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# IMPACT OF INTEREST RATE VOLATILITY AND CASH RESERVE RATIO ON COMMERCIAL BANK LENDING ACTIVITIES IN NIGERIA (1986 – 2022)

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## ABSTRACT

*This research work investigates the impact of Interest rate volatility and cash reserve ratio on commercial bank lending activities in Nigeria from 1986 to 2022, using a quarterly data. The evidence of volatility in interest rate were found using generalized autoregressive conditional heteroscedasticity (GARCH) model. The study employed autoregressive distributive lag model (ARDL), and found that In the long run, interest rate volatility has a positive and statistically significant impact on commercial bank lending, with a 1% increase in volatility resulting in a 2.71% rise in lending activities while cash reserve ratio also shows a positive relationship with lending, where a 1% increase leads to a 0.27% rise in lending activities, statistically significant at the 5% level. In the short run, interest rate volatility positively affects lending activities, with a 1% increase leading to a 25.06% rise in lending activities, while the cash reserve ratio shows no impact on lending. The causality result from (Toda-Yamamoto) approach to granger causality revealed that there is causal relation between interest rate volatility and cash reserve ratio, that future values of commercial bank lending activities can be determine with the present value of interest rate volatility and cash reserve ratio. The study recommends that, policymakers and financial institutions should develop a comprehensive framework that balances the need for financial stability with the promotion of lending activity in order to manage the effects of interest rate volatility and cash reserve ratio on lending activities, that would result into more stable and dynamic banking sector in Nigeria.*

**Keywords**: Commercial Bank, Lending Activities, Interest Rate Volatility, Cash Reserve Ratio

## 1.0 Introduction

Banks play a crucial role in economic development by acting as financial intermediaries that mobilize resources, allocate funds, and promote growth. They contribute to economic activity through functions like accepting deposits, transferring funds, and creating money via lending (Agbada, 2010). Commercial banks are integral to economic growth, facilitating credit to sectors such as agriculture, manufacturing, and services, which boosts investment and productivity (CBN, 2022). They also help maintain financial stability and public confidence, with regulatory oversight from institutions like Nigeria's Central Bank (Eke et al., 2015). Over time, Nigeria's banking sector has undergone reforms to improve infrastructure, supervision, and financial intermediation, contributing to increased savings, credit availability, and economic growth (Okon & Oladapo, 2014). These reforms and banking activities are pivotal in enhancing the overall financial system, supporting job creation, and fostering sustainable development (CBN, 2021)

This study aims to examine the impact of interest rate volatility and the cash reserve ratio on commercial bank lending activities in Nigeria. Specifically, it seeks to investigate how interest rate volatility affects bank lending, assess the influence of the cash reserve ratio on lending, and explore the causal relationship between these factors and commercial bank lending activities in Nigeria. The study is structured into five chapters: Chapter one introduces the research, providing the background, problem statement, research questions, objectives, scope, and significance. Chapter two reviews relevant literature and prior studies, while Chapter three details the methodology used to test the hypotheses and achieve the research objectives. Chapter four focuses on data analysis and interpretation, and Chapter five concludes with a summary of the findings, conclusions, and recommendations based on the results

## 2.0 Literature Review

Interest rate volatility refers to fluctuations in interest rates that can significantly affect economic stability, credit availability, and decision-making. This volatility can influence the cost and availability of credit, impacting banks' willingness to lend, as well as financing conditions in the economy. It can arise from various factors, such as central bank policies, changes in inflation expectations, fiscal decisions, and currency adjustments. High volatility may lead to poor management by commercial banks, resulting in inefficient financial decisions and economic instability. Managing these fluctuations is essential for maintaining long-term economic growth and stability (Dabale & Jagero, 2013; Olorunfemi, 2008; Schwartzman, 1992).

Efficient bank lending plays a crucial role in economic development, as businesses, individuals, and governments rely on credit for operational expenses and investments. Bank lending practices, influenced by the central bank's monetary policy. Monetary policy rate (MPR), determine the cost and availability of loans. High interest rates reduce borrowing and lending, while low rates encourage investment and consumption. Volatility in interest rates can affect commercial banks' profitability, liquidity, and financial stability, with excessive fluctuations potentially destabilizing the economy and influencing decision-making (Yakubu & Affoi, 2014; Maigua & Mouni, 2016).

The Cash Reserve Ratio (CRR) is an important tool for managing liquidity in the banking system. By adjusting the CRR, central banks control the money available for lending, which influences economic activity. An increased CRR helps reduce liquidity to control inflation and stabilize the currency, while a lower CRR can stimulate economic growth by making more funds available for lending. In Nigeria, the Central Bank has adjusted the CRR to manage liquidity and economic conditions, maintaining a high rate in 2021 to control inflation and adopting a more flexible approach by 2022, with a rate of 32.5% as of June 2023 (CBN, 2022; CBN, 2023).

## 2.1 Theoretical review

The Credit Channel of Monetary Policy Theory is used to underpin the objectives of this study as it provides a comprehensive framework for understanding how changes in interest rates and monetary policy impact commercial bank lending activities. The theory highlights three key mechanisms; Bank Lending, Balance Sheet, and Collateral Channels, which explain how monetary policy affects the availability and cost of credit. Interest rate volatility, a key variable in this study, directly influences bank lending behaviour by altering banks' cost of capital and borrowers' financial conditions, as outlined by the theory (Bernanke & Gertler, 1995). For instance, tightening monetary policy raises interest rates, which can constrain bank lending and make borrowing more expensive, thus impacting businesses and consumers. This can also influence the value of collateral and borrowers' balance sheets, further restricting credit

availability. By linking these mechanisms with commercial bank lending, the theory underscores the importance of understanding the broader economic and financial implications of interest rate changes, which aligns with the study's objective to explore how interest rate volatility and the cash reserve ratio influence lending activities in Nigeria. Furthermore, the theory helps explain the dynamic between monetary policy adjustments and their effects on credit markets, investment, and economic stability, all of which are central to the study's aim of assessing the economic impact of changes in monetary policy tools on lending activities of commercial banks in Nigeria.

## 3.0 Data and Methodology

## 3.1 Model Specification

The study adopts statistical and econometric techniques to achieve the set objectives of the study. However, a general econometric model capturing the established relationship between interest rate volatility (IRV), Cash Reserve Ratio (CRR), Real exchange rate (RER), Inflation (INF), Money Supply (MSS) and Commercial Bank Lending activities (CBL) based on theoretical postulations, following Gujarati and Porter, (2005) specification, the models were specified as follows:

$$\boldsymbol{CBL_t = \beta_0 + \beta_1 IRV_t + \beta_2 CRR_t + \beta_3 RER_t + \beta_4 INF_t + \beta_5 MSS_t + \varepsilon_t}$$

Where: $CBL_t$ is the Commercial Bank Lending activities at time t; $IRV_t$ is the Interest Rate Volatility at time t (measured using GARCH model); $CRR_t$ is the Cash Reserve Ratio at time t $RER_t$ is the Real Exchange Rate at time t; $INF_t$ is the Inflation Rate at time t; $MSS_t$ is the Money Supply at time t; $\varepsilon_t$ = Error term at time t.

### 3.1.1 Autoregressive Distributive Lag (ARDL) Model

To estimate the short run and long run relationship between interest rate volatility, cash reserve ratio, real exchange rate, inflation, Money Supply, and commercial bank lending activities this study adopts the Autoregressive Distributed Lag (ARDL) model modified by Pesaran, Shin and Smith (2001). The short run and long run model ARDL (p,q) model for this study is specified below.

$$\begin{aligned}\Delta \ln \mathrm{CBL}_t = {} & b_0 + \alpha_1 \Delta \ln \mathrm{CBL}_{t-i} + \alpha_2 \ln \mathrm{IRV}_{t-i} + \alpha_3 \Delta \ln \mathrm{CRR}_{t-i} + \alpha_4 \ln \mathrm{INF}_{t-i} + \alpha_5 \Delta \ln \mathrm{RER}_{t-i} \\ & + \alpha_5 \Delta \ln \mathrm{MSS}_{t-i} + \sum_{i=0}^{p} b_1 \, \Delta \ln \mathrm{CBL}_{t-i} + \sum_{i=0}^{p} b_2 \ln \mathrm{IRV}_{t-i} + \sum_{i=0}^{p} b_3 \Delta \ln \mathrm{CRR}_{t-i} \\ & + \sum_{i=0}^{p} b_4 \ln \mathrm{INF}_{t-i} + \sum_{i=0}^{p} b_5 \, \Delta \ln \mathrm{RER}_{t-i} + \sum_{i=0}^{p} b_5 \, \Delta \ln \mathrm{MSS}_{t-i} + \mathrm{ECT}_{t-i}\end{aligned}$$

Where: Inflation, real exchange rate and money supply are used as an control variables in the model and $\Delta$ is the first difference operator, $b_0$ symbolize a drift component, the general forms of the ARDL approach that combine both the long run variables and the error-correction model (ECM) variables together. When Equations (3.8) will be estimated, *F*-test will be carried out to evaluate the joint significance of the lagged level series as an indication of long run cointegration. This can be on the basis of the *F* critical values documented in Pesaran *et al.* (2001) and Narayan (2005) *F*-tests values.

### 3.1.2 GARCH Model

This study adopted the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model to establish the presence of volatility in Interest rate. The model is widely used in financial econometrics to model and forecast time series data where volatility is expected to

change over time. It is particularly useful for capturing and predicting the volatility of financial returns, including interest rates.

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{q} \alpha_i \in_{t-1}^2 + \sum_{i=1}^{q} \beta_j \sigma_{t-J}^2$$

### 3.1.3 Toda-Yamamoto Causality

The study applies the Granger test for non-causality using Pairwise equations and modified Wald test (MWald) for the significance of parameters on examined equations on number time lags (k+dmax). The modified Wald test (MWald) follows Chi-square ($\chi 2$) distribution asymptotically and the degrees of freedom are equal to the number of time lags ($k+d_{max}$). Rejection of null hypothesis entails the rejection of Granger causality. And lastly, check if there is a combination on VAR model. Thus, the VAR model of Toda and Yamamoto causality is set up as follows:

$$IRV_t = \alpha_0 + \sum_{i=i}^{k} b_{1i} IRV_{t-i} + \sum_{i=0}^{d\max} b_{2i} IRV_{t-i} + \sum_{i=i}^{k} \lambda_{1i} CBL_{t-i} + \sum_{i=0}^{d\max} \lambda_{2i} CBL_{t-i} + \varepsilon_{2t}$$

$$CRR_t = \alpha_0 + \sum_{i=i}^{k} b_{1i} CRR_{t-i} + \sum_{i=0}^{d\max} b_{2i} CRR_{t-i} + \sum_{i=i}^{k} \lambda_{1i} CBL_{t-i} + \sum_{i=0}^{d\max} \lambda_{2i} CBL_{t-i} + \varepsilon_{it}$$

### 3.1.4 ADF Unit Root

The Augmented Dickey-Fuller (ADF) will be employed to ascertain the integration level of the variables (Dickey and Fuller 1981). The objective is to ensure that the time series variables are stationary; this will prevent spurious results and problems of autocorrelation.

The ADF test on the other hand, is an extension of the Dickey-Fuller (DF) test which includes additional lags that account for possible serial correlation in the series.

$$y_t = \rho y_{t-1} + \varepsilon_t$$

## 3.2 Bound Test for Cointegration

The Bound Test for Cointegration is a statistical method used to test the long-run relationship between variables that may have different integration orders (I(0) or I(1)). The test evaluates the joint significance of the lagged levels of the variables (λ\lambda and δ\delta) using an F-statistic. If the F-statistic exceeds the upper bound, the variables are cointegrated; if it is below the lower bound, they are not. Results between the bounds are inconclusive.

**Table 1: Summary of Variables Definition and Measurement**

| Variables | Definition | Measure | Source |
|---|---|---|---|
| Interest Rate | The lending rate is the bank rate that usually meets the short- and medium-term financing needs of the private sector. This rate is normally differentiated according to creditworthiness of borrowers and objectives of financing. | Lending interest rate adjusted for inflation as measured by the GDP deflator. | World Bank, (2024) |

| | | | |
|---|---|---|---|
| Comm Bank Lending activities | Commercial bank and other lending include net commercial bank lending (public and publicly guaranteed and private nonguaranteed) and other private credits. | Commercial bank lending (public and publicly guaranteed & private nonguaranteed) for the year. | World Bank, (2024) |
| Interest Rate volatility | Frequent changes or fluctuation associated with the lending rate in the short- and medium-term financing needs of the private sector through financial institutions which is commercial banks. | Deviation of interest rate in variance equation from their mean over a specific quarter. Using a GARCH framework | Researcher's Computation using GARCH model. (2024) |
| Cash Reserve Ratio | Ratio of bank liquid reserves to bank assets is the ratio of domestic currency holdings and deposits with the monetary authorities to claims on other governments, nonfinancial public enterprises, the private sector, and other banking institutions. | Amount of funds that banks are required to hold in reserve with the central bank, divide by the total deposits are the total amount of customer deposits multiply by 100. | World Bank, (2024) |
| Inflation | Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. | The Laspeyres formula is used. The total expenditures for all items at the observation period using base quantities, divide by the total expenditures for all items at the base period using base quantities multiply by 100. | World Bank, (2024) |
| Real effective Exchange Rate | A real effective exchange rate is the nominal effective exchange rate. Is the unit of naira intern of other currency. | Measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs. | World Bank, (2024) |
| Money Supply | Broad money is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates | Total sum of money in circulation, demand deposits, and other liquid assets, saving account, time deposit, money market accounts. | World Bank, (2024) |

| | | | |
|---|---|---|---|
| | of deposit and commercial paper. | | |

## 4.0 Data Presentation and Analysis

**Table 2: Descriptive Statistics Result**

| Statistics | MSS | CBL | IRVOL | CRR | RER | INFL |
|---|---|---|---|---|---|---|
| Mean | 2.937616 | 19.95561 | 17.04025 | 18.36529 | 4.621929 | 111.2684 |
| Median | 2.944034 | 22.38234 | 17.39268 | 17.65167 | 4.567132 | 96.27100 |
| Maximum | 4.983487 | 23.70498 | 18.35875 | 34.86667 | 5.883991 | 359.2399 |
| Minimum | 1.717224 | -24.24904 | 14.08505 | 9.700000 | 3.832743 | 46.18904 |
| Std. Dev. | 0.816877 | 8.685921 | 1.266291 | 4.221708 | 0.400485 | 55.59446 |
| Skewness | 0.359191 | -3.728283 | -0.929033 | 0.855744 | 0.901011 | 2.147802 |
| Kurtosis | 2.484243 | 15.77172 | 2.682774 | 5.078773 | 3.986656 | 7.844469 |
| Jarque-Bera | 4.822806 | 1348.756 | 21.91041 | 44.71137 | 26.02812 | 258.5134 |
| Probability | 0.089689 | 0.000000 | 0.000017 | 0.000000 | 0.000002 | 0.000000 |
| Sum | 434.7671 | 2953.430 | 2521.956 | 2718.063 | 684.0455 | 16467.73 |
| Sum Sq. Dev. | 98.09143 | 11090.45 | 235.7134 | 2619.954 | 23.57711 | 454339.3 |
| Observations | 148 | 148 | 148 | 148 | 148 | 148 |

Researcher's Computation, (2024)

The notations CBL, IRVOL, CRR, INF, RER, and MSS refer to commercial bank lending activities, interest rate volatility, cash reserve ratio, inflation, exchange rate, and money supply, respectively. The summary of the dataset includes the mean values for each variable: commercial bank lending activities (CBL) have a mean of 19.96, interest rate volatility (IRVOL) has a mean of 17.04, cash reserve ratio (CRR) has a mean of 18.37, inflation (INF) has a mean of 111.27, exchange rate (RER) has a mean of 4.62, and money supply (MSS) has a mean of 2.94. The median values represent the middle points when the data is arranged from highest to lowest. The standard deviation indicates the dispersion or spread of the data around the sample average. The control variables in the study are inflation (INF), exchange rate (RER), and money supply (MSS)

Table 3: Unit Root Test Results

| Variables | ADF Test Result | | PP-Test Result | |
|---|---|---|---|---|
| | At-Level | At-First Diff | At-Level | At-First Diff |
| CBL | -2.436239 | -9.366102*** | -1.996883 | -9.237088*** |
| IRVOL | -10.61745*** | -11.42238*** | -10.61745*** | -11.42197*** |
| CRR | -2.315925 | -10.01241*** | -3.327488** | -31.13979** |
| RER | -4.793221*** | -9.545876*** | -4.972465*** | -9.509119*** |
| INFL | 0.394886 | -10.92945*** | 0.34824 | -10.34989*** |
| MSS | 1.268823 | -11.96200*** | 1.078887 | -12.12539*** |

Note: ***, ** and * represent significance level at 1%, 5% and 10% respectively. The figures are the t-statistics for testing the null hypothesis that the series has unit root. The lag length is determined and fixed as 8 based on Schwartz (1987). The critical values for intercept without trend are -3.479, -2.883 and -2.578 whereas, for intercept with trend the values are -4.028, -3.443 and -3.146 for 1%, 5% and 10% respectively.

Table 2 presents unit root test results using both the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test. The ADF test shows that commercial bank lending activities,

inflation, and money supply are integrated variables, while interest rate volatility and exchange rate are level variables. The PP test, on the other hand, indicates that interest rate volatility, cash reserve ratio, and exchange rate are level variables, while commercial bank lending activities and money supply are integrated variables.

## 4.1 Presence of ARCH Effect (ARCH Family Model)

The study employed generalized autoregressive conditional heteroscedasticity model (GARCH) which is the extension of the ARCH model by including lagged values of the conditional variance itself, in addition to lagged squared errors. This allows for modeling more complex volatility patterns like interest rate volatility.

Table 4: Interest Rate Volatility (GARCH)

| Variable | Coefficient | Std. Error | z-Statistic | Prob. |
|---|---|---|---|---|
| C | 1.832480 | 0.244099 | 7.507102 | 0.0000 |
| RIR (-1) | 0.888012 | 0.014636 | 60.67200 | 0.0000 |
| | | **Variance Equation** | | |
| C | 0.136663 | 0.214394 | 0.637438 | 0.5238 |
| RESID (-1)$^2$ | 1.161232 | 0.331451 | 3.503483 | 0.0005 |
| GARCH (-1) | 0.063483 | 0.033571 | 1.891004 | 0.0586 |
| RIR | 0.016458 | 0.014251 | 1.154902 | 0.2481 |

Researcher's Computation, (2024)

The mean equation analysis shows that both the constant term and the first lag of interest rate are statistically significant, with probability values below 5%. The variance equation, based on the ARCH model, detects the presence of ARCH effects. The GARCH coefficient is positive (0.063483), indicating mean reversion in interest rates. The residual term is 1.161232, with a chi-squared probability value of 0.0005, which is below the 5% significance level. This suggests that interest rate volatility is influenced by past variances, where small or large changes in one period tend to be followed by similar changes in the next. To establish the existence of a long-run relationship between the variables, the study applies the bound test for cointegration.

Table 5: Bound Test for Cointegration Result

| Test Statistic | Value | Signif. | I(0) | I(1) |
|---|---|---|---|---|
| F-Bounds Test: Null Hypothesis: No levels relationship | | | | |
| | | | Asymptotic: n=1000 | |
| F-statistic | 8.244752 | 10% | 2.08 | 3 |
| K | 5 | 5% | 2.39 | 3.38 |
| | | 2.5% | 2.7 | 3.73 |
| | | 1% | 3.06 | 4.15 |
| Actual Sample Size | 145 | | Finite Sample: n=80 | |
| | | 10% | 2.303 | 3.154 |
| | | 5% | 2.55 | 3.606 |
| | | 1% | 3.351 | 4.587 |

Researcher's Computation, (2024)

The bond test's null hypothesis posited no long-run relationship. However, the results show an F-statistic value of 8.244752, which exceeds the critical values at the 1%, 5%, and 10% significance levels, with a sample size of 145. This indicates strong evidence of a long-run relationship between commercial bank lending activities, interest rate volatility, cash reserve ratio, inflation rate, exchange rate, and money supply. The analysis further estimates the long-run relationship between cash reserve ratio, interest rate volatility, and commercial bank lending activities, confirming a significant connection between these factors.

Table 6: ARDL Long Run Result

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| CBL | -0.381632 | 0.054570 | -6.993439 | 0.0000 |
| IRVOL | 2.706739 | 0.518025 | 5.225118 | 0.0000 |
| CRR | 0.271489 | 0.107310 | 2.529962 | 0.0126 |
| RER | -1.185069 | 1.145042 | -1.034957 | 0.3026 |
| INFL | 0.059043 | 0.025977 | 2.272923 | 0.0247 |
| MSS | 0.417819 | 0.549683 | 0.760108 | 0.4486 |
| C | -41.23348 | 11.08429 | -3.719994 | 0.0003 |

Researcher's Computation, (2024)

The long-run results on table 5 highlight key factors influencing commercial bank lending activities. The coefficient for interest rate volatility is positive and statistically significant, indicating that a 1% increase in volatility leads to a 2.71% rise in lending, as banks respond to higher uncertainty by adjusting their strategies. This finding aligns with previous studies by Njagi and Nzai (2022), Okon (2020), and Samuel and Vivian (2022), which also found that interest rate fluctuations can boost lending. Additionally, the cash reserve ratio is positively related to lending, with a 1% increase leading to a 0.27% rise in lending, consistent with findings by Okon et al. (2020) and others. The exchange rate negatively affects lending but is statistically insignificant. Inflation and money supply both have positive relationships with lending, with inflation contributing a 0.06% increase and money supply a 0.42% increase, indicating their influence on lending dynamics in the long run.

Table 7: ARDL Short Run Dynamic Result

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(CBL(-1)) | 0.202273 | 0.070124 | 2.884492 | 0.0046 |
| D(IRVOL) | 25.05953 | 5.296733 | 4.731129 | 0.0000 |
| D(RER) | -5.959300 | 1.959767 | -3.040821 | 0.0029 |
| D(RER(-1)) | 4.975094 | 1.887634 | 2.635625 | 0.0094 |
| D(INFL) | 0.048251 | 0.046288 | 1.042408 | 0.2992 |
| CointEq(-1)* | -0.381632 | 0.049106 | -7.771590 | 0.0000 |

Researcher's Computation, (2024)

In the short run, interest rate volatility positively affects commercial bank lending, with a 1% increase in volatility leading to a 25.06% rise in lending activities. This suggests that higher interest rate fluctuations encourage more borrowing. Inflation and exchange rates also show positive relationships with bank lending, with 1% increases in inflation and exchange rate leading to increases of 0.048% and 4.98%, respectively. However, the cash reserve ratio does not impact lending activities in the short run, aligning with previous research by Hussien et al. (2020). The error correction term (ECT) is negative and statistically significant, indicating that any disequilibrium in the system will adjust at a rate of 38% per quarter, moving towards equilibrium. This dynamic behavior is consistent with studies by Ayodele and Taiwo (2023) and Ariwa and Uremadu (2023), which also found positive impacts of interest rate changes on commercial bank activities in Nigeria.

Table 8: Diagnostics Test

| Type of Diagnostics (Test) | F-Statistics | Prob V. |
|---|---|---|
| Breusch-Godfrey Serial Correlation LM Test | 6.426617 | 0.0521 |
| Heteroskedasticity Test: Breusch-Pagan-Godfrey | 0.034427 | 0.8531 |
| Normality: J-Bera/Skewness/ Kurtosis | 1921.365 | 0.8030 |
| Functional form: Ramsey Reset Test | 0.053845 | 0.8169 |
| Stability: Cusum | Stable | 0.0000 |

| | | |
|---|---|---|
| Stability: Cusum of Square | Stable | 0.0000 |

Researcher's Computation, (2024)

Table 7 presents the results of various diagnostic tests for the model. The Breusch-Godfrey test for autocorrelation shows an F-statistic of 6.4266 with a probability value of 0.0521, which is greater than 5%, indicating no evidence of serial correlation, and thus the null hypothesis of no serial correlation is not rejected. The Breusch-Pagan-Godfrey test for heteroscedasticity yields an F-statistic of 0.0344 with a probability of 0.8531, also greater than 5%, suggesting the model is homoscedastic, and the null hypothesis of no heteroscedasticity is not rejected. The Jarque-Bera test, with a value of 19210.36 and a probability of 0.8030, indicates that the residuals are normally distributed. Finally, the Ramsey Reset test for functional form, with an F-statistic of 0.0538 and a probability value of 0.8169, confirms that the model is correctly specified.

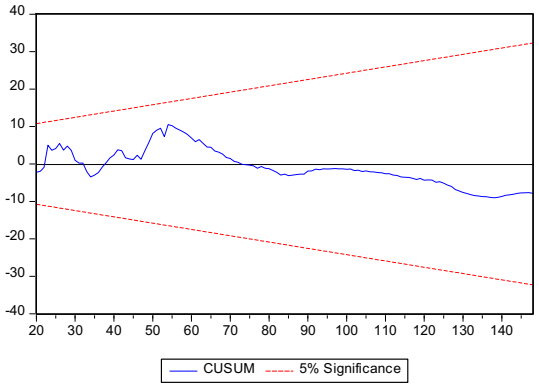


**Figure 1: Cusum Graph**

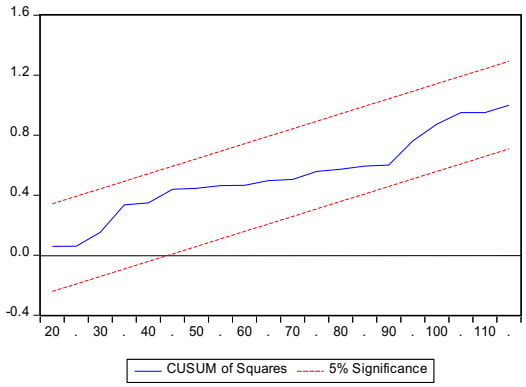


**Figure 2: Cusum of Square Graph**

The stability diagnostic was conducted using Cusum test as well as Cusum square test. As stated in figure 1 and 2 above, both the Cusum line and Cusum of square laid within the 5 percent significant boundary, therefore it is concluded that the model is stable.

## 5.0 Summary of the Finding

The study explores how interest rate volatility (IRVOL) and the cash reserve ratio (CRR) influence commercial bank lending (CBL) in Nigeria over the period from 1986 to 2022, using time-series data from the World development indicators (WDI). It applies the credit channel theory of monetary policy, which explains how changes in interest rates can affect credit availability and economic activity. The study utilizes the Autoregressive Distributed Lag (ARDL) model to assess these relationships and the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model to measure interest rate volatility.

The results indicate that both IRVOL and CRR have a positive impact on commercial bank lending. As both variables increase, the volume of loans extended by banks also rises, suggesting that banks may adapt their lending strategies in response to these changes. The study finds a causal relationship between IRVOL, CRR, and CBL, indicating that current values of IRVOL and CRR can predict future lending activity in Nigeria.

## 5.1 Conclusion

In conclusion, this study highlights the significant impact of interest rate volatility and the cash reserve ratio on commercial bank lending activities in Nigeria from 1986 to 2022. The findings reveal that both variables have a positive relationship with lending, with interest rate volatility having a particularly strong effect, both in the short and long run. Specifically, a 1%

increase in interest rate volatility results in a substantial rise in lending activities, while the cash reserve ratio also contributes positively, though to a lesser extent. The causal relationship between interest rate volatility, cash reserve ratio, and commercial bank lending underscores the importance of managing these factors for the stability and growth of the banking sector in Nigeria

## 5.2 Recommendation

Based on the findings of this research, it is recommended that policymakers and financial institutions in Nigeria develop a comprehensive framework that carefully balances financial stability with the promotion of lending activities. Given that both interest rate volatility and cash reserve ratio have significant impacts on commercial bank lending, with interest rate volatility showing a particularly strong effect in both the short and long run, it is crucial to implement policies that mitigate excessive volatility while fostering a conducive environment for lending. Additionally, managing the cash reserve ratio effectively will be essential for ensuring that it does not negatively impede lending. By addressing these factors, the banking sector can become more stable and dynamic, ultimately supporting sustained economic growth in Nigeria.

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