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Modelling Exchange Rate Volatility in Kenya: The Role of Monetary Policy

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Abstract

This research investigates the influence of monetary policy on exchange rate volatility in Kenya, utilising an annual time series dataset spanning from 1970 to 2024. The study employs the Autoregressive Distributed Lag (ARDL) model and the Error Correction Model (ECM) to evaluate both long-run and short-run relationships. Exchange rate volatility is assessed using the Generalised Autoregressive Conditional Heteroskedasticity (GARCH) model, revealing that past volatility influences current rates. The F-bound test indicates a long-term relationship among the variables. In the long run, exchange rate volatility is affected by interest rates, money supply, and inflation rates. In the short run, the variable is significantly determined by its lagged values and the prevailing rates of inflation, interest rates, and money supply. Managing these factors is crucial for controlling exchange rate fluctuations in Kenya. Therefore, the study recommends that the Central Bank of Kenya adopt inflation-targeting frameworks, prudent monetary expansion, and effective interest rate management policies as key strategies for stabilising exchange rates.

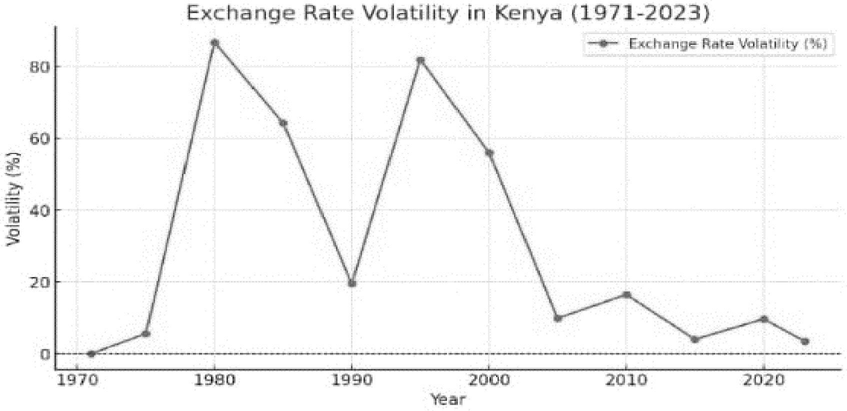
Keywords: *Exchange rate volatility, Monetary policy, Central Bank, GARCH*

1. Introduction

Kenya, being a developing country, faces the challenges of designing policies to spur economic growth, stabilise the exchange rate, and mitigate the challenges that arise from implementing both monetary and fiscal policies (Kibiy & Nasieku, 2016; Iliyasu, Ibrahim, & Musa, 2024). The exchange rate stability is fundamental in ensuring a country has sound economic policy objectives (Popa & Codreanu, 2010). These policies include fiscal policies, monetary policies, exchange rate policies, trade policies, industrial policies, labour market policies, investment policies, development policies, and environmental policies. Each of these plays a crucial role in addressing economic challenges and fostering long-term economic stability and growth (Ndung'u, 2000; Popa & Codreanu, 2010).

Exchange rate policies are considered the determinants of international transactions (Kibiy & Nasieku, 2016). The exchange rate policy in Kenya has undergone various regime changes in the past. Up to 1974, the exchange rate was pegged to the US dollar; after discrete devaluations, the peg was changed to the International Monetary Fund's Special Drawing Rights (Madura & Fox, 2021). Since the introduction of a freely floating exchange rate regime, the Kenyan shilling and US dollar exchange rates have been highly volatile (Waweru, 2014; Madura & Fox, 2021). When the foreign exchange market was liberalised, Kenya gained the right to control inflation but lost the right to lock in domestic prices, thereby transmitting the effects of globalisation directly into the country (Katusiime, Agbola & Shamsuddin, 2016). Kenya has experienced significant exchange rate volatility over the past two decades, impacting business operations, trade, and economic planning. Figure 1 shows the trend of Kenya's exchange rate volatility.

Figure 1: Trends in Exchange Rate Volatility for Kenya



Source: World Bank Data (2024).

As shown in Figure 1, exchange rate volatility in Kenya has exhibited significant fluctuations over the years. From 1971 to the early 1980s, the exchange rate remained relatively stable, with minimal fluctuations. However, the late 1970s and early 1980s saw a sharp rise in volatility, reaching a peak of 86.7% around 1980. This period was marked by a confluence of global economic shocks, domestic, structural adjustments, and changes in Kenya's foreign exchange policies. In the 1990s, the country experienced another wave of volatility, with fluctuations reaching around 81.9% in 2000 (World Bank, 2024). The liberalisation of the foreign exchange market and economic reforms played a role in these variations. By the mid-2000s, volatility had started to decline, though occasional spikes were observed due to external shocks and inflationary pressures (Kaboro, 2019). The 2010s saw a relatively more stable exchange rate environment, with volatility fluctuating between 9.9% and 16.5% (Kimolo, Odhiambo & Nyasha, 2024; World Bank, 2024). However, more recent years, including the post-pandemic period, have shown moderate fluctuations, with exchange rate volatility remaining around 9.7% in 2020 and slightly reducing by 2023 (Kimolo *et al.*, 2024). To combat the high levels of inflation, the Central Bank of Kenya has regularly adjusted the Central Bank interest rate (CBR), which has reached as high as 9.0% in 2023 in an attempt to curb inflation (Kimolo *et al.*, 2024). The Central Bank also intervened directly in the foreign exchange market by selling foreign currency reserves to stabilise the Kenyan shilling in times of excessive depreciation. Persistent fluctuations in exchange rates affect economic stability and investment attractiveness in an economy (Aidoo, 2017).

Volatility in exchange rates has caused significant depreciation of the Kenyan shilling, leading to increased concerns about the nation's economic stability and investment attractiveness (Ndagara, Mugendi & Galo, 2020). This sharp depreciation in the Kenyan shilling raises concerns about the effectiveness of monetary policy tools in stabilising exchange rate volatility. This study was conducted to investigate the impact of key monetary policy variables on foreign exchange rate volatility within the Kenyan economy. The rationale for conducting the research arose from the persistent volatility observed in Kenya's exchange rate, which posed risks to trade, investment, and overall macroeconomic stability.

Literature Review

Theoretical Perspective

General equilibrium theory provides a comprehensive analytical framework that views the economy as a system of interdependent markets, including goods, money, and foreign exchange, that adjust simultaneously to achieve equilibrium (Acemoglu & Robinson, 2019). The theory emphasises how monetary policies interact to influence macroeconomic variables, including exchange rates. Monetary expansion, for instance, may drive inflation and alter interest rates, affecting capital flows and currency valuation, while a change in policy shapes investor expectations and liquidity conditions (Alfaro, Bloom & Lin, 2024). This theory is particularly useful for examining the broader and systemic impact of policy decisions in open economies, offering insights into how various monetary forces collectively shape exchange rate volatility. The theory of purchasing power parity (PPP) bases its prediction of exchange rate movements on the changing patterns of trade due to different inflation rates between countries (Kirai, 2018; Bile, 2022). Therefore, when inflation in one nation exceeds that of its trading partner, the exchange rate adjusts by weakening the high-inflation country's currency to maintain equivalent purchasing capacity (Irungu, 2020; Madura & Fox, 2021).

Empirical Review

This nexus is theoretically supported by the principles of Interest Rate Parity and models of capital mobility, asserting that monetary tightening (higher interest rates) enhances the currency's attractiveness to foreign investors, driving appreciation through increased demand in the foreign exchange market (Desire, 2018). This is supported by Desire (2018), who observed that increased interest rates in Kenya led to a stronger shilling due to foreign investor demand for higher-yielding assets. However, Alper, Clements, Hobdari, and Moya Porcel (2020) show that structural interventions, such as interest rate caps, can reduce this attractiveness, causing capital outflows and depreciation. Oyadeyi, Osinubi, Simatele, and Oyadeyi (2025) provide broader regional insights, indicating time-varying and sometimes inconclusive links between interest differentials and exchange rates. Results by Desire (2018), Alper et al. (2020), and Oyadeyi et al. (2025) conclude that while interest rates are influential, their impact is heavily mediated by investor confidence, market openness, and policy stability.

Inflation typically exerts depreciating pressure on a currency, as it reduces purchasing power and erodes investor confidence, prompting capital flight and increased demand for foreign currencies (Ndagara, Mugendi & Galo, 2020). This classical view is supported by studies like Sumba, Nyabuto, and Mugambi (2024) and Xinyue (2023), which associate rising inflation in Kenya with shilling depreciation. However, Oranga (2022) presents a contrasting view by linking inflation to an increase in exchange rates, possibly reflecting pass-through effects from import costs and broader economic instability. Additionally, Ndagara et al. (2020) argue that inflation undermines the effectiveness of monetary policy aimed at exchange rate stability.

A fundamental nexus exists between monetary aggregates and the exchange rate, as articulated by monetary theory. This theory asserts that expansionary monetary policy results in domestic currency devaluation, a tendency amplified in highly integrated global financial systems (open economies with high capital mobility). This view is affirmed by Beldjebel and Hellal (2024) and Fratzscher and Rieth (2019), who link expansionary monetary policies to weaker currencies. In the Kenyan context, Ndung'u (1999) and Muchiri (2017) confirm that excessive money supply can devalue the shilling, although the latter also notes a possible positive effect under certain conditions. Jawo, Jebou, and Bayo (2023) and Kibiy and Nasieku (2016) find that increased money supply may reduce exchange rate volatility, though this finding is limited by the lack of interaction with other macroeconomic variables.

Methods

Data Issues

In this study, monetary indicators and exchange rate volatility were used for the 1970-2024 period in Kenya. The selected study period of 1970 to 2024 was justified by its ability to capture the beginning of the transition to a flexible exchange rate regime and the onset of increased market volatility, making it particularly relevant for the study's focus (CBK, 2023). Data for the dependent variable, exchange rate volatility (VOL), were collected from the World Bank database. The real exchange rate volatility series was measured by the conditional variance or standard deviation values obtained from the generalised autoregressive conditional heteroscedasticity (GARCH) model (Bollerslev, 1986; Yensu, Yusif, Tetteh, Asumadu & Atuilik, 2021; Iliyasu et al., 2024). The independent variables that influence the exchange rate volatility (VOL) included inflation rates (INF), interest rates (INT), and money supply (BMS). Data on monetary policy factors were sourced from the Kenya National Bureau of Statistics (KNBS) and Central Bank of Kenya (CBK) reports.

Analytical Techniques

The time series of exchange rates and monetary policy parameters often manifest stochastic processes, demonstrating autoregressive characteristics where historical values impact their realisation in the present period (Iliyasu et al., 2024). To adequately capture this dynamic nature and the presence of volatility clustering in exchange rate movements, this study employed the Generalised Autoregressive Conditional Heteroskedasticity (GARCH) model, specifically the GARCH(1,1) specification, due to its effectiveness in modelling time-varying variance through past squared residuals and lagged conditional variances. Before applying the GARCH model, an Autoregressive Conditional Heteroskedasticity Lagrange Multiplier (ARCH-LM) test was performed to detect heteroskedasticity, thus justifying the use of GARCH-type models.

Bollerslev (1986) proposed a useful extension known as the GARCH model. In the GARCH (p, q) process, the lagged values of the conditional variance are also included in the model, as captured by Iliyasu et al. (2024) and Kiliçarslan (2018)'s empirical works. The GARCH (p, q) model is defined as follows:

$$\delta_t^2 = \mu + \sum_{i=1}^{p} \alpha_i ¥_{t-1}^2 + \sum_{i=1}^{p} \beta_j \delta_{t-l}^2 \qquad 1$$

In Equation 1, σ 2 denotes the conditional variance of the error term. The first term (μ) represents the average, the second term is the ARCH term, and the third term is the GARCH term (Kiliçarslan, 2018).An important feature of the GARCH(p, q) model was that when both the ARCH (lagged squared error) and GARCH (lagged variance) terms are statistically significant the model behaves similarly to an ARCH(p+q) model. This is because it effectively includes the same number of lagged components for modelling conditional variance, but does so more efficiently by separating short-term shocks (ARCH effects) and long-term volatility persistence (GARCH effects) (Umoru, Akpoviroro, & Effiong, 2023). The study constructed a moving average (MA) model for the real effective exchange rate and examined whether these variables exhibit autoregressive conditionally heteroskedastic variance (ARCH) (Madan, Satish, Kumar, Varun, & Marc, 2023; Yensu et al., 2021). The Lagrange multiplier (LM) test, developed by Engle (1982), was employed to determine if the variable displayed ARCH effects, as commonly explored in the empirical literature. The exchange rate was transformed into its logarithmic form and analysed via a moving average process, with the conditional variance obtained from the model serving as a proxy for volatility (Umoru et al., 2023).

The study adopted the Autoregressive Distributed Lag (ARDL) estimation technique. The stages of an ARDL model include stationarity testing, optimal lag selection, model estimation, and cointegration testing through the bounds test. After the initial estimation and testing, the final steps involve checking the model's adequacy and interpreting the long-run and short-run coefficients, including the error correction term (Ige-Gbadeyan, Mose & Thomi, 2025). The ARDL model is favoured due to its structural flexibility in modeling heterogeneous integration orders, its inherent robustness against endogeneity challenges, and its ability to ensure the integrity of estimation by delivering consistent and unbiased parameter estimates for both short- and long-term relationship**s** (Hassler & Wolters, 2006). The major limitations of the ARDL model require specifying the appropriate lag lengths, and selecting incorrect lag orders might lead to biased parameters and unreliable conclusions (Ige-Gbadeyan et al., 2025).

Subsequent to volatility estimation, stationarity tests, including the Phillips-Perron (PP) tests, were conducted on all variables to determine their integration orders and to confirm that none were integrated of order two, which would compromise the validity of the ARDL framework (Phillips & Perron, 1988).

The PP unit root test is specified as follows:

$$\Delta X_t = \alpha_i + \beta_i X_{t-1} + \sum_{j=1}^{k} \gamma_{i,j} \, \Delta X_{t-j} + \varepsilon_t \qquad 2$$

Where $\Delta$is the first difference operator, X_t is the dependent variable, and $\varepsilon_t$is the white-noise disturbance with a variance $\sigma^2$of the index year (t). The Phillips-Perron test is similar to the Augmented Dickey-Fuller test, but it is a bit more advanced. It checks to see if the data points are changing predictably.

Subsequent to verification of the variables' order of integration, the lag order selection for the ARDL model was guided by the Akaike Information Criterion (AIC). This methodology prioritises model adequacy while simultaneously maintaining simplicity to avert statistical overfitting. The bounds testing approach developed by Pesaran *et al.* (2001) was employed to test for the presence of a long-run association among the factors. Subsequently, the long-run coefficients were estimated, and the model was reparameterised following Equation 3 to formulate the dynamic Error Correction Model (ECM) as described by Hassler and Wolters (2006). This step involved estimating both the Error Correction Term (ECT) and the short-run coefficients. The error correction term indicates the speed at which the system returns to equilibrium after experiencing short-term deviations. The general autoregressive distributed lag model for this research is as specified in Equation 3.

$$\Delta VOL_t = \sum_{i=0}^{k} \beta \Delta INF_{t-1} + \sum_{i=0}^{k} INT_{t-1} + \sum_{i=0}^{k} \gamma \Delta BMS_{t-1} + \gamma ECM_{t-1} + \varepsilon_t \qquad 3$$

In this model, γ_t is the short-run dynamic effect that measures the immediate impact that a change in **monetary policy** will have on the change in **volatility**. On the other hand ECM_{t-1} is the feedback effect, which indicates how much of the disequilibrium is being corrected, that is, the extent to which any disequilibrium in the previous period affects any adjustment. The error-correction model estimated will capture both the short- and long-run adjustment equilibrium mechanisms. To ensure the reliability of regression results, diagnostic residual tests were conducted. These tests included autocorrelation (Breusch-Godfrey LM test), heteroskedasticity (Breusch-Pagan-Godfrey test), and normality (Jarque-Bera test).

Results and Discussion

Exchange Rate Volatility Modelling

The study applied the ARCH-LM test and GARCH model to assess the volatility of the exchange rate, as presented in Table 1 below.

Table 1: Measurement of exchange rate volatility

Heteroskedasticity test: ARCH				
F-statistic	25.4086	Probability	0.0000	
Obs*R-squared	17.7249	Probability	0.0000	
GARCH model estimation				
Test	Coefficient	Standard error	z-value	p-value
GARCH (1,1)	0.5218	0.2135	2.4439	0.0145

Source: Authors' Concept (2025).

The ARCH Lagrange multiplier test results presented in Table 1 demonstrate significant volatility in Kenya's exchange rate during the study period. With an *F*-statistic of 25.4086 and an Observed *R*-squared of 17.7249, both having p-values of 0.0000, the null hypothesis of no ARCH effects was decisively rejected. The result validates the assumption of heteroskedasticity, demonstrating that the exchange rate's volatility dynamics are time-dependent, a finding characteristic of volatility clustering. Such results are in line with well-established empirical evidence on exchange rate dynamics in emerging markets (Engle, 1982; Baillie & Bollerslev, 1992), where shocks to exchange rates persistently affect future variability rather than dissipating immediately.

The application of the GARCH (1,1) model further substantiated the nature of exchange rate volatility in Kenya. As shown in Table 1 of the results, the estimated GARCH coefficient of 0.5218 was significant, confirming strong volatility persistence and the existence of volatility clustering. The GARCH (p,q) model is mathematically equivalent to an ARCH ($p+q$) model, indicating a correlation between the error variances over time. The high GARCH coefficient, approaching unity, suggests that past volatility exhibits a persistent, long-term effect on current volatility, thereby providing empirical evidence of volatility clustering. This agrees with findings from Bollerslev (1986), who introduced the GARCH framework to capture such persistent volatility effects in financial time series, and subsequent applications in currency markets (Madan *et al.*, 2023).

Unit Root Test

For robust ARDL estimation, the study first tested for stationarity, aided by the Philips-Peron (1988) unit root test. Table 2 presents unit root results.

Table 2: Unit root test results

Variable	Level		Difference		Conclusion
	Adj. t-Stat	P-value	Adj. t-Stat	P-value	
VOL	-0.9095	0.7778	-5.7448	0.0000	I(1)
INT	-3.4005	0.0152	-	-	I(0)
INF	-5.0923	0.0001	-	-	I(0)
BMS	-1.5738	0.4889	-8.5559	0.0000	I(1)

Source: Authors' Concept (2025).

The Philips Perontest results in Table 2 indicate that the level, interest rate, and inflation rate are stationary, with t-statistics of -3.4005 and -5.0923 and *p*-values of 0.0152 and 0.0001, respectively. These values fall below the 5% significance level, leading to rejection of the null hypothesis that these variables contain a unit root. Economically, this indicates that interest rates and inflation demonstrate mean-reverting behaviour. Inflation's stationarity reflects the impact of monetary policy instruments, such as inflation targeting and interest rate adjustments, which help contain inflation shocks. Conversely, exchange rate volatility and money supply were found to be non-stationary at the level; however, after first differencing, these variables became stationary. This shows that these series are integrated of order one, I(1).

The implication is that shocks to these monetary variables, such as abrupt changes in money supply, tend to have persistent effects. This phenomenon is often observed in developing economies where the efficacy of monetary intervention is attenuated by systemic structural rigidities and protracted policy transmission lags. These findings echo earlier empirical evidence by Ndung'u (2000), who found most Kenyan economic variables, particularly those related to monetary policy, to be of order I(1), suggesting persistent trends. Similarly, Mutuku (2013) confirmed the non-stationarity of key financial variables, indicating that their impact on the economy accumulates over time rather than dissipating immediately. Such persistence is often attributed to weak institutional mechanisms, delayed policy effects, and external vulnerabilities like global capital. Given the mixed integration orders (I(0) and I(1)) of the variables, the ARDL bounds testing framework is well-suited for this analysis.

Optimal Lag Selection Results

To conduct the ARDL analysis for the study, the appropriate lag length for the model was determined as indicated in Table 3.

Table 3: Determination of lag length

Lag	Log-likelihood	LR test statistic	Final predictor error	Akaike information criterion	Schwarz criterion	Hannan-quinn
0	68.4140	NA	9.40e-07	-2.5260	-2.3745	-2.4681
1	219.2273	272.0552*	4.77e-09*	-7.8128*	-7.0552*	-7.5233*
2	234.3822	24.9610	4.99e-09	-7.7796	-6.4160	-7.2586
3	242.7386	12.45275	6.94e-09	-7.4799	-5.5102	-6.7272
4	251.5125	11.6984	9.79e-09	-7.1965	-4.6208	-6.2122

Source: Authors' Concept (2025).

As shown in Table 3 of the results, the Log-likelihood value increased from 68.4140 at lag 0 to 219.2273 at lag 1, indicating improved model fit with higher lag orders. Correspondingly, the Akaike information criterion decreased from -2.5260 at lag 0 and reached its minimum of -7.8128 at lag 1, suggesting lag 1 as optimal. The lag length of 1 yielded the lowest Schwarz criterion value (–7.0552) and the smallest final predictor error (4.77e–09) and was also supported by the Hannan-Quinn criteria, confirming it as the most suitable lag for the model. The majority of the criteria determined that lag 1 provides the best balance of model fit and parsimony. Based on these results, the Akaike information criterion (1, 1, 0, 0) model was selected for further analysis, where the exchange rate volatility and interest rate are lagged once, and the money supply and inflation rate have no lags.

Bounds Test for Cointegration

After assessing stationarity and the levels of integration, the Bounds test for cointegration was performed. The results are captured in Table 4.

Table 4: Bounds cointegrationtest results.

Test Statistics	**Value**	**Significance**	**Level**	
F-Statistics	6.98		I(0)	I(1)
K	3	10%	2.37	3.20
		5%	2.79	3.67
		1%	3.65	4.66

Source: Authors' Concept (2025).

The F-Bounds test yielded an F-statistic of 6.98, which exceeds the upper critical bounds at the 5% significance level (3.67). This resulted in the rejection of the null hypothesis of no cointegration, indicating the presence of a significant long-run relationship among the factors. This confirms that the variables move together over time, supporting the appropriateness of the short- and long-run analysis.

Autoregressive Distributed Lag Model Estimation Results

Table 5 shows the long-run and short-run coefficient estimates using the ARDL technique.

Table 5: Regression results

Variable	Coefficient	Standard Error	t-Statistics	P-Value
Long-run results				
INT	-0.0872	0.0337	-2.5894**	0.0143
BMS	1.3419	0.4451	3.0147***	0.0050
INF	0.5710	0.2135	2.6744**	0.0117
Short-run dynamicsand error correction				
ΔINT	-0.0681	0.0236	-2.8900***	0.0069
ΔBMS	0.6246	0.2026	3.0826***	0.0042
ΔINF	0.4908	0.1802	2.7229**	0.0104
ΔVOL	0.5378	0.2826	1.9035*	0.0835
ECT	-0.1527	0.0244	-6.2649***	0.0000
Constant	2.1596	0.7083	3.0489***	0.0046
		Tests	F-statistics	Probability
Durbin Watson 2.09		Breusch-Godfrey LM	0.3729	0.6919
R-Squared 0.56		Ramsey RESET	2.0448	0.1627
Log likelihood 96.96		Breusch-Pagan	2.1949	0.0326
F-statistic 310.62 (0.0000)		Jarque-Bera	3.9021	0.1421
*Note: indicates ** $p < 0.05$, *** $p < 0.01$ are significance levels.*				

Source: Authors' Concept (2025).

Interest rate (INT) exhibited a negative and statistically significant effect on exchange rate volatility at the 5% level in the long run and short run, with a coefficient of -0.0872 and p-value of 0.0143 in the long run and a coefficient of -0.0681 and p-value of 0.0069 in the short run. a tendency for increases in interest rates to correlate with lower exchange rate variability, a relationship attributable to monetary policy's influence on capital flows and foreign exchange markets, which is consistent with the uncovered interest rate parity theory (Mohammed, Abubakari & Nketiah, 2021). When interest rates rise, they tend to attract foreign capital inflows as investors seek higher returns, increasing the demand for the domestic currency and causing its value to appreciate. A study by Ndung'u (2000) on the exchange rate and interest rate differential in Kenya found that an increase in interest rates resulted in the appreciation of the Kenyan shilling due to increased foreign investment in government securities. A study by Desire (2018), Alper et al. (2020), and Oyadeyi et al. (2025) on real exchange rate volatility and misalignment in Africa observed that during periods of high interest rates, the Kenyan shilling strengthened as foreign investors sought higher returns on investments, particularly in the bond market. However, these capital movements can be speculative and short-term, leading to greater fluctuations in exchange rates. Additionally, changes in interest rates often signal shifts in monetary policy or inflation expectations, which can introduce uncertainty and amplify exchange rate movements.

Inflation rate was positively and significantly associated with exchange rate volatility in the long run and short run, with coefficients of 0.5710 ($p = 0.0117$) and 0.4908 ($p = 0.0104$), respectively. This suggests that higher inflation exacerbates currency fluctuations, possibly due to eroding purchasing power and heightened uncertainty, consistent with past results from Popa (2010) and Yensu et al. (2021). The implication is that persistent inflation undermines both investor sentiment and the intrinsic value of the domestic currency, consequently increasing the frequency and magnitude of its market fluctuations (Kaboro, 2019). The result aligns with Ndung'u (1997) and Mutuku (2013), who documented that inflation led to depreciation of the Kenyan shilling, especially during periods of global oil price surges. The Purchasing Power Parity (PPP) theory provides a theoretical foundation for this relationship by explaining that inflation differentials between countries induce exchange rate adjustments as markets seek to restore parity in purchasing power. Consequently, high inflation creates uncertainty and volatility in the exchange market by affecting both demand for the currency and speculative behaviour among investors (Karikari et al., 2025). This finding aligns with Kiyota and Urata (2004), who noted that inflationary pressures reduce the purchasing power of the currency, increasing demand for foreign currency and causing exchange rate fluctuations. The result is consistent with the monetary hypothesis of exchange rate determination, which links inflation differentials to exchange rate movements through relative purchasing power parity. Rising inflation increases uncertainty and speculative pressures, thereby amplifying short-term exchange rate volatility.

Money supply (BMS) had the strongest positive effect on exchange rate volatility, with coefficients of 1.3419 ($p < 0.001$) and 0.6246 ($p < 0.001$), implying that rapid growth in the broad money supply significantly increases exchange rate instability in both the long run and the short run. Money supply, with the highest coefficient at 1.3419, demonstrates that excessive liquidity significantly amplifies exchange rate volatility in the long run. This occurs because an increased money supply without corresponding growth in economic output generates inflationary pressures and fuels speculative activities in the foreign exchange market. These speculative movements create fluctuations in currency value and reduce exchange rate stability. This finding aligns with empirical studies by Chen and Liu (2018) and Fratzscher and Rieth (2019), who reported similar dynamics in China and the European Union, respectively. The General Equilibrium Theory supports this relationship by emphasising how monetary expansion can disrupt equilibrium across interconnected financial and goods markets, leading to increased volatility in exchange rates.

Table 5 reveals that the model's coefficient of determination (R^2) is 0.56, indicating that approximately 56% of the variation in exchange rate volatility in Kenya is explained by the monetary variables in the model. The Breusch-Pagan-Godfrey test shows heteroskedasticity (F-statistic of 2.1949, p-value of 0.0326), while the ARCH-LM test confirms autoregressive conditional heteroskedasticity (F-statistic of 25.4086, p-value of 0.0000). The Breusch–Godfrey LM test indicates no autocorrelation (F-statistic of 0.3729, p-value of 0.6919). Finally, the Jarque–Bera test confirms normally distributed residuals (p-value of 0.1421), validating the model in the ARDL and GARCH frameworks.

Conclusion

This research investigated the influence of monetary policy on exchange rate volatility in Kenya using annual data spanning the period 1970 to 2024. Through the application of econometric methods, including GARCH modelling and ARDL bounds testing, the study identified the key monetary variables influencing volatility in both the short and long run. The ARCH-LM and GARCH(1,1) models confirmed the presence of volatility clustering, a common feature in exchange rate behaviour, indicating that periods of high volatility tend to be followed by further fluctuations. The result demonstrated that inflation exhibited a positive and significant influence on volatility. The analytical inference is that accelerating inflation drives currency volatility by diminishing transactional value and heightening systemic risk within the market. The results align with the economic hypothesis, which posits that inflation differentials are a key driver of exchange rate adjustments. Money supply was found to have the most pronounced positive long-run effect on exchange rate volatility. Rapid monetary expansion was related to greater currency fluctuations, reinforcing concerns that excessive liquidity, especially in the absence of corresponding economic output, can amplify inflationary pressures and speculative activity in the exchange market. An increase in interest rates resulted in the appreciation of the Kenyan shilling due to increased foreign investment in government securities as foreign investors sought higher returns on investments, particularly in the bond market. In conclusion, the study establishes that past volatilities, inflation rate, interest rate, and money supply are key monetary policy drivers of volatility in Kenya. These findings underscore the importance of stable inflation and interest rate management and prudent monetary expansion as essential tools for exchange rate stabilisation.

Recommendations

The government of Kenya, through the Central Bank of Kenya (CBK), should implement appropriate inflation-targeting frameworks and respond promptly and proactively to supply shocks, as inflation is a strong contributor to exchange rate instability. Establishing a clear inflation target can help manage expectations. Communicating this target effectively can bolster confidence among consumers and investors, aiding in stabilising the currency. Governments can reduce budget deficits through spending cuts or increased taxation. This can decrease inflationary pressure and enhance currency stability. Implementing policies to improve supply chain efficiency can help alleviate inflation pressures caused by supply shortages, thereby improving price stability.

In addition, central banks can tighten monetary policy by increasing interest rates. This approach can help contain inflation by reducing consumer spending and business investment, which in turn can stabilise the currency. Implement a cautious approach to interest rate adjustments to avoid sudden shocks to the economy. Gradual changes allow market participants to adjust their expectations without causing drastic fluctuations in the exchange rate.

Furthermore, since money supply expansion is strongly associated with higher exchange rate volatility, the government of Kenya should consider adopting measures that will ensure careful control of broad money growth. The government should also adopt measures that will ensure that liquidity injections are well-aligned with the country's output levels. The accumulation of international reserves is a critical monetary policy instrument for mitigating currency fluctuations, which empowers the central bank to execute more robust exchange rate stabilisation efforts. Establishing currency swap agreements with other central banks can provide liquidity support during times of market stress, reducing the need for abrupt interest rate changes.

Limitations and Scope for Future Studies

The limitations of this study included its reliance on available data spanning the period 1970 to 2024, the focus on only threemonetary policy determinants of exchange rate volatility, and the Kenya-specific scope, which limits the generalisability of the findings to other developing countries. Future research should consider incorporating additional variables such as governance indicators, fiscal policy factors, and climate change variables. Including these factors would provide more comprehensive and pragmatic insights into strategies for minimising exchange rate volatility in Kenya and other developing countries.

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