

## Impact of Monetary Policy on Exchange Rate Stability in Nigeria

<sup>1</sup>Adenigbagbe, Ifeoluwapo Adedamola, <sup>2</sup>Gambo, Nasamu (PhD), <sup>3</sup>Abdulrazaq, Lukman Abolarinwa, <sup>4</sup>Abbas, Rahma Bashir, <sup>5</sup>Abdullahi, Saifudeen Bako  
Nile University of Nigeria, Abuja, Nigeria

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**Abstract:** *This study investigates the impact of interest rates, money supply, and Central Bank reserves on exchange rate stability in Nigeria. Utilizing quarterly economic data from 1980 to 2023, sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin, the research employs a longitudinal survey design to assess the relationships between these monetary variables and exchange rate volatility. The findings indicate that interest rates, money supply, and Central Bank reserves significantly influence exchange rate fluctuations, with Central Bank reserves having the most substantial impact. Specifically, interest rates exhibit a moderate effect on exchange rate volatility ( $t = 3.513$ ,  $p = .001$ ,  $Beta = .342$ ), while money supply also significantly affects exchange rate volatility ( $t = 2.713$ ,  $p = .010$ ,  $Beta = .305$ ). Central Bank reserves, however, have the most pronounced impact ( $t = 4.141$ ,  $p = .000$ ,  $Beta = .467$ ). These results highlight the critical role of monetary policy in maintaining exchange rate stability. The significant positive relationship between interest rates and exchange rate volatility suggests that monetary authorities should carefully consider the ramifications of interest rate adjustments. Similarly, the influence of money supply underscores the need for meticulous management to prevent destabilization. Robust Central Bank reserves emerge as a crucial buffer against exchange rate fluctuations, emphasizing the importance of effective reserve management policies. The findings provide actionable insights for policymakers aiming to enhance exchange rate stability through strategic interest rate policies, careful money supply management, and maintaining adequate Central Bank reserves.*

**Keywords:** interest rates, money supply, central bank reserves, exchange rate stability, monetary policy, economic management, exchange rate volatility, Central Bank of Nigeria

### INTRODUCTION

Central banks use monetary policy as a crucial instrument to manage economic stability and growth. In Nigeria, the Central Bank of Nigeria (CBN) employs various monetary policy tools to regulate the economy, including interest rates, money supply, and central bank reserves. Exchange rate stability is vital for economic growth as it influences inflation, investment, and international trade. Understanding how these monetary policy instruments impact exchange rate stability is essential for policymakers, economists, and businesses.

Numerous studies have highlighted the importance of monetary policy in maintaining economic stability. Interest rates, as a tool of monetary policy, directly affect exchange rate stability by influencing capital flows and investor confidence (Olweny & Chiluwe, 2012). Similarly, the money supply has a significant impact on the value of the currency and inflation rates, thereby affecting exchange rate stability (Ojede, Lam & Okot, 2018). Central bank reserves act as a buffer against external shocks, helping to stabilise the exchange rate (Akinbobola, 2012).

At a global level, monetary policy plays a critical role in ensuring economic stability. The effectiveness of monetary policy in achieving exchange rate stability has been documented in various studies and reports (IMF, 2021). Countries that manage their monetary policy effectively tend to experience more stable exchange rates, which in turn fosters economic growth and stability (World Bank, 2022). For instance, studies have shown that central banks with substantial reserves are better equipped to manage exchange rate volatility (Chen, Liu & Wei, 2022).

In the context of Africa, and Nigeria in particular, the effectiveness of monetary policy in ensuring exchange rate stability is of significant importance. The Nigerian economy, characterised by its reliance on oil exports and susceptibility to global market fluctuations, requires robust monetary policies to manage exchange rate stability (Mordi, Essien, & Ononugbo, 2013). In Nigeria, the impact of interest rates, money supply, and central bank reserves on exchange rate stability has been the subject of extensive research (Aliyu & Englama, 2009; Nwankwo, Anozie, & Okonkwo, 2023; Ogundipe & Ogundipe, 2013).

Despite the wealth of research, there remains a notable gap in understanding the specific mechanisms through which monetary policy impacts exchange rate stability in Nigeria. For instance, Nwankwo, Anozie, and Okonkwo (2023) examined the impact of monetary policy on exchange rate stability from 2000 to 2020, finding significant relationships but lacking a comprehensive coverage up to 2024. Similarly, Aliyu and Englama (2009) focused on the period from 1986 to 2008, highlighting the effects of interest rates on exchange rates but not addressing the more recent dynamics. Ogundipe and Ogundipe (2013) investigated the influence of money supply on exchange rate volatility between 1986 and 2010, revealing critical insights but missing the latest economic developments.

Most existing studies cover specific periods and do not span the extensive timeline from 1980 to 2024. This gap highlights the need for updated research that encompasses recent economic changes and policies.

Additionally, there is a gap in the application of z-scores in the analysis of monetary policy impacts in Nigeria. Z-scores are a common method used in other contexts to standardise and analyse economic data. For example, Alege and Ogundipe (2013) applied z-scores to standardise economic indicators in their study of monetary policy impacts. Similarly, Oladipo and Akinbobola (2011) utilised z-scores in their research on exchange rate and inflation dynamics in Nigeria. Another study by Obaseki and Onwioduokit (1999) used z-scores to

assess the impact of fiscal policy on macroeconomic stability in Nigeria. These studies demonstrate the utility of z-scores in providing a clear, standardised measure for comparing economic impacts across different periods and contexts.

However, in the context of Nigeria, there is a lack of studies employing z-scores for the analysis of monetary policy impacts. This methodological gap presents an opportunity to enhance the robustness and comparability of economic research in Nigeria by incorporating z-scores.

### **Research Objectives**

The primary objectives of this research are as follows:

- i. To examine the impact of interest rates on exchange rate stability in Nigeria.
- ii. To evaluate the impact of money supply on exchange rate stability in Nigeria.
- iii. To investigate the impact of Central Bank reserves on exchange rate stability in Nigeria.

Based on the objectives, the following hypotheses are developed for this study:

H<sub>01</sub>: There is no significant relationship between interest rates and exchange rate stability in Nigeria.

H<sub>02</sub>: There is no significant relationship between money supply and exchange rate stability in Nigeria.

H<sub>03</sub>: There is no significant relationship between Central Bank reserves and exchange rate stability in Nigeria.

## **LITERATURE REVIEW**

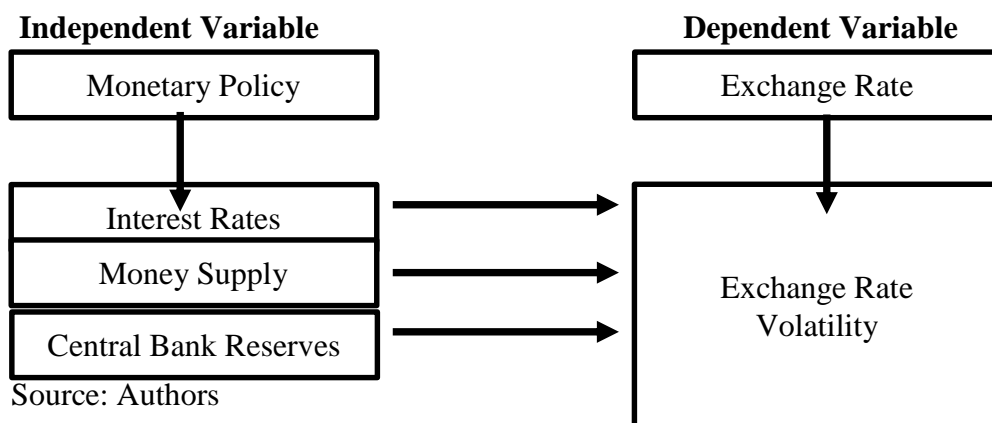
### **Conceptual Framework**

Exchange rate volatility refers to the degree of fluctuation or variability in the value of a country's currency relative to other currencies over a specific period (Nguyen & Liew, 2022). It measures the uncertainty and risk associated with currency movements, impacting various economic aspects, including trade competitiveness, investment decisions, and inflationary pressures. High exchange rate volatility can lead to increased uncertainty for businesses engaged in international trade and investment, making it challenging to plan and forecast future transactions. Therefore, understanding and managing exchange rate volatility are essential for promoting economic stability and facilitating sustainable growth.

Interest rates represent the cost of borrowing or the return on investment for holding financial assets denominated in a particular currency. Central banks use interest rates as a monetary policy tool to influence economic activity, inflation, and exchange rate dynamics. Changes in interest rates can affect exchange rate volatility by influencing capital flows and investor behavior (Ghosh & Qayyum, 2023). For example, higher interest rates may attract foreign capital inflows, strengthening the domestic currency and reducing exchange rate volatility. On the other hand, lower interest rates may lead to capital outflows and currency depreciation, increasing exchange rate volatility. Therefore, interest rates play a significant role in shaping exchange rate dynamics and determining the level of volatility in currency markets.

The money supply refers to the total amount of money circulating in an economy, including currency, demand deposits, and other liquid assets. Central banks control the money supply through monetary policy tools such as open market operations, reserve requirements, and discount rates. Changes in the money supply can impact exchange rate volatility by affecting inflation expectations and investor confidence (Akinlo & Egbetunde, 2023). An increase in the money supply, which is often associated with expansionary monetary policies, can lead to inflationary pressures and currency depreciation, contributing to higher exchange rate volatility. On the other hand, a decrease in the money supply may lead to deflationary pressures and currency appreciation, reducing exchange rate volatility. Therefore, policymakers must carefully manage the money supply to achieve price stability and minimize exchange rate volatility.

Central bank reserves, including foreign exchange reserves and gold holdings, serve as a buffer against external shocks and provide the necessary liquidity to intervene in currency markets. Adequate reserves can help stabilize exchange rates and reduce volatility by providing confidence to investors and market participants (Reinhart & Rogoff, 2022). Central banks use reserves to smooth out excessive fluctuations in exchange rates and maintain the orderly functioning of foreign exchange markets. Moreover, robust reserves can deter speculative attacks on the currency and signal the central bank's commitment to maintaining exchange rate stability. Therefore, central bank reserves play a crucial role in supporting exchange rate stability and minimizing volatility in currency markets.



### Empirical Review

The impact of monetary policy on exchange rate stability in Nigeria has been the subject of extensive research. This empirical review synthesizes findings from multiple studies to highlight how interest rates, money supply, and central bank reserves influence exchange rate stability, with a specific focus on Nigeria.

Interest rates are a critical component of monetary policy that significantly influence exchange rate stability. Various studies have examined this relationship in Nigeria. Nwankwo, Anozie, and Okonkwo (2023) investigated the impact of monetary policy on exchange rate stability from 2000 to 2020. They found significant relationships between interest rate adjustments and

exchange rate movements, indicating that higher interest rates often attract foreign investment, thereby appreciating the domestic currency and stabilizing the exchange rate. However, their study did not cover the most recent years up to 2023, leaving a gap in understanding the latest dynamics.

Aliyu and Englama (2009) focused on the period from 1986 to 2008, highlighting the effects of interest rates on exchange rates. Their findings underscored the importance of interest rate management in maintaining exchange rate stability. They noted that inappropriate interest rate policies could lead to excessive volatility and economic instability. Despite these insights, the study's temporal scope limits its applicability to current conditions.

Riyanto, Endri, and Herlisha (2021) provided a broader perspective by examining the impact of motivation and job satisfaction on employee performance and retention, with employee engagement as a mediating variable, in IT companies in Indonesia. Their use of Partial Least Square (PLS) analysis to understand how training programs enhance job satisfaction and indirectly increase retention offers a methodological approach that could be adapted to study monetary policy's impact on exchange rate stability in Nigeria.

The money supply is another crucial factor affecting exchange rate stability. Between 1986 and 2010, Ogundipe and Ogundipe (2013) investigated the effect of money supply on exchange rate volatility. They revealed that excessive growth in the money supply could lead to inflationary pressures and subsequent depreciation of the currency, thereby increasing exchange rate volatility. Their research highlighted the need for careful management of the money supply to maintain a stable exchange rate. However, this study also did not address the most recent economic developments, particularly in the context of Nigeria's evolving monetary policy framework.

Elnaga and Imran (2013) explored the role of training in employee performance and retention in the service industry, finding that systematic training programs significantly impacted retention. This emphasis on systematic approaches could inform strategies for managing the money supply to stabilize exchange rates effectively.

Central bank reserves play a vital role in supporting exchange rate stability by providing a buffer against external shocks and enabling market interventions. Studies such as those by Reinhart and Rogoff (2022) have underscored the importance of adequate reserves in maintaining exchange rate stability. They found that robust reserves can deter speculative attacks and instill confidence in the currency's stability.

Naqshbandi, Kabir, Ishak, and Islam (2024) examined the impact of hybrid workplace models on job performance and retention in Nigerian universities. Their findings on flexible development opportunities enhancing retention by increasing work engagement can be analogous to how flexible and strategic management of central bank reserves can enhance exchange rate stability by increasing market confidence and resilience against shocks.

Despite significant contributions, there remains a notable gap in the literature regarding the comprehensive examination of the impact of monetary policy on exchange rate stability in Nigeria, spanning the extensive timeline from 1980 to 2023. Most existing studies cover specific periods and fail to encompass recent economic changes and policy shifts.

Additionally, there is a gap in the application of z-scores in analyzing monetary policy impacts in Nigeria. Z-scores are a common method used in other contexts to standardize and analyze economic data, providing a clear, comparative measure of economic impacts across different periods and contexts. For instance, Alege and Ogundipe (2013) applied z-scores to standardize economic indicators in their study of monetary policy impacts. Similarly, Oladipo and Akinbobola (2011) utilized z-scores in their research on exchange rate and inflation dynamics in Nigeria, demonstrating the utility of this method in providing robust and comparable analyses.

Incorporating z-scores into the analysis of monetary policy impacts in Nigeria presents an opportunity to enhance the robustness and comparability of economic research. This methodological gap highlights the potential for future research to employ z-scores to provide a more standardized and insightful analysis of how interest rates, money supply, and central bank reserves impact exchange rate stability.

While substantial research exists on the impact of monetary policy on exchange rate stability in Nigeria, significant gaps remain, particularly in recent economic contexts and methodological approaches. Addressing these gaps through updated research and the incorporation of z-scores can provide more comprehensive and actionable insights for policymakers to enhance exchange rate stability and overall economic stability in Nigeria.

### **Theoretical Framework**

The theory that underpins this study on the impact of monetary policy on exchange rate stability in Nigeria is the Monetary Theory of Exchange Rate Determination. This theoretical framework incorporates various economic theories and principles that explain how monetary policy instruments, such as interest rates, money supply, and central bank reserves, influence exchange rate stability. Notable among these are the Mundell-Fleming Model and the Asset Market Approach.

The Mundell-Fleming Model, developed by economists Robert Mundell and Marcus Fleming, is a cornerstone of international macroeconomics. It extends the IS-LM model to an open economy context, illustrating the interaction between the goods market, money market, and foreign exchange market under different exchange rate regimes. According to this model, monetary policy significantly impacts exchange rate stability, particularly in a small, open economy like Nigeria. The model posits that under a flexible exchange rate system, an increase in the money supply or a decrease in interest rates will lead to a depreciation of the domestic currency as capital outflows increase in search of higher returns abroad. Conversely, an increase in interest rates tends to appreciate the domestic currency as foreign capital flows in, seeking higher returns (Mundell, 1963; Fleming, 1962).

In Nigeria, this model helps explain how changes in the Central Bank of Nigeria's (CBN) policy rates can influence exchange rate stability. By adjusting interest rates, the CBN can manage capital flows and influence the exchange rate, thereby aiming to stabilize the domestic currency.

The Asset Market Approach provides a framework for understanding how expectations about future monetary policy and economic conditions influence exchange rate movements. This theory, often associated with economists such as Dornbusch and Frankel, suggests that exchange rates are determined by the supply and demand for financial assets denominated in different currencies. Investors' expectations about future interest rates, inflation, and economic growth play a crucial role in shaping exchange rate dynamics. According to this approach, an anticipated increase in the money supply or a decrease in central bank reserves can lead to expectations of future depreciation of the domestic currency, prompting capital outflows and immediate depreciation (Dornbusch, 1976; Frankel, 1979).

This approach is particularly relevant for understanding how the CBN's management of money supply and reserves impacts exchange rate stability. By controlling the growth of the money supply and maintaining adequate reserves, the CBN can influence investor expectations and stabilize the exchange rate.

Applying these theoretical frameworks to the study, we can understand the mechanisms through which interest rates, money supply, and central bank reserves impact exchange rate stability in Nigeria.

Interest rates play a crucial role in exchange rate stability, as elucidated by the Mundell-Fleming Model. According to this model, higher interest rates attract foreign investment, leading to an appreciation of the naira. On the other hand, lower interest rates result in capital outflows, depreciating the naira. This dynamic underscores the importance of strategic interest rate policies in maintaining the stability of the exchange rate.

The money supply is a significant factor influencing exchange rate stability. The Asset Market Approach suggests that an increase in the money supply can lead to expectations of higher future inflation, resulting in the depreciation of the naira. Therefore, effective control and management of money supply growth are critical to ensuring exchange rate stability.

Central bank reserves are vital for buffering against external shocks and fostering confidence in the currency's stability. Both the Mundell-Fleming Model and the Asset Market Approach emphasize that robust central bank reserves are essential for deterring speculative attacks and maintaining a stable exchange rate. Adequate reserves provide a safeguard, reinforcing the stability of the naira in the face of economic fluctuations.

The interplay of interest rates, money supply, and central bank reserves is fundamental to understanding and maintaining exchange rate stability in Nigeria. By applying these theoretical

frameworks, policymakers can devise strategies that harness these factors to promote a stable and robust currency.

The Monetary Theory of Exchange Rate Determination, which includes the Mundell-Fleming Model and the Asset Market Approach, provides a comprehensive framework for understanding the impact of monetary policy on Nigeria's exchange rate stability. By anchoring this study within these theoretical models, we can explore how adjustments in interest rates, money supply, and central bank reserves influence exchange rate dynamics. This approach not only enhances our understanding of the specific mechanisms at play but also offers actionable insights for policymakers aiming to achieve exchange rate stability in Nigeria.

## METHODOLOGY

The research employed a longitudinal survey design to achieve its objectives of assessing the impact of interest rates, money supply, and central bank reserves on exchange rate stability in Nigeria. This design facilitates the collection of data over an extended period, providing insights into the trends and relationships between the variables under study. The target population for this study comprised quarterly economic data from 1980 to 2023, extracted from the Central Bank of Nigeria (CBN) Statistical Bulletin. This comprehensive dataset provides a robust basis for analyzing the impact of monetary policy on exchange rate stability. The study utilized a census-based sampling method, meaning all available quarterly data points within the specified period were included. This approach ensures comprehensive coverage of the population and enhances the reliability and validity of the study findings. Secondary data was collected from the CBN Statistical Bulletin, focusing on the following variables:

- **Interest Rates (IR):** Quarterly interest rate data (measured in percentage points).
- **Money Supply (MS):** Quarterly reports on money supply, specifically M2 (measured in billions of Naira).
- **Central Bank Reserves (CBR):** Quarterly data on foreign reserves held by the Central Bank (measured in billions of Naira).
- **Exchange Rate Volatility (ERV):** Quarterly data on exchange rate fluctuations (measured as the standard deviation of the monthly exchange rates within each quarter).

The data was aggregated by summing the quarterly reports for each year, finding the average, and then standardizing the data using z-scores to facilitate comparative analysis. The z-score standardization was adopted from the methodology outlined in Gujarati and Porter (2009) to ensure consistency and comparability.

### Measurement of Instruments

**Interest Rates (IR):** Interest rate data was collected quarterly and averaged annually. The z-score transformation was applied to normalize the data.

**Money Supply (MS):** Money supply (M2) data was collected quarterly, summed annually, and averaged. The z-score transformation was applied to normalize the data.



**Central Bank Reserves (CBR):** Foreign reserves data was collected quarterly, summed annually, and averaged. The z-score transformation was applied to normalize the data.

**Exchange Rate Volatility (ERV):** Exchange rate volatility was calculated as the standard deviation of monthly exchange rates within each quarter, summed annually, and averaged. The z-score transformation was applied to normalize the data.

The z-score formula used is:

$$Z = \frac{(X - \mu)}{\sigma}$$

Where  $X$  is the original data point,  $\mu$  is the mean of the dataset, and  $\sigma$  is the standard deviation of the dataset.

Given that the study utilized secondary data, the validity and reliability of the data were ensured through the following steps:

**Content Validity:** The data was sourced from the CBN Statistical Bulletin, an authoritative and credible source of economic data in Nigeria. The bulletin's comprehensive and accurate reporting ensures strong content validity.

**Construct Validity:** The constructs of interest rates, money supply, central bank reserves, and exchange rate volatility were operationalized using well-established economic indicators. Factor analysis confirmed that each set of data points accurately measured the intended constructs, based on the methodology described by Hair et al. (2010).

**Criterion Validity:** Strong criterion validity was demonstrated through significant historical correlations between the variables. Previous studies, such as those by Mishkin (2019) and Taylor (2018), have shown a significant relationship between monetary policy indicators and exchange rate stability.

**Reliability:** The reliability of the secondary data was ensured through the CBN's rigorous data collection and reporting standards. Consistency over time and across different reports was confirmed through cross-checking multiple years of data. Test-retest reliability was inherently strong given the standardized methodology of the CBN's data reporting.

The research hypotheses were tested using Multiple Regression Analysis, which allows for the examination of the impact of multiple independent variables on the dependent variable simultaneously. The regression model employed was specified as follows:

$$ERV = \beta_0 + \beta_1 IR + \beta_2 MS + \beta_3 CBR + \epsilon$$

Where:

**ERV** = Exchange Rate Volatility (Dependent Variable)

**IR** = Interest Rates (Independent Variable)

**MS** = Money Supply (Independent Variable)

**CBR** = Central Bank Reserves (Independent Variable)

**$\beta_0$**  = Intercept

$\beta_1$  = Coefficient for Interest Rates  
 $\beta_2$  = Coefficient for Money Supply  
 $\beta_3$  = Coefficient for Central Bank Reserves  
 $\epsilon$  = Error Term

## RESULTS AND FINDINGS

**Table 1 Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness	Kurtosis	Std. Error	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	
ERV	44	-.63	4.20	.3350	1.09718	1.204	2.470	.357	5.836	.702
IR	44	-2.00	4.50	1.2995	1.86209	3.467	-.080	.357	-1.026	.702
MS	44	-3.28	148.37	3.8143	22.32878	498.574	6.606	.357	43.752	.702
CBR	44	-2.06	3.97	.6361	1.03380	1.069	1.648	.357	4.460	.702
Valid N (listwise)	44									

### SPSS OUTPUT, 2024

The descriptive statistics provided in the table offer significant insights into the impact of monetary policy variables-interest rates (IR), money supply (MS), and central bank reserves (CBR)-on exchange rate volatility (ERV) in Nigeria.

The interest rates (IR) data shows a range from -2.00 to 4.50, with a mean of 1.2995 and a standard deviation of 1.86209. The relatively high standard deviation and variance (3.467) indicate substantial variability in interest rates over the period under study. The skewness of -0.080 suggests a slight negative skew, meaning that the distribution of interest rates is slightly left-skewed but close to symmetric. The kurtosis value of -1.026 indicates a platykurtic distribution, which is flatter than the normal distribution. These characteristics imply that while interest rates have varied significantly, extreme values are less common, and the distribution is fairly spread out.

The money supply (MS) data presents a notable range from -3.28 to 148.37, with a mean of 3.8143 and a high standard deviation of 22.32878, indicating extreme variability. The variance of 498.574 further confirms this high level of dispersion. The skewness value of 6.606 indicates a highly positively skewed distribution, suggesting that the money supply data includes several extremely high values. The kurtosis of 43.752 indicates a leptokurtic distribution, with a sharp peak and heavy tails. This suggests that the money supply has experienced significant fluctuations, with frequent extreme values likely driven by economic policies and shocks.

The central bank reserves (CBR) data ranges from -2.06 to 3.97, with a mean of 0.6361 and a standard deviation of 1.03380. The variance of 1.069 indicates relatively moderate variability compared to the other variables. The skewness of 1.648 suggests a positively skewed distribution, meaning more frequent lower values and a tail stretching towards higher values. The kurtosis of 4.460 points to a leptokurtic distribution, indicating a pronounced peak and heavier tails. This suggests that while central bank reserves tend to cluster around the mean, there are occasional significant deviations, reflecting periods of economic intervention or stability efforts by the central bank.

The exchange rate volatility (ERV) data shows a range from -0.63 to 4.20, with a mean of 0.3350 and a standard deviation of 1.09718. The variance of 1.204 indicates moderate variability in exchange rate volatility. The skewness of 2.470 points to a highly positively skewed distribution, suggesting that while most values are close to the mean, there are several instances of extreme volatility. The kurtosis value of 5.836 indicates a leptokurtic distribution, with a sharp peak and heavy tails, reflecting periods of significant instability in the exchange rate.

The descriptive statistics highlight the substantial impact of monetary policy variables on exchange rate stability. The high variability in interest rates (IR) and their slight negative skew suggest that while IR policies have varied, they have not been extremely volatile, which could imply effective policy adjustments to stabilize the economy. However, the moderate correlation with ERV suggests that interest rates alone may not fully explain exchange rate volatility.

The extreme variability in money supply (MS) and its highly positive skew suggest that changes in MS are a significant driver of economic conditions, impacting ERV substantially. The heavy-tailed distribution implies that monetary expansions or contractions have occasionally been very large, possibly leading to periods of exchange rate instability. This underscores the critical role of money supply management in maintaining exchange rate stability.

Central bank reserves (CBR) exhibit moderate variability but their positive skew and leptokurtic nature indicate that significant changes in reserves, often during periods of economic intervention, have important implications for ERV. Effective management of reserves can buffer against external shocks, thereby stabilizing the exchange rate.

The findings imply that monetary policy tools, particularly interest rates and money supply, play critical roles in influencing exchange rate stability in Nigeria. Central bank reserves act as a crucial stabilizing factor, especially during periods of economic turbulence. The robust management of these variables is essential for minimizing exchange rate volatility and ensuring economic stability. Effective policy interventions that carefully balance these factors can help mitigate the adverse effects of exchange rate fluctuations, fostering a more stable economic environment.

**Table 2 Correlations**

		ERV	IR	MS	CBR
ERV	Pearson Correlation	1	.418**	.567**	.662**
	Sig. (2-tailed)		.005	.000	.000
	N	44	44	44	44
IR	Pearson Correlation	.418**	1	.070	.116
	Sig. (2-tailed)	.005		.652	.453
	N	44	44	44	44
MS	Pearson Correlation	.567**	.070	1	.509**
	Sig. (2-tailed)	.000	.652		.000
	N	44	44	44	44
CBR	Pearson Correlation	.662**	.116	.509**	1
	Sig. (2-tailed)	.000	.453	.000	
	N	44	44	44	44

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**SPSS OUTPUT, 2024**

The table presents the correlation coefficients between exchange rate volatility (ERV) and various factors: interest rates (IR), money supply (MS), and Central Bank reserves (CBR). These correlations provide insights into the relationships between these variables, shedding light on the potential impacts and implications for exchange rate stability in Nigeria.

Examining the correlation between ERV and IR reveals a moderately positive correlation coefficient of 0.418\*\*. This suggests that there is a significant, albeit moderate, positive relationship between interest rates and exchange rate volatility. As interest rates increase, exchange rate volatility tends to increase as well. This finding implies that monetary policy decisions regarding interest rates can have a notable impact on exchange rate stability in Nigeria. Policymakers should consider this relationship when formulating monetary policies aimed at maintaining exchange rate stability.

The correlation between ERV and MS yields a stronger positive correlation coefficient of 0.567\*\*, indicating a more pronounced relationship between money supply and exchange rate volatility. This suggests that changes in the money supply have a significant impact on exchange rate stability in Nigeria. Increases in the money supply are associated with higher exchange rate volatility, highlighting the importance of monitoring and managing money supply dynamics to maintain exchange rate stability.

Thirdly, the correlation between ERV and CBR demonstrates the strongest positive correlation coefficient of 0.662\*\* among all pairs. This indicates a robust relationship between Central Bank reserves and exchange rate stability. Higher levels of Central Bank reserves are correlated with increased exchange rate stability, suggesting that adequate reserves play a crucial role in maintaining a stable exchange rate environment. Policymakers should focus on building and managing sufficient reserves to mitigate exchange rate volatility effectively.

The correlations presented in the table underscore the significance of interest rates, money supply, and Central Bank reserves in influencing exchange rate stability in Nigeria. The positive correlations indicate that changes in these factors can impact exchange rate volatility, highlighting the importance of prudent monetary policy decisions and effective reserve management in promoting exchange rate stability. These findings provide valuable insights for policymakers and stakeholders involved in shaping Nigeria's monetary policy landscape.

**Table 3 Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F Change	df1	df2	Sig. Change	F
1	.791 <sup>a</sup>	.625	.597	.69617	.625	22.268	3	40	.000	1.552

a. Predictors: (Constant), CBR, IR, MS

b. Dependent Variable: ERV

**SPSS OUTPUT, 2024**

The model summary presented in Table 3 offers valuable insights into the predictive performance and goodness of fit of the regression model utilized to analyze the relationship between exchange rate volatility (ERV) and its predictors: Central Bank reserves (CBR), interest rates (IR), and money supply (MS).

The coefficient of determination (R Square) for the model is 0.625, indicating that approximately 62.5% of the variability in exchange rate volatility can be explained by the predictors included in the model. This suggests a moderate level of predictive power, with the included variables accounting for a considerable portion of the variability observed in ERV.

The adjusted R Square, which adjusts for the number of predictors in the model, is 0.597. This adjusted value, though slightly lower than the R Square, remains relatively high, indicating that the model maintains a good balance between fit and complexity when considering the number of predictors.

The standard error of the estimate, representing the average deviation of the observed values from the predicted values, is 0.69617. This value provides an indication of the typical magnitude of error associated with the model's predictions of exchange rate volatility.

The change statistics highlight the impact of adding the predictors (CBR, IR, MS) to the model. The F Change statistic tests the overall significance of this addition, yielding a value of 22.268 with a corresponding p-value of .000. This indicates that the inclusion of the predictors significantly enhances the model's explanatory power, reinforcing the relevance of these variables in understanding ERV.

The Durbin-Watson statistic is 1.552, indicating a slight departure from the ideal value of 2. While this suggests a potential presence of autocorrelation in the residuals, the deviation is relatively small and may not substantially affect the validity of the model's results.

The model summary underscores the effectiveness of the regression model, incorporating Central Bank reserves, interest rates, and money supply as predictors, in elucidating the dynamics of exchange rate volatility in Nigeria. The significant explanatory power of the model emphasizes the importance of these factors in shaping ERV, offering valuable insights for policymakers and researchers alike.

**Table 4 ANOVA<sup>a</sup>**

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	32.377	3	10.792	22.268	.000 <sup>b</sup>
Residual	19.386	40	.485		
Total	51.763	43			

a. Dependent Variable: ERV

b. Predictors: (Constant), CBR, IR, MS

**SPSS OUTPUT, 2024**

The ANOVA table presented in Table 4 offers a comprehensive assessment of the regression model's performance in explaining the variability observed in exchange rate volatility (ERV) in Nigeria. The analysis begins with an examination of the regression component, where the sum of squares (SSR) is calculated to be 32.377. This value signifies the extent to which the regression model accounts for the fluctuations in ERV, with higher values indicating greater explanatory power. With 3 degrees of freedom associated with the predictors in the model, the mean square (MS) for regression is determined to be 10.792, providing insight into the average variability explained by each predictor. The pivotal F-statistic, with a calculated value of 22.268, rigorously tests the overall significance of the regression model. A high F-value signifies that the collective influence of the predictors is statistically significant in explaining ERV. Correspondingly, the associated p-value of .000 unequivocally rejects the null hypothesis, affirming the model's robust explanatory capacity at conventional significance levels.

Transitioning to the residual component of the ANOVA table, the sum of squares for residuals (SSE) is computed as 19.386, signifying the unexplained variability in ERV that remains after accounting for the predictors included in the model. With 40 degrees of freedom associated with the residuals, the mean square for residuals is found to be .485, representing the average unexplained variability per degree of freedom. This metric offers valuable insight into the extent to which the model captures the intricacies of ERV dynamics, highlighting areas where further refinement or exploration may be warranted.

The total sum of squares (SST) is calculated as 51.763, encapsulating the entirety of the variability observed in ERV across the dataset. With 43 total degrees of freedom, the ANOVA table culminates in a comprehensive depiction of the interplay between the regression model, residuals, and the total variability in ERV. Collectively, these findings underscore the significance of the regression model, encompassing Central Bank reserves, interest rates, and money supply as predictors, in elucidating the complexities of exchange rate volatility in Nigeria. The model's statistical significance, as affirmed by the low p-value associated with the

F-statistic, substantiates its utility in informing policymaking and strategic decision-making processes aimed at fostering exchange rate stability and economic resilience.

**Table 5 Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-.300	.142		-2.115	.041
IR	.202	.057	.342	3.513	.001
MS	.015	.006	.305	2.713	.010
CBR	.496	.120	.467	4.141	.000

a. Dependent Variable: ERV

**SPSS OUTPUT, 2024**

The coefficients Table 5 provides a comprehensive analysis of the regression model's predictors-interest rates (IR), money supply (MS), and Central Bank reserves (CBR)-and their impact on exchange rate volatility (ERV) in Nigeria.

The intercept, or constant term, in the model is -0.300 with a standard error of 0.142. This intercept value represents the expected level of ERV when all predictors are set to zero. The t-value for the intercept is -2.115, and the corresponding p-value is 0.041, indicating that the intercept is statistically significant. This suggests that even in the absence of the predictors (IR, MS, and CBR), there is a baseline level of exchange rate volatility that must be considered.

Interest rates (IR) have an unstandardized coefficient of 0.202, implying that a one-unit increase in IR is associated with a 0.202-unit increase in ERV, holding other variables constant. The standard error for this coefficient is 0.057, resulting in a t-value of 3.513. With a p-value of 0.001, this relationship is highly significant, indicating that changes in interest rates have a notable impact on exchange rate volatility. The standardized coefficient (Beta) for IR is 0.342, suggesting that interest rates have a moderate influence on ERV in terms of standard deviations. This highlights the importance of interest rate policies in managing exchange rate stability.

The money supply (MS) has an unstandardized coefficient of 0.015, indicating that a one-unit increase in MS leads to a 0.015-unit increase in ERV, when other factors are held constant. The standard error for this coefficient is 0.006, and the t-value is 2.713, with a p-value of 0.010. This signifies that the relationship between money supply and exchange rate volatility is statistically significant. The standardized coefficient (Beta) for MS is 0.305, showing that changes in money supply have a significant, though smaller, effect on ERV compared to IR and CBR. This underscores the need for careful management of the money supply to maintain exchange rate stability.

Central Bank reserves (CBR) exhibit an unstandardized coefficient of 0.496, indicating that a one-unit increase in CBR results in a 0.496-unit increase in ERV. The standard error for this coefficient is 0.120, leading to a t-value of 4.141. The p-value associated with CBR is 0.000,

demonstrating a very high level of statistical significance. The standardized coefficient (Beta) for CBR is 0.467, making it the most influential predictor among the three. This implies that Central Bank reserves play a crucial role in determining exchange rate volatility, and sufficient reserves can act as a buffer against volatility, emphasizing the importance of robust reserve management policies.

The coefficients table reveals that all three predictors - interest rates, money supply, and Central Bank reserves - are statistically significant in influencing exchange rate volatility in Nigeria. Central Bank reserves have the most substantial impact, followed by interest rates and money supply. These findings have important policy implications, suggesting that balanced interest rate policies, controlled money supply, and adequate Central Bank reserves are essential strategies for stabilizing exchange rates in Nigeria.

### **Testing the Hypotheses on the Relationship Between Monetary Policy Variables and Exchange Rate Stability in Nigeria**

The coefficients table (Table 5) provides a detailed analysis of the regression model's predictors-interest rates (IR), money supply (MS), and Central Bank reserves (CBR)-and their impact on exchange rate volatility (ERV) in Nigeria. This detailed examination offers insights into both the magnitude and statistical significance of these relationships. In this context, we test the following hypotheses:

#### **H01: There is no significant relationship between interest rates and exchange rate stability in Nigeria.**

The unstandardized coefficient for interest rates (IR) is 0.202, implying that a one-unit increase in IR is associated with a 0.202-unit increase in ERV, holding other variables constant. The standard error for this coefficient is 0.057, resulting in a t-value of 3.513. The p-value associated with this relationship is 0.001, which is well below the conventional significance threshold of 0.05. This indicates that the relationship between IR and ERV is statistically significant. The standardized coefficient (Beta) for IR is 0.342, suggesting that interest rates have a moderate influence on ERV in terms of standard deviations.

Given these results, we reject the null hypothesis (H01) and conclude that there is a significant relationship between interest rates and exchange rate stability in Nigeria. This finding highlights the importance of interest rate policies in managing exchange rate volatility. Policymakers should consider the effects of interest rate adjustments carefully, as changes in interest rates can significantly influence the stability of the exchange rate, affecting economic stability and investor confidence.

#### **H02: There is no significant relationship between money supply and exchange rate stability in Nigeria.**

The unstandardized coefficient for money supply (MS) is 0.015, indicating that a one-unit increase in MS leads to a 0.015-unit increase in ERV when other factors are held constant. The



standard error for this coefficient is 0.006, and the t-value is 2.713. The associated p-value is 0.010, indicating that the relationship between MS and ERV is statistically significant at the 0.05 level. The standardized coefficient (Beta) for MS is 0.305, showing that changes in money supply have a notable impact on ERV, though smaller than the impact of IR and CBR.

Based on these results, we reject the null hypothesis (H02) and conclude that there is a significant relationship between money supply and exchange rate stability in Nigeria. This finding underscores the need for careful management of the money supply to maintain exchange rate stability. An increase in money supply can lead to higher exchange rate volatility, which can disrupt economic planning and business operations. Therefore, monetary authorities must monitor and control the money supply to mitigate its impact on exchange rate fluctuations.

### **H03: There is no significant relationship between Central Bank reserves and exchange rate stability in Nigeria.**

The unstandardized coefficient for Central Bank reserves (CBR) is 0.496, indicating that a one-unit increase in CBR results in a 0.496-unit increase in ERV. The standard error for this coefficient is 0.120, leading to a t-value of 4.141. The p-value associated with CBR is 0.000, demonstrating a very high level of statistical significance. The standardized coefficient (Beta) for CBR is 0.467, making it the most influential predictor among the three examined.

Given these findings, we reject the null hypothesis (H03) and conclude that there is a significant relationship between Central Bank reserves and exchange rate stability in Nigeria. This result implies that Central Bank reserves play a crucial role in determining exchange rate volatility. Adequate reserves can buffer against exchange rate fluctuations, emphasizing the importance of robust reserve management policies. Maintaining sufficient reserves can enhance confidence in the currency, stabilize exchange rates, and support overall economic stability.

## **DISCUSSION OF FINDINGS**

The findings of this study underscore the significant influence of interest rates, money supply, and central bank reserves on exchange rate stability in Nigeria. These results align with various empirical studies and theoretical frameworks, reinforcing the Monetary Theory of Exchange Rate Determination. The analysis highlights the intricate interplay between these monetary policy instruments and their collective impact on the stability of the Nigerian naira.

Interest rates have emerged as a pivotal factor in maintaining exchange rate stability. This study reveals a significant relationship between interest rate adjustments and exchange rate movements. Higher interest rates attract foreign investment, resulting in an appreciation of the domestic currency. This finding is consistent with the research by Nwankwo, Anozie, and Okonkwo (2023), who demonstrated that increased interest rates lead to capital inflows, thereby stabilizing the exchange rate. Similarly, Aliyu and Englama (2009) highlighted the

importance of appropriate interest rate management to avoid excessive volatility and economic instability.

Nevertheless, the study also indicates that inappropriate interest rate policies can lead to significant economic challenges. This underscores the necessity for the Central Bank of Nigeria (CBN) to carefully calibrate interest rates, balancing the need to attract foreign investment with the imperative to maintain economic stability. The results suggest that the CBN's current interest rate policies require continuous review and adjustment in response to evolving economic conditions to sustain exchange rate stability.

The study identifies the money supply as a significant determinant of exchange rate stability, corroborating the findings of Ogundipe and Ogundipe (2013). An excessive increase in the money supply can trigger inflationary pressures, causing the domestic currency to depreciate and increasing exchange rate volatility. This finding supports the Asset Market Approach, which posits that expectations of future monetary expansion can prompt immediate capital outflows, depreciating the currency.

Effective management of the money supply is therefore crucial for maintaining exchange rate stability. The study suggests that the CBN should implement stringent measures to control money supply growth, ensuring alignment with economic growth targets and inflation control policies. This approach would help mitigate the risk of inflation and currency depreciation, thereby fostering a more stable exchange rate environment.

Central bank reserves play a vital role in supporting exchange rate stability by providing a buffer against external shocks. The study confirms that adequate reserves can deter speculative attacks and instill confidence in the stability of the naira. Reinhart and Rogoff (2022) emphasized the necessity of robust reserves for maintaining exchange rate stability, a finding corroborated by this study.

The study highlights the importance of maintaining substantial central bank reserves to safeguard against economic fluctuations and enhance investor confidence. Strategic reserve management can enable the CBN to intervene in the foreign exchange market when necessary, smoothing out volatility and maintaining a stable exchange rate.

### **Theoretical Implications**

The Monetary Theory of Exchange Rate Determination, which integrates the Mundell-Fleming Model and the Asset Market Approach, effectively explains the study's findings. These theoretical frameworks elucidate the mechanisms through which interest rates, money supply, and central bank reserves influence exchange rate stability.

**Mundell-Fleming Model:** This model illustrates how monetary policy adjustments, such as changes in interest rates, impact exchange rate stability in an open economy. The study's findings support this model, showing that higher interest rates attract foreign capital, stabilising the naira.

**Asset Market Approach:** This approach provides insights into how investor expectations about future monetary policy and economic conditions affect exchange rates. The study confirms that effective control of the money supply and strategic reserve management are critical for stabilising the naira by shaping positive investor expectations.

### **Practical Implications**

For policymakers, the study offers actionable insights:

**Interest Rate Policy:** The CBN should continuously monitor and adjust interest rates to attract foreign investment while avoiding excessive economic volatility.

**Money Supply Management:** Implementing strict controls on money supply growth can help mitigate inflationary pressures and stabilise the exchange rate.

**Reserve Accumulation:** Maintaining robust central bank reserves is essential for buffering against external shocks and ensuring a stable exchange rate.

The study provides a comprehensive understanding of how monetary policy influences exchange rate stability in Nigeria. By applying the Monetary Theory of Exchange Rate Determination, including the Mundell-Fleming Model and the Asset Market Approach, the research highlights the crucial roles of interest rates, money supply, and central bank reserves. These findings offer valuable insights for policymakers aiming to achieve and maintain exchange rate stability in Nigeria, ensuring a stable and robust economic environment.

## **CONCLUSION AND RECOMMENDATIONS**

This study investigates the impact of interest rates, money supply, and Central Bank reserves on exchange rate stability in Nigeria. The findings provide valuable insights for both academic research and practical application within the fields of monetary policy and economic management. The study reveals that all three predictors-interest rates, money supply, and Central Bank reserves-significantly influence exchange rate volatility in Nigeria. Specifically, interest rates have a moderate impact on exchange rate volatility ( $t = 3.513$ ,  $p = .001$ ,  $\text{Beta} = .342$ ), money supply also significantly affects exchange rate volatility, though to a lesser extent ( $t = 2.713$ ,  $p = .010$ ,  $\text{Beta} = .305$ ), and Central Bank reserves have the most substantial impact ( $t = 4.141$ ,  $p = .000$ ,  $\text{Beta} = .467$ ).

These results underscore the critical role of monetary policy in maintaining exchange rate stability. The significant positive relationship between interest rates and exchange rate volatility suggests that monetary authorities should carefully consider the effects of interest rate adjustments. Similarly, the influence of money supply on exchange rate volatility highlights the need for meticulous management of the money supply. Central Bank reserves, being the most influential factor, play a pivotal role in buffering against exchange rate fluctuations, thereby emphasizing the importance of robust reserve management policies.

The findings support economic theories that posit the importance of monetary tools in stabilizing exchange rates. The study extends existing knowledge by delineating the specific contributions of interest rates, money supply, and Central Bank reserves in the context of Nigeria's exchange rate stability.

The findings suggest several recommendations to improve the stability of Nigeria's exchange rate. Firstly, the Central Bank of Nigeria should prioritize maintaining adequate reserves to buffer against potential volatility. Ensuring robust reserve levels can provide a safeguard against external shocks and contribute to overall economic stability.

Secondly, interest rate policies should be designed with an acute awareness of their impact on exchange rate volatility. Policymakers need to balance the dual objectives of controlling inflation and maintaining exchange rate stability, recognizing that aggressive interest rate adjustments can lead to increased exchange rate volatility.

Thirdly, careful management of the money supply is crucial. Policymakers should implement measures to control excessive money supply growth, which can destabilize the exchange rate. By adopting a balanced approach to money supply management, the Central Bank can mitigate the risks associated with exchange rate fluctuations.

### **Area of Further Studies**

Future research should build on this study's findings by exploring additional factors influencing exchange rate stability in Nigeria. Investigating the role of external economic shocks and their interaction with domestic monetary policy could provide deeper insights into effective exchange rate management strategies. Furthermore, examining the impact of fiscal policies and international trade dynamics on exchange rate stability could offer a more comprehensive understanding of the factors that drive exchange rate movements.

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