliminary and diagnostic tests, Feasible Generalized Least Square Techniques and Panel Corrected Standard Error. It was discovered that exchange rate sensitivity to firm value significantly have positive effect on financial performance measured as Tobins' Q while foreign exchange rate sensitivity to operating profit has negative and significant effect on Tobin's Q.

3. Methodology

The type of research design used was ex-post facto. The reason for this type of design was that the variables being investigated were historical macroeconomic and financial data which could not be manipulated and controlled by the researcher. Ex-post facto design was thought to be suitable as it allowed the study of cause-and-effect relationship among the variables with the available data. It has been widely used in economic and financial research with exchange rates, monetary variables and sectoral credit, as it allows the researcher to study the relationship between the variables of interest based on the observed events and historical records without the need for experimental intervention (Kerlinger & Lee, 2000; Gujarati & Porter, 2009). In particular, the design allowed the study of how exchange rate

volatility impacted on Nigerian banks' lending to the agricultural sector, using annual time-series data from 1986 to 2024.

The positivist paradigm of philosophy was used as the basis of the study. The positivism is rooted in the idea that reality is objective, measurable, independent from the researcher, and that valid knowledge could be achieved through the observation of reality and quantitative analysis. The philosophy is the use of scientific method, statistical techniques and observable facts in explaining social and economic phenomena. The study employed numerical data obtained from official statistical sources, and employed econometric techniques to establish relationships between the variables, thus making the philosophy of positivism appropriate as a basis for the study. The paradigm also supported the hypothesis testing and empirical testing of theoretical proposition in the study of exchange rate volatility and bank lending behaviour in Nigeria (Creswell & Creswell, 2018; Saunders, Lewis, & Thornhill, 2019).

Reliable secondary data from national and international sources were used. The time series data were obtained from Central Bank of Nigeria (CBN), National Bureau of Statistics (NBS) and World Development Indicators (WDI) of the World Bank for the period of 1986 to 2024. The data comprised of exchange rate changes and bank credit to agriculture. Secondary data was considered appropriate because they provided reliable, consistent and comprehensive historical data which was required to analyse long run trends and volatility patterns. The time period covered the significant exchange rate regimes, monetary policy reforms, structural adjustments, and financial sector developments in the Nigerian economy (Central Bank of Nigeria, 2024; World Bank, 2024).

Descriptive statistics, unit root tests and volatility modelling techniques were used in the analysis of the data. Descriptive statistics were used to describe the characteristics of the variables in terms of their mean, maximum, minimum, standard deviation, skewness and kurtosis. These statistics gave initial information on the distribution and characteristics of the data over the study period (Brooks, 2019). Next, the Augmented Dickey-Fuller (ADF) unit root test was used to test the stationarity of the variables. The unit root procedure was needed to obtain the order of integration of the series to avoid spurious regression results that are often obtained with non-stationary time-series data. The ADF test has been one of the most accepted tests for stationarity in the field of economics and finance (Dickey & Fuller, 1981; Gujarati & Porter, 2009).

The Autoregressive Conditional Heteroskedasticity (ARCH) model of Engle (1982) and the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model of Bollerslev (1986) were used to assess the exchange rate volatility. To test for volatility clustering in the exchange rate series, ARCH tests were conducted and to estimate the persistence and size of exchange rate volatility over time, GARCH tests were conducted. Because the models were judged to be appropriate, exchange rate movements often exhibit time-varying variance and volatility clustering that are not well captured by standard regression methods. The estimated volatility series from the GARCH model was then explored to assess the impact of exchange rate volatility on bank lending to the agriculture sector in Nigeria.

The model used in this study is stated below:

$$BLAS = f(EXR) \quad 3.1$$

$$BLAS_t = \alpha_0 + \alpha_1 EXR_t + \xi_t \quad 3.2$$

$$\text{Apriori, } \alpha_1 < 0$$

Where: BLAS = Banking lending to agriculture sector, EXR = Exchange rate volatility, α_0 represents the intercept, and α_1 , represent the coefficients of exchange rate volatility. The econometric form includes an error term (ξ) to account for unobserved factors and measurement error in the relationship between bank lending to agriculture, industrial and service sectors and the exchange rate volatility.

The study estimated exchange rate volatility using the GARCH(1,1) model because exchange rate series are characterized by volatility clustering and persistence. The GARCH equation that was employed to estimate exchange rate volatility will be expressed as:

$$h_t = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 h_{t-1} \quad 3.3$$

Where, h_t = Conditional variance representing exchange rate volatility at time t , α_0 = Constant variance parameter, α_i = ARCH coefficient measuring short-run volatility effects, ε_{t-1}^2 = Lagged squared residuals, β_1 = GARCH coefficient measuring volatility persistence, q = Number of lag periods, h_{t-1} = Lagged conditional variance

The ARCH term (α_1) will capture the immediate impact of new exchange rate shocks, while the GARCH term (β_1) will capture the persistence of volatility over time. If the sum of the ARCH and GARCH coefficients approaches unity, volatility persistence will be considered high, implying that exchange rate shocks will dissipate slowly over time (Bollerslev, 1986).

4. Results

Table 1 Descriptive Statistics Result

	EXR	BLAS
Mean	163.0677	803.9059
Median	128.6516	525.9452
Maximum	856.9890	2255.357
Minimum	2.020575	34.90000
Std. Dev.	181.9674	754.1531
Skewness	1.993241	0.499629
Kurtosis	7.468579	1.731496
Jarque-Bera	58.27290	4.237386
Probability	0.000000	0.120189
Sum	6359.641	31352.33
Sum Sq. Dev.	1258261.	21612385

Source: E-views 10 Output

The descriptive statistics of exchange rate (EXR) and bank lending to agricultural sector (BLAS) in Nigeria for the period 1986-2024 is presented in Table 1. The result indicated that the mean of the exchange rate over the period under study was ₦163.07 per unit of United States dollar and the mean of the bank lending to agriculture was ₦803.91 billion. The median of exchange rate is 128.65 and the median of agricultural lending is ₦525.95, which shows that there was a considerable variation over time in both indicators. The minimum value of the exchange rate was ₦2.02 while the maximum value was ₦856.99, which indicates the huge depreciation of the naira during the period under study. Lending to agriculture, on the other hand, was between ₦34.90 billion and ₦2,255.36 billion, indicating that over the years, there was significant increase in credit allocated to agriculture. The standard deviations of 181.97 and 754.15 respectively indicate that both variables have relatively high value of standard deviations, it means that there is a lot of variability in both variables, thus showing instability in the movement of exchange rates and instability in the allocation of agricultural credit.

The skewness also showed that both the variables were positively skewed. Skewness coefficient of exchange rate was 1.993 while bank lending to agriculture was 0.500. This implies that the distributions were far more right tailed, that is, there were very large observations. Moreover, the kurtosis value for exchange rate (7.469) was above the benchmark value of 3, which means that the distribution of the exchange rate is leptokurtic with high peaks and fat tails. In contrast, bank loans to agriculture were platykurtic with a kurtosis value of 1.731, and relatively flat tails. The Jarque-Bera statistics showed that exchange rate was not normally distributed since its probability value of 0.0000 was less than 0.05. But, bank lending to agriculture had a probability value of 0.1202, which means that the variable was normally distributed. Based on the overall descriptive statistics, the exchange rate fluctuated a lot and the agricultural sector lending was quite different for the period investigated.

Table 2 Result of Unit Root Test (Using ADF)

Variables	ADF T-Stat @ Level	T-Critical @ level	P-value @ level	ADF T-Stat @ 1 st Diff.	T-Critical @ 1 st Diff.	P-value @ 1 st Diff.	Order of Integration
EXR	-1.083787	-2.910019	0.7169	-6.816748	-2.910019	0.0000	I(1)
BLAS	-1.278053	-2.909206	0.6346	-4.761082	-2.909206	0.0002	I(1)

Source: E-views 10 Output

The results of the Augmented Dickey-Fuller (ADF) unit root test are shown in Table 2. The purpose of the test was to test for stationarity of the variables and to avoid the spurious regression estimates. The result indicated that the value of the ADF statistic at level was -1.0838, which is not as negative as the critical value of -2.9100 and the probability value was 0.7169 for the exchange rate. The agriculture sector's bank lending also has an ADF statistic at level of -1.2781, less negative than the critical value of -2.9092 and a probability value of 0.6346. The results show that both variables were non-stationary at level.

However, the variables were stationary after first differencing. The ADF statistics of exchange rate and bank lending to agriculture were -6.8167 and -4.7611, respectively, with probability value of 0.0000 and 0.0002, respectively. The probability values were below 5 per cent significance level and the values of the ADF statistics were more negative than the corresponding critical values, thus rejecting the null hypothesis of unit root. So both variables were integrated to the first order (I(1)). This result suggests that the variables had stable long-run properties after first differencing, and were appropriate for further volatility analysis using ARCH and GARCH models.

Table 3 ARCH Result

Dependent Variable: BLAS				
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)				
GARCH = C(3) + C(4)*RESID(-1)^2				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
EXR	0.009929	0.000548	18.11107	0.0000
C	4.487754	0.101449	44.23654	0.0000
Variance Equation				
C	0.051684	0.058802	0.878955	0.3794
RESID(-1)^2	0.807575	0.096344	8.382203	0.0000
R-squared	0.560129	Mean dependent var		5.926707
Adjusted R-squared	0.530943	S.D. dependent var		1.474343
Durbin-Watson stat	1.715899			

Source: E-views 10 Output

The ARCH estimation results on the impact of exchange rate on bank lending to agriculture sector are shown in Table 3. The mean equation indicated that exchange rate had a positive and significant impact on agricultural lending. The coefficient of exchange rate was 0.009929 while the probability value was 0.0000 which implies that a unit increase in exchange rate resulted in an increase of approximately 0.99 per cent in bank lending to agriculture. This positive relationship suggests that the credit allocation to agriculture in nominal terms has increased during the period under study although the exchange rate has been depreciated, which may be due to the inflationary adjustment, government interventions programmes and the increased demand for credit due to the rising cost of production.

The variance equation showed that the ARCH coefficient (RESID(-1)^2) was 0.8076 and significant at the 1 percent level. This finding validates the ARCH effects in the series and suggests that the agricultural lending volatility was heavily affected by past shocks. The value of 0.8076 implies that 80.8 per cent of the current volatility could be explained by the

past disturbances. So there was volatility clustering in the data, meaning that high volatility would be followed by high volatility and low volatility by low volatility. The Durbin-Watson of 1.715899 showed the absence of autocorrelation.

Table 4 GARCH Result

Dependent Variable: BLAS				
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)				
GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
EXR	0.002602	0.000321	8.101566	0.0000
C	6.606584	0.014821	445.7445	0.0000
Variance Equation				
C	0.039744	0.024565	1.617938	0.1057
RESID(-1)^2	0.787575	0.096344	8.174657	0.0000
GARCH(-1)	0.016420	0.003297	4.980207	0.0000
R-squared	0.543724	Mean dependent var		5.926707
Adjusted R-squared	0.531392	S.D. dependent var		1.474343
Durbin-Watson stat	2.133203			

Source: E-views 10 Output

The results of the GARCH estimation are presented in Table 4. The mean equation showed that the exchange rate was positively related to bank lending to agriculture with a coefficient of 0.002602 and a probability value of 0.0000 which is significant. This is a confirmation of the positive relation that can be observed in the ARCH model. The variance equation indicated that the coefficient of the ARCH term [RESID(-1)^2] was positive and significant with 0.7876 and the coefficient of the GARCH term [GARCH(-1)] was also positive and significant with 0.0164. Both the coefficients are significant indicating that the series has long-term volatility.

The ARCH and GARCH parameters (0.7876 + 0.0164 = 0.8040) were less than one, suggesting that the volatility was mean-reverting and stable in the long term. This indicates that shocks associated with exchange rate changes had an impact on bank lending to agriculture but this impact was not permanent. Moreover, the Durbin-Watson statistic is 2.1332 which indicates that there is no serious autocorrelation problem in the GARCH model. Thus, the results indicate that the exchange rate significantly affected the bank lending to the agricultural sector in Nigeria and the volatility effects were significant but not explosive, thereby confirming the need for exchange rate stability in sustainable agricultural financing.

5. Discussion of Findings

The findings from the GARCH showed that the bank lending to the agricultural sector in Nigeria was positively and significantly impacted by the exchange rate. The coefficient of exchange rate was 0.002602 and the probability value was 0.0000 which was less than 5 percent level of significance. This implied that the exchange rate had a considerable impact on bank loans to agriculture during the period 1986-2024. The positive coefficient suggested that there was a positive relationship between nominal bank lending to agriculture and exchange rate. This could be explained by the depreciation of the exchange rate which has resulted in increased prices of agricultural inputs, machines, fertilizers, agrochemicals and agricultural processing machines, which in turn has increased the credit demand of agricultural operators. So, in nominal terms, it appeared that banks were providing more credit to the agricultural sector as the demand for financing in the sector had increased due to the depreciation of the exchange rate.

The variance equation showed that the ARCH term was positive and significant at 0.787575 and 0.0000 respectively. This indicated that bank lending to agriculture was highly volatile in the present and that past shocks had significant impact on the present volatility of bank lending to agriculture. More specifically, changes in previous years, such as exchange rate volatility, inflationary pressures and the conditions for agricultural financing, were important factors influencing the current lending behavior. The GARCH term also had a positive and significant coefficient of 0.016420

with the probability value of 0.0000. This showed that the volatility in agricultural lending was also time varying, but the sum of the ARCH and GARCH was less than one (0.803995) indicating that the volatility was stable and mean-reverting.

This finding was similar to that of Nambie and Dadzie (2026) who showed that macro-financial factors such as exchange rate volatility and financial depth had an impact on financial stability in Sub-Saharan Africa. Their evidence was supportive of the idea that exchange rate volatility could have an impact on the behavior of financial institutions because of the uncertainty in credit allocation. The result was also consistent with the result of Uwaeme, Diyoke and Azu (2026) which revealed that the productivity of the real sector in Nigeria was affected by the fluctuation in the exchange rate. Their role lent credence to the suggestion that exchange rate fluctuations could have an impact on agricultural financing and production. In the same vein, Obiekwe and Edokobi (2025) revealed that the performance of micro and small enterprises in Southeast Nigeria was impacted by exchange rate volatility, indicating that exchange rate volatility negatively influenced the performance of the businesses and their financing needs.

This was further explained by Gurley and Shaw's (1960) financial intermediation theory. As per the theory, the financial institutions are the intermediaries which mobilize the savings of the surplus units and allocate it to the deficit units for productive investment. The positive and significant effect of exchange rate volatility on bank lending to the agricultural sector shows that banks still functioned as intermediaries since they provided more nominal credit to the agricultural sector despite the volatility of the exchange rate. But the large volatility of the GARCH model suggests that the uncertainty of the exchange rate had an impact on the volume and stability of credit allocation. This result thus supports the view of Gurley and Shaw (1960) that macroeconomic conditions affect the efficiency of financial intermediation and the supply of funds to the productive sectors. Further, the findings are consistent with the bank lending channel theory of Bernanke and Blinder (1988) and the extension of the theory by Kashyap and Stein (2000). The idea is that macroeconomic and monetary shocks have an impact on the real economy through fluctuations in the supply of bank credit. The strong correlation between exchange rate volatility and agricultural lending shows that the foreign exchange market volatility had an impact on the banks lending and consequently on the credit flow to the agricultural sector. The result of the volatility in the GARCH model also corroborates the views of Bernanke and Blinder (1988) who stated that the behaviour of banks in lending and the effect on financing the productive sector can change due to economic shocks. As such, the study provides empirical evidence to the Bank Lending Channel Theory in the study of agricultural financing in Nigeria.

6. Conclusion

The study revealed that the volatility of the exchange rate had significant impact on the lending of banks to the agriculture sector in Nigeria. Based on the result of GARCH, it was concluded that the exchange rate had positive and significant impact on agricultural lending and the variance equation revealed that there was persistent volatility. This meant that agricultural credits were not protected against exchange rate volatility.

Limitations

The study has only included annual time-series data for the period 1986–2024, which may not have been sufficient to reflect monthly and quarterly volatility in exchange rate and agricultural lending. Other sources of agricultural finance such as cooperative credit, development finance institutions and informal credit were also not included in the study as they are only included in bank lending to agriculture. Furthermore, the overall agricultural lending data might have hidden the differences among the various sectors of agricultural production, livestock, fisheries, forestry, agro-processing and agricultural marketing.

Recommendation

The Central Bank of Nigeria should increase the level of stabilisation of the exchange rate and create a dedicated foreign exchange credit window for banks to offer concessionary lending rates to farmers and agribusinesses for the importation of farm inputs and farm machines. This will help to cushion the impact of naira depreciation cost squeeze, minimize default risk and encourage banks to boost agricultural credit. The policy should be linked to value chain financing which is monitored and credit should be directed to productive activities such as mechanisation, storage, processing and procurement of inputs. This recommendation is in line with the Bank Lending Channel Theory and the necessity of safeguarding agricultural credit against macroeconomic shocks.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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