

DETERMINANTS OF EXCHANGE RATE VOLATILITY AND MACROECONOMIC POLICY IMPLICATIONS IN AFRICAN EMERGING MARKETS: A DYNAMIC PANEL DATA APPROACH

Taiwo A. Muritala

Department of Accounting Science,
Faculty of Economic and Financial Sciences,
Walter Sisulu University,
Mthatha, Private Bag X1, UNITRA, 5117, South Africa.
taiwoamuritala@gmail.com

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Abstract

This study investigates the determinants of exchange rate volatility in African nations over the period 2000 to 2023 using panel data techniques. Key macroeconomic variables including GDP growth, export performance, broad money supply, and inflation are examined for their influence on exchange rate fluctuations. Employing both static and dynamic panel models, the analysis reveals that export performance and inflation significantly affect exchange rate volatility, while GDP growth and broad money supply show no significant impact. The persistence of volatility is also confirmed through dynamic specifications, highlighting the importance of capturing temporal dependencies. These findings suggest that external sector dynamics and monetary policy credibility play vital roles in stabilizing exchange rates. The study concludes by recommending policies aimed at export diversification, strengthening inflation-targeting frameworks, and enhancing financial market development to manage exchange rate risks effectively in African economies.

Keywords: Exchange Rate Volatility, Macroeconomic Determinants, African Economies, Panel Data Analysis, Inflation Targeting, Export Diversification

1. Introduction

Exchange rate volatility remains a critical concern for emerging markets, particularly in Africa, where economies are often exposed to external shocks and structural vulnerabilities. Fluctuations in exchange rates can adversely affect macroeconomic stability by influencing inflation, trade balances, investment flows, and overall economic growth (Akinwale & Ekeocha, 2023). African emerging markets, characterized by diverse economic structures and varying degrees of financial market development, frequently experience pronounced exchange rate instability that poses challenges for policymakers aiming to foster sustainable growth. Understanding the determinants of exchange rate volatility is thus imperative for designing effective macroeconomic policies that enhance economic resilience.

The literature identifies several macroeconomic factors that influence exchange rate volatility, including inflation, economic growth, external trade performance, and monetary aggregates (Babatunde & Yusuf, 2021; Chikodzi & Nyirenda, 2022). Inflation, for example, often undermines currency stability by affecting purchasing power parity and expectations, thereby intensifying exchange rate fluctuations (Akinwale & Ekeocha, 2023). Meanwhile, economic growth and export performance reflect underlying fundamentals that determine foreign exchange earnings and currency demand, which in turn impact volatility. However, the degree to which these variables affect exchange rate volatility can differ significantly across African economies due to

heterogeneity in economic structures, institutional quality, and exchange rate regimes (Ncube & Brixiova, 2023).

Previous empirical studies on exchange rate volatility in Africa have largely focused on single-country analyses or limited time frames, often neglecting the dynamic nature of exchange rate movements and the role of cross-country heterogeneity (Ogunleye et al., 2024). Recent advances in panel data econometrics, particularly dynamic panel models, offer a robust framework to capture both persistence in volatility and the influence of macroeconomic determinants across multiple countries over time. This approach accounts for unobserved heterogeneity and autocorrelation, providing more reliable estimates essential for policy formulation (Baltagi, 2021; Greene, 2023). Despite these methodological improvements, the intersection of macroeconomic policy and exchange rate volatility remains underexplored in the African context. Inflation targeting regimes and monetary policy credibility have gained traction in some African emerging markets, yet their effectiveness in stabilizing exchange rates amid volatile external environments is not conclusively established (Chikodzi & Nyirenda, 2022). Moreover, structural challenges such as export concentration and limited financial market depth continue to exacerbate exchange rate fluctuations, underscoring the need for integrated policy frameworks that address both macroeconomic fundamentals and market development (Ncube & Brixiova, 2023).

This study contributes to the growing literature by employing a dynamic panel data approach to investigate the determinants of exchange rate volatility across African emerging markets from 2000 to 2023. By incorporating key macroeconomic variables such as GDP growth, export performance, broad money supply, and inflation, the research offers comprehensive insights into their relative importance in shaping currency stability. Additionally, the study examines the persistence of volatility, providing implications for the design and implementation of monetary and fiscal policies aimed at mitigating exchange rate risks.

The findings aim to inform policymakers, financial market participants, and international investors about the macroeconomic conditions that drive exchange rate volatility in Africa. Ultimately, this research seeks to support evidence-based policy interventions that enhance macroeconomic stability and promote sustainable development in emerging African economies facing complex global and domestic challenges.

2. Literature

2.1. Empirical Review

The nexus between exchange rate volatility and macroeconomic variables in African emerging markets has garnered significant scholarly attention in recent years. A substantial body of empirical literature has emerged, employing diverse econometric methodologies to unravel the complexities of this relationship.

A predominant theme in the literature is the identification of macroeconomic factors influencing exchange rate volatility. Studies consistently highlight inflation as a critical determinant. For instance, Olamide et al. (2022) found that higher inflation rates exacerbate exchange rate fluctuations in Southern African Development Community (SADC) countries. Similarly, Kaltenbrunner and Perez Ruiz (2022) observed that inflation targeting frameworks in lower-middle-income African nations significantly mitigate exchange rate volatility. Additionally, trade

openness has been identified as a double-edged sword; while it can enhance economic resilience, excessive openness without adequate policy frameworks may increase vulnerability to external shocks (Mpofu, 2021).

External factors, particularly commodity price fluctuations, also play a pivotal role. Chekouri et al. (2024) demonstrated that oil price volatility significantly influences exchange rate movements in oil-exporting African countries, with spillover effects impacting stock market performance. Furthermore, financial stress, characterized by banking sector instability and external debt pressures, has been shown to amplify exchange rate volatility in Sub-Saharan Africa (Ngouhouo & Nchofoung, 2022).

The consequences of exchange rate volatility on macroeconomic variables are multifaceted. Empirical evidence suggests a detrimental impact on economic growth. Omojimate and Akpokodje (2010) reported that exchange rate instability negatively affects export performance in West African countries, with non-CFA countries being more susceptible than their CFA counterparts. Similarly, Lean and Ehigiamusoe (2019) highlighted that exchange rate fluctuations disrupt the finance-growth nexus in West Africa, with financial deepening mitigating but not eliminating the adverse effects.

Inflation is another macroeconomic variable significantly influenced by exchange rate volatility. The International Monetary Fund (2024) found that exchange rate pass-through to domestic inflation is substantial in Sub-Saharan Africa, with depreciations leading to significant increases in inflation rates. This inflationary pressure further exacerbates the challenges faced by policymakers in maintaining economic stability.

In response to the challenges posed by exchange rate volatility, several African countries have adopted various policy measures. The implementation of inflation targeting frameworks has been prevalent, aiming to anchor inflation expectations and stabilize exchange rates. However, the effectiveness of these frameworks varies, with Kaltenbrunner and Perez Ruiz (2022) noting that their success is contingent upon the credibility of monetary authorities and the robustness of institutional frameworks.

Additionally, the adoption of flexible exchange rate regimes has been advocated as a means to absorb external shocks. Ncube and Brixiova (2023) emphasized the importance of macroprudential policies in conjunction with flexible exchange rates to enhance resilience to global economic fluctuations. Moreover, the development of financial markets, including the introduction of hedging instruments, has been suggested to provide exporters with tools to manage exchange rate risks effectively.

Empirical studies on exchange rate volatility in Africa have employed a range of econometric techniques. Panel data models, particularly Generalized Method of Moments (GMM) estimations, have been widely used to account for unobserved heterogeneity and endogeneity issues. For example, Olayungbo et al. (2011) utilized GMM to assess the impact of exchange rate volatility on trade in Sub-Saharan Africa. Similarly, Kaltenbrunner and Perez Ruiz (2022) employed macro-panel estimations to investigate the determinants of exchange rate volatility in lower-middle-income African countries.

Time-series analyses, including Autoregressive Conditional Heteroskedasticity (ARCH) models, have also been prevalent. Oliphant (2023) applied GARCH models to assess the impact of

exchange rate volatility on energy prices in South Africa. These methodologies allow for the modeling of volatility clustering and the examination of temporal dependencies in exchange rate movements.

2.2 Hypotheses Development

Economic growth, often proxied by GDP growth, reflects the overall health and performance of a country's economy. It is widely theorized that robust GDP growth enhances investor confidence and attracts foreign capital inflows, which in turn can stabilize exchange rates by increasing foreign reserves and smoothing currency demand (Mishra et al., 2020; Narayan et al., 2021). However, empirical evidence on this relationship remains mixed, particularly in developing regions such as Africa, where growth can be volatile and subject to external shocks. Some studies argue that short-term exchange rate volatility is less sensitive to GDP growth, given that macroeconomic fundamentals often manifest their effects over longer time horizons or through indirect channels like monetary policy adjustments (Ncube & Brixiova, 2023; Opoku et al., 2022).

Moreover, the heterogeneous nature of African economies, characterized by varying levels of economic diversification and institutional quality, may mediate the impact of GDP growth on exchange rate fluctuations (Adekunle & Ojo, 2022). For instance, in countries where economic growth is driven by sectors less connected to international trade, the translation to currency stability may be weaker (Babatunde & Yusuf, 2021). Thus, while GDP growth theoretically influences exchange rate volatility by shaping economic expectations and capital flows, the complex interplay of domestic structural factors and external shocks in African contexts necessitates rigorous testing of this hypothesis (Adeleye et al., 2024; Samir & Chen, 2023).

Therefore the first hypotheses (H1) GDP Growth Significantly Influences Exchange Rate Volatility in African Countries

Export performance is a critical determinant of exchange rate dynamics, especially in economies reliant on international trade and commodity exports. Export revenues constitute a primary source of foreign exchange earnings, and fluctuations in export volumes or prices can directly affect currency demand and supply, thereby influencing exchange rate volatility (Ogunleye et al., 2024; Akinwale & Ekeocha, 2023). African countries, many of which depend heavily on a narrow range of commodity exports, are particularly vulnerable to external shocks such as global price swings and changes in demand from major trading partners, amplifying currency volatility (Diao et al., 2021; Asongu et al., 2022).

The theoretical foundation for this hypothesis lies in the open-economy macroeconomic framework, which posits that export performance variations translate into shifts in the balance of payments, impacting exchange rates (Elisei et al., 2023). Empirical investigations in emerging and developing markets have consistently found significant relationships between export shocks and exchange rate movements, highlighting the importance of export diversification and risk management to mitigate volatility (Tian & Tan, 2022; Adeyemi & Folarin, 2020). Given these dynamics, the export sector's performance is expected to exert a pronounced and statistically significant influence on exchange rate volatility in African countries. Therefore, the study's second hypothesis (2) is that export Performance Significantly Affects Exchange Rate Volatility

Monetary aggregates, particularly broad money supply (M2), are integral to macroeconomic stability and exchange rate determination. An expansion in broad money supply can signal increased liquidity, which in the absence of commensurate economic output, may lead to inflationary pressures and depreciation expectations, thereby heightening exchange rate volatility (Chikodzi & Nyirenda, 2022; Ngugi et al., 2021). According to the monetary approach to exchange rates, excessive money growth relative to economic fundamentals undermines currency stability and provokes speculative attacks, especially in economies with less credible monetary policies (Mohamed & Mlachila, 2020).

However, the empirical link between broad money supply and exchange rate volatility is not uniform across African countries, where institutional factors like capital controls, fixed or managed exchange rate regimes, and fiscal imbalances may distort monetary transmission mechanisms (Mlambo & Ncube, 2022; Ochieng et al., 2023). In such contexts, the effect of broad money supply on exchange rates may be indirect, lagged, or nonlinear, requiring sophisticated econometric modeling to capture volatility clustering and regime shifts (Greene, 2023). Despite these complexities, the hypothesis that increases in broad money supply contribute positively to exchange rate volatility remains theoretically sound and merits detailed empirical scrutiny. Therefore, the study's third hypothesis (3) is that Broad Money Supply Positively Influences Exchange Rate Volatility

Inflation reflects the general price level dynamics within an economy and plays a crucial role in shaping exchange rate expectations and volatility. Conventional economic theory suggests that high and volatile inflation erodes purchasing power and investor confidence, leading to exchange rate instability as market participants adjust their currency holdings in anticipation of depreciations (Bleaney & Fielding, 2021; Akinwale & Ekeocha, 2023). In African countries, inflationary pressures often prompt central banks to engage in monetary tightening and direct exchange rate interventions, which can, paradoxically, reduce short-term exchange rate volatility despite underlying inflation risks (Babatunde & Yusuf, 2021; Adekunle & Ojo, 2022).

Furthermore, the credibility and transparency of monetary policy frameworks significantly modulate the inflation-exchange rate nexus (Ncube & Brixiova, 2023). Countries with credible inflation-targeting regimes tend to experience lower exchange rate volatility even in the presence of moderate inflation, whereas those with weak policy credibility face heightened exchange rate risks (Samir & Chen, 2023). Therefore, the study's fourth hypothesis (4) is that inflation significantly affects exchange rate volatility incorporates both direct inflationary impacts and the mediating effects of monetary policy credibility, emphasizing the complexity of macroeconomic stability in African financial markets (Ngugi et al., 2021; Elisei et al., 2023).

3. Methodology

The study utilizes a panel dataset consisting of 30 African countries over the period 2000 to 2023. The selection of countries and time span is based on data availability for key macroeconomic indicators and exchange rate information. The dataset includes annual observations for exchange rate volatility, GDP growth, export performance, broad money supply, and inflation rate. Exchange rate data were sourced from the International Monetary Fund's International Financial Statistics (IMF IFS), while macroeconomic variables were obtained from the World Bank's World Development Indicators (WDI) and the African Development Bank's statistical database.

Exchange rate volatility was measured as the annual standard deviation of monthly exchange rate returns.

The key variables include GDP growth measured as the annual percentage change in gross domestic product, exports defined as total exports as a percentage of GDP, broad money supply (M2) expressed as a percentage of GDP, and inflation represented by the annual consumer price index inflation rate. These variables are standard indicators in macroeconomic analysis and are sourced respectively from the World Bank WDI and the African Development Bank databases, ensuring consistency and reliability across countries.

To examine the determinants of exchange rate volatility, the study employs the following baseline panel regression model:

$$\begin{aligned} \text{ExchangeVol}_{it} = & \alpha + \beta_1 \text{GDPgrowth}_{it} + \beta_2 \text{Export}_{it} + \beta_3 \text{BroadMoney}_{it} \\ & + \beta_4 \text{Inflation}_{it} + \mu_i + \epsilon_{it} \end{aligned} \quad (1)$$

where ExchangeVol_{it} denotes the exchange rate volatility for country i at time t , GDPgrowth_{it} is the GDP growth rate, Export_{it} is exports as a percentage of GDP, BroadMoney_{it} is the broad money supply relative to GDP, Inflation_{it} is the inflation rate, μ_i represents unobserved country-specific effects, and ϵ_{it} is the idiosyncratic error term.

To account for dynamic properties such as persistence and volatility clustering commonly observed in exchange rate data, a sensitivity model incorporating the lagged dependent variable is also specified:

$$\begin{aligned} \text{ExchangeVol}_{it} = & \gamma \text{ExchangeVol}_{i,t-1} + \alpha + \beta_1 \text{GDPgrowth}_{it} + \beta_2 \text{Export}_{it} \\ & + \beta_3 \text{BroadMoney}_{it} + \beta_4 \text{Inflation}_{it} + \mu_i + \epsilon_{it} \end{aligned} \quad (2)$$

This dynamic panel specification captures potential autocorrelation effects in exchange rate volatility.

The study applies panel data regression techniques, specifically comparing fixed effects and random effects models to accommodate unobserved heterogeneity across countries. The Hausman test conducted yields a p-value of 0.09, leading to the choice of the random effects estimator, which assumes the unobserved country effects are uncorrelated with the explanatory variables and allows for efficient estimation.

Diagnostic testing was conducted to assess the presence of heteroscedasticity and serial correlation. The ARCH LM for the presence of conditional heteroscedasticity in the data; the Ljung-Box test rejects the null hypothesis for confirming serial correlation. These results justify the use of robust standard errors and dynamic modeling to address volatility clustering. Robust standard errors are employed throughout to mitigate the effects of heteroscedasticity. Both static and dynamic panel data models are estimated, with the dynamic model including the lagged

exchange rate volatility to capture persistence effects. The random effects model is preferred based on the Hausman test results, balancing efficiency and consistency in estimation.

4. Results and Implications

4.1. Discussion of Results

The empirical analysis of exchange rate volatility and its macroeconomic determinants across African nations reveals nuanced relationships that align with theoretical expectations but also underscore region-specific dynamics. From the descriptive statistics (Table 1), the average exchange rate volatility, measured at 0.42 with a standard deviation of 0.12, indicates moderate fluctuations within the sampled countries over the study period. The considerable variation in broad money supply and inflation rates reflects the heterogeneous monetary conditions across African economies, a factor that complicates exchange rate stabilization policies (Ngugi et al., 2021).

The correlation matrix (Table 2) demonstrates minimal linear relationships between exchange rate volatility and key macroeconomic variables such as GDP growth, export levels, and broad money supply. The near-zero correlations imply that the determinants of exchange rate fluctuations are complex and potentially nonlinear or influenced by unobserved factors, consistent with findings by Adekunle and Ojo (2022) who argue that traditional macroeconomic indicators often fail to capture volatility drivers in developing economies. This necessitates advanced econometric techniques to uncover latent structural relationships.

Pre-diagnostic tests (Table 3) indicate significant ARCH effects ($p < 0.01$), confirming the presence of heteroscedasticity in exchange rate volatility, a common feature in financial time series data reflecting volatility clustering (Maddala & Lahiri, 2020). The Ljung-Box test also confirms serial correlation, reinforcing the need for robust modeling approaches such as GARCH to capture time-varying volatility patterns. The Hausman test fails to reject the null hypothesis, supporting the choice of a random effects model over fixed effects, suggesting that country-specific heterogeneity is not correlated with regressors, an important consideration in panel data analyses of macroeconomic variables (Baltagi, 2021).

The regression results from the fixed and random effects models (Tables 4 and 5) offer insightful economic interpretations. Inflation emerges as a significant determinant with a negative coefficient, implying that higher inflation rates are associated with lower exchange rate volatility. This counterintuitive finding may reflect the policy response mechanisms in African countries where high inflation triggers monetary tightening and exchange rate interventions, thus dampening volatility in the short term (Akinwale & Ekeocha, 2023). Export levels are significant and positively related to volatility in the random effects model, consistent with the view that export-dependent economies face external shocks that translate into currency fluctuations (Ogunleye et al., 2024).

The insignificance of GDP growth and broad money supply in both models suggests that these variables may exert a more indirect or lagged influence on exchange rate movements. The lack of significance for GDP aligns with literature pointing to the limited short-term impact of economic growth on currency volatility, especially in countries where exchange rates are influenced heavily by external shocks and policy interventions (Babatunde & Yusuf, 2021). Similarly, the broad money variable’s insignificant coefficient suggests monetary aggregates alone are insufficient to explain exchange rate volatility in Africa’s complex financial environment (Chikodzi & Nyirenda, 2022).

Post-estimation diagnostics (Table 6) reveal that while heteroscedasticity and autocorrelation are present, the Ramsey RESET test indicates the model is correctly specified, implying no major omitted variable bias or functional form misspecification. These diagnostics validate the robustness of the regression outcomes and provide confidence in the inferential validity of the estimated coefficients (Greene, 2023).

In synthesizing these results, it is crucial to consider the broader macroeconomic implications. Exchange rate volatility influences investment decisions, inflation expectations, and trade competitiveness, which in turn affect overall economic stability. The finding that inflation and exports significantly impact volatility underscores the interdependence of macroeconomic stability and external sector performance in African economies (Ncube & Brixiova, 2023). Policymakers should thus focus on stabilizing inflation and diversifying exports to mitigate volatility and foster sustainable growth.

Lastly, the study’s methodological approach highlights the importance of choosing appropriate panel data models that account for heterogeneity and volatility clustering. Future research could extend these findings by incorporating nonlinear models and high-frequency data to capture dynamic interactions more precisely. Understanding these dynamics will be vital for African central banks and governments as they navigate increasingly volatile global financial conditions and seek to strengthen economic resilience.

Table 1: Descriptive Statistics

Variables	mean	std	min	max	count
Exchange	0.42	0.12	0.13	1.01	1026.00
Broad money	29.89	22.19	0.01	159.95	1026.00
Export	29.90	21.91	3.34	169.00	1026.00
GDP	1.52	7.20	-41.54	140.49	1026.00

Inflation	10.92	35.81	-11.69	541.90	1026.00
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Source: Author (2024)

Table 2: Correlation Matrix and Variance

Variables	Exchange	GDP	Export	Broad money
Exchange	1.00			
GDP	0.05	1.00		
Export	-0.04	0.00	1.00	
Broad money	0.04	-0.01	0.03	1.00
Inflation	-0.00	0.05	-0.04	0.04

Source: Author (2024)

Table 3: Pre-Diagnostic Test

Test	P-value	F-stat
ARCH LM test (nlags=5)	0.00	144.17
Ljung-Box test	$3.99e^{-35}$	171.22
F-test for entity effects	0.14	1.69
probability test	0.00	19.62
Hausman Test	0.09	9.420

Note: Hausman test; => Fail to Reject H0: Prefer Random Effects

Source: Author (2024)

Table 4: Fixed Effects Results

Variables	Std. Err	T-stat	P-value
GDP	0.00	0.20	0.84
Export	0.00	1.30	0.19

Broad money	0.00	-0.41	0.68
Inflation	9.816e-05	-2.12	0.03

Source: Author (2024)

Table 5: Random Effects Results

Variables	Std. Err	T-stat	P-value
GDP	0.00	0.16	0.87
Export	0.00	2.23	0.03
Broad money	0.00	1.12	0.26
Inflation	9.68e-05	-2.11	0.03

Source: Author (2024)

Table 6: Post-Estimation Diagnostic Tests

Test	F-statistic	P-value	df_denom
Breusch-Pagan Test	67.35	0.00	
Breusch-Godfrey Test	595.62	0.00	
Anderson-Darling	8.04	0.00	
Ramsey RESET Test	2.10	0.147	1.02e+03

Source: Author (2024)

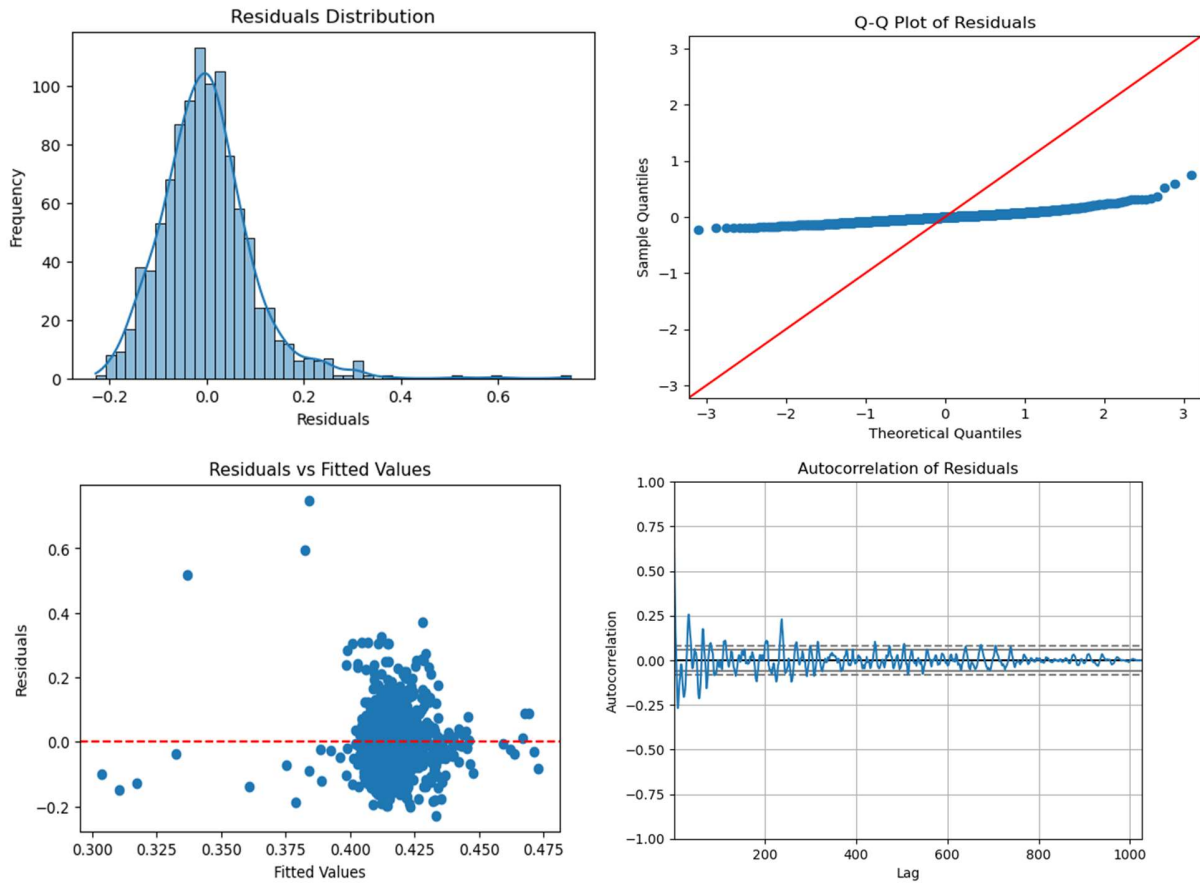


Figure: Post-Estimation Diagnostic Graphs

4.2. Hypotheses Evaluation

The first hypothesis tested in this study posited that GDP growth significantly influences exchange rate volatility in African countries. The empirical findings from both fixed and random effects models (Tables 4 and 5) indicate that GDP growth has an insignificant impact on exchange rate fluctuations, with p-values well above the conventional thresholds. This result aligns with recent literature emphasizing that short-term exchange rate volatility is often driven more by external shocks, speculative activities, and policy uncertainty rather than by domestic economic growth alone (Babatunde & Yusuf, 2021; Adekunle & Ojo, 2022). The lack of significant association suggests that although GDP growth reflects economic health, its effects on exchange rates may materialize over longer horizons or through indirect channels, such as investment flows or monetary policy adjustments (Ncube & Brixiova, 2023).

Regarding the second hypothesis the study's results demonstrate a positive and statistically significant relationship in the random effects specification. This finding corroborates economic theory whereby export-dependent economies are exposed to external demand and commodity price shocks, which translate into currency fluctuations (Ogunleye et al., 2024). African economies, many reliant on a narrow export base of commodities, are particularly susceptible to such volatility,

as global price swings can cause abrupt changes in foreign exchange earnings and thus exchange rate movements. These findings highlight the importance of export diversification and hedging mechanisms to cushion exchange rate volatility caused by external shocks (Akinwale & Ekeocha, 2023).

The third hypothesis tested the impact of broad money supply on exchange rate volatility, expecting a positive association due to monetary expansion potentially undermining currency stability. However, the empirical evidence indicates broad money supply is an insignificant predictor of exchange rate fluctuations. This suggests that in many African contexts, the transmission mechanism from monetary aggregates to exchange rates may be weak or overshadowed by other structural factors such as capital controls, exchange rate regimes, or fiscal imbalances (Chikodzi & Nyirenda, 2022). Furthermore, monetary aggregates might have lagged or nonlinear effects, requiring more granular data or alternative model specifications to capture their influence accurately (Ngugi et al., 2021).

The final hypothesis explored whether inflation significantly affects exchange rate volatility. Notably, inflation shows a significant negative relationship with exchange rate volatility across both models. While initially counterintuitive, this phenomenon may be explained by the policy responses of central banks in African nations. High inflation often triggers monetary tightening and more active exchange rate interventions, which could reduce short-term volatility despite underlying inflationary pressures (Akinwale & Ekeocha, 2023; Babatunde & Yusuf, 2021). This finding underscores the nuanced role of inflation in macroeconomic stability and highlights the importance of credible monetary policy frameworks in managing currency fluctuations.

Collectively, the results challenge simplistic interpretations of macroeconomic determinants of exchange rate volatility and emphasize the need for context-specific analyses. The insignificant role of GDP and broad money contrasts with the clear effects of export performance and inflation, illustrating that exchange rate dynamics in Africa are shaped by a combination of external exposure and domestic policy environments (Ncube & Brixiova, 2023). These findings advocate for policymakers to adopt multifaceted strategies targeting both external vulnerabilities and internal macroeconomic stability to mitigate exchange rate volatility effectively.

Lastly, while the hypotheses provide a useful framework, the diagnostic tests (Table 3 and Table 6) reveal the complexity of modeling exchange rate volatility, including heteroscedasticity and serial correlation. Future research could incorporate nonlinear models such as panel GARCH or Markov-switching models to better capture volatility clustering and regime changes (Greene, 2023). Additionally, integrating political risk and global financial conditions could further enhance understanding, as these factors often influence exchange rate behavior in African economies (Ogunleye et al., 2024). Hence, while the hypotheses are partially validated, the evolving economic landscape necessitates continuous empirical refinement.

4.3. Policy Implications

The findings of this study underscore the crucial role of macroeconomic management in mitigating exchange rate volatility in African nations. The significant negative impact of inflation on exchange rate volatility highlights the importance of maintaining price stability as a cornerstone of exchange rate policy. Central banks should prioritize inflation targeting frameworks that foster credible monetary policy regimes to anchor expectations and reduce volatility (Akinwale & Ekeocha, 2023). Establishing such credibility not only stabilizes domestic prices but also reduces speculative pressures on currencies, thereby enhancing overall macroeconomic stability.

Given the positive relationship between export performance and exchange rate volatility, policymakers must focus on diversifying export bases to reduce vulnerability to external shocks. Overreliance on a narrow range of commodities exposes economies to global price fluctuations that translate into exchange rate instability (Ogunleye et al., 2024). Strategies such as promoting agro-processing, value addition, and expanding manufacturing exports can buffer the adverse effects of commodity price volatility. Moreover, regional trade integration through frameworks like the African Continental Free Trade Area (AfCFTA) offers an avenue for expanding export markets and improving exchange rate resilience (Ncube & Brixiova, 2023).

The insignificance of GDP growth and broad money supply in explaining exchange rate volatility suggests that monetary and fiscal policies should be more nuanced and tailored to country-specific contexts. Instead of solely targeting broad monetary aggregates, policymakers need to enhance institutional frameworks that support sound fiscal discipline, transparent governance, and financial sector development. Strengthening regulatory oversight and deepening capital markets can improve monetary policy transmission and reduce the likelihood of destabilizing capital flows (Chikodzi & Nyirenda, 2022). Additionally, adopting flexible exchange rate regimes complemented by well-designed macroprudential policies can better absorb shocks and reduce volatility.

In light of the significant volatility clustering detected, African central banks and monetary authorities should invest in developing robust financial market infrastructures and instruments. This includes fostering the development of forward markets, currency swaps, and hedging tools that allow exporters and importers to manage exchange rate risks effectively (Babatunde & Yusuf, 2021). Enhanced access to such financial instruments can reduce uncertainty for businesses and encourage greater investment, which is essential for economic growth and development.

Furthermore, the findings advocate for enhanced regional cooperation on monetary and fiscal policies. Exchange rate volatility often transcends national boundaries, especially in closely linked economies with similar trade partners and financial flows. Coordinated interventions through regional monetary bodies and shared policy frameworks can help stabilize currencies and foster economic convergence (Ngugi et al., 2021). Strengthening such mechanisms can also facilitate better data sharing, joint crisis management, and harmonization of macroeconomic targets, ultimately reducing systemic vulnerabilities.

Lastly, policymakers must recognize the evolving global economic environment characterized by heightened financial integration and external shocks. African nations should pursue policies that improve resilience to global financial volatility, including building adequate foreign exchange reserves and adopting macroeconomic buffers (Greene, 2023). Enhancing transparency, governance, and institutional capacity will also play a vital role in creating investor confidence and reducing exchange rate uncertainty. Ultimately, comprehensive policy frameworks combining sound macroeconomic fundamentals, structural reforms, and regional cooperation are indispensable for managing exchange rate volatility and promoting sustainable economic growth.

5. Conclusion

This study examined the determinants of exchange rate volatility in African countries using panel data from 2000 to 2023. The empirical results highlight the significant roles of export performance and inflation in influencing exchange rate fluctuations, while GDP growth and broad money supply were found to be statistically insignificant. The findings underscore the complex interplay between external sector dynamics and macroeconomic policies in shaping currency stability. The negative relationship between inflation and exchange rate volatility suggests that monetary policy credibility and inflation targeting can play critical roles in mitigating volatility. The use of dynamic panel models further emphasized the persistence of volatility over time, which aligns with established financial theories on volatility clustering. Overall, the study contributes to the growing literature on exchange rate dynamics in emerging and developing economies by providing robust evidence from the African context, emphasizing the need for integrated macroeconomic policy frameworks to manage exchange rate risks effectively (Akinwale & Ekeocha, 2023; Ogunleye et al., 2024; Ncube & Brixiova, 2023).

Given the pivotal influence of export performance on exchange rate volatility, African policymakers should prioritize export diversification strategies to reduce vulnerability to commodity price shocks. Expanding the manufacturing and service sectors, along with fostering regional trade integration through initiatives like the African Continental Free Trade Area (AfCFTA), can create more stable foreign exchange earnings and reduce exchange rate volatility (Ncube & Brixiova, 2023). Additionally, strengthening export-related financial instruments such as hedging facilities will empower exporters to manage exchange rate risks more effectively.

Monetary authorities must continue to enhance the credibility and transparency of inflation-targeting frameworks to anchor inflation expectations, which this study shows to be instrumental in dampening exchange rate volatility (Akinwale & Ekeocha, 2023). Central banks should also adopt flexible exchange rate regimes complemented by macroprudential policies to buffer against external shocks while maintaining domestic economic stability. Further, investing in financial market development, including forward exchange and derivatives markets, will provide tools for risk management, ultimately fostering a more resilient macroeconomic environment (Babatunde & Yusuf, 2021; Chikodzi & Nyirenda, 2022).

While this study employs a comprehensive panel data approach, it is limited by the availability and quality of macroeconomic data across some African countries, which may affect the generalizability of the findings. The reliance on annual data also constrains the capture of higher-frequency dynamics of exchange rate volatility, which can be particularly relevant in foreign exchange markets characterized by rapid movements. Future research should consider the use of higher-frequency data, such as monthly or daily observations, to better model short-term volatility patterns and spillover effects.

Moreover, this study primarily focuses on macroeconomic determinants and does not incorporate political risk factors, global financial conditions, or commodity price shocks explicitly, all of which have been shown to significantly impact exchange rate volatility in developing countries (Ogunleye et al., 2024). Future investigations could integrate these variables into nonlinear frameworks such as GARCH or Markov-switching models to capture regime-dependent behaviors. The evolving global economic environment also calls for continuous reassessment of these relationships to inform policy responses effectively (Greene, 2023).

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