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Research Article

Regime-Dependent Exchange Rate Volatility in Nigeria: Persistence, Clustering and Implications for Growth Stability

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Abstract

This study investigates whether exchange-rate volatility in Nigeria is regime-dependent, and how its persistence and clustering bear on growth stability over the period 2000Q1–2023Q4. The sample is partitioned into a broad-based growth regime (2000Q1–2014Q4), when output expanded at roughly seven per cent annually, and a slowdown regime (2015Q1–2023Q4), when growth decelerated and per-capita output flattened. An Exponential Generalized Autoregressive Conditional Heteroscedasticity (E-GARCH) model is used to characterise volatility persistence and clustering in each regime; a Non-linear Autoregressive Distributed Lag (NARDL) model captures the asymmetric long- and short-run effects of positive and negative volatility shocks on growth; and a threshold regression identifies the lending-rate ceiling consistent with growth. Augmented Dickey–Fuller and Zivot–Andrews tests confirm a mixed I(0)/I(1) integration order and an endogenous break around 2015. The E-GARCH estimates reveal statistically significant ARCH and GARCH effects in both regimes, with volatility persistence markedly higher and covariance-non-stationary in the slowdown regime, indicating that shocks become near-permanent once growth weakens. The NARDL results show that the long-run impact of overall volatility on growth is negative and significant, while the partial-sum responses are asymmetric: positive volatility raises growth by about 0.51 per cent and negative volatility lowers it by about 0.10 per cent, though neither partial effect is individually significant at five per cent. Interest rate exerts a significant negative long-run effect on growth, and the optimal lending-rate threshold is estimated at 26.69 per cent. The findings imply that volatility, rather than its direction, is the binding constraint on growth stability. The study recommends export diversification, unification of the exchange-rate windows under a market-based regime, and anchoring the policy rate so that market lending rates remain at or below the estimated threshold.

Keywords

Exchange-rate Volatility, Volatility Persistence, Volatility Clustering, E-GARCH, NARDL, Growth Stability, Nigeria

1. Introduction

Exchange rate and interest rate are pivotal macroeconomic indices whose management by the monetary authority has far-reaching consequences for an economic growth trajectory. A stable exchange rate underpins trade competitiveness and the balance of payments, while predictable interest rates are central to thex cost of capital and the intermediation function of

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the financial system [16]. When either price becomes volatile, it transmits uncertainty to the money and capital markets, distorts the returns expected by domestic and foreign investors, and ultimately weakens the investment decisions that drive output growth [15, 20].

Nigeria offers an instructive setting for studying this transmission. Between 2000 and 2014 the economy recorded a broad-based and sustained average growth rate of about seven per cent, supported by favourable global conditions and first-generation structural and macroeconomic reforms [30]. From 2015 onward, however, the growth path contracted: per-capita output flattened, two recessions occurred in 2016 and 2020, and inflation reached a multi-year high, driven by monetary and exchange-rate policy distortions, declining oil receipts, a costly fuel-subsidy programme, and external shocks including the COVID-19 pandemic. The Naira mirrored this deterioration, depreciating from an average of about N168/US$ in early 2014 to N905/US$ by the end of 2023 following the move to a floating regime, with the parallel-market premium widening throughout [4, 17].

The coexistence of two distinct growth experiences within a single quarter-century, both punctuated by currency turbulence, motivates the central question of this paper: is exchange-rate volatility in Nigeria regime-dependent, and does the way it persists and clusters differ between the period of strong growth and the period of slowdown? This framing matters because volatility that dies out quickly is qualitatively different, for investment planning and policy design, from volatility that persists indefinitely. A shock whose effect decays is a temporary inconvenience; a shock that becomes near-permanent re-prices risk across the entire economy and depresses the long-horizon investment on which growth depends.

A substantial literature has examined the exchange-rate–growth and interest-rate–growth nexuses in Nigeria, but three limitations recur. First, most studies treat the full sample as a single homogeneous regime, thereby averaging away the regime-specific persistence that is of first-order interest for stability analysis. Second, the majority rely on symmetric, linear estimators that implicitly assume currency appreciation and depreciation transmit to growth in equal and opposite measure, an assumption that is rarely tested. Third, few studies model the conditional second moment (volatility itself) and the conditional mean (the growth effect) within an integrated framework. This study addresses these gaps by combining regime-disaggregated E-GARCH estimation of volatility persistence and clustering with an asymmetric NARDL model of the growth response, complemented by a threshold analysis of the lending rate.

The contribution is therefore threefold. Empirically, the paper documents that volatility persistence is not constant but escalates sharply, and becomes covariance-non-stationary, in the slowdown regime, evidence that weakening growth and intensifying volatility are mutually reinforcing. Methodologically, it applies the partial-sum decomposition of modelling asymmetric cointegration and dynamic multipliers in a non-linear ARDL framework to a volatility series rather than to the exchange-rate level, isolating the asymmetric growth consequences of upside and downside volatility. For policy, it quantifies a lending-rate threshold of 26.69 per cent beyond which interest rates become detrimental to growth, providing an operational anchor for the Monetary Policy Committee. The remainder of the paper is organised as follows. Section 2 reviews the conceptual, theoretical and empirical literature. Section 3 describes the data and methodology. Section 4 presents and discusses the results. Section 5 concludes with policy implications.

2. Literature Review

2.1. Conceptual Framework

Exchange-rate volatility refers to the unpredictable fluctuation in the value of a domestic currency against the currencies of trading partners. It is conventionally measured by the conditional variance of the exchange-rate series, since this captures time-varying uncertainty better than a simple standard deviation. Two empirical regularities are central to this paper. Volatility clustering describes the tendency of large changes to be followed by large changes and small changes by small changes, so that tranquil and turbulent episodes group together in time. Volatility persistence describes how long a shock to the conditional variance endures; when the persistence parameter approaches or exceeds unity, shocks decay slowly or not at all, and the variance process becomes non-stationary.

Growth stability, in turn, refers to the smoothness and predictability of the output path rather than its average level. An economy can post a respectable mean growth rate while remaining fragile if that growth is repeatedly interrupted by volatility-induced contractions. The link between the two concepts is the investment channel: persistent, clustered volatility raises the option value of waiting, depresses irreversible investment, and thereby flattens the growth path. This is why the persistence and clustering of volatility—not merely its average magnitude—are the appropriate objects of study when growth stability is the concern.

Interest rate, the price of loanable funds, is the second policy price examined here. In Nigeria it has been liberalised since the 1986 reforms, and the Monetary Policy Committee adjusts the policy rate to manage inflation and exchange-rate pressure. Because the lending rate determines the cost of capital, it conditions both real investment and the portfolio flows that respond to cross-country return differentials, making it a natural co-determinant of growth alongside volatility.

2.2. Theoretical Framework

The study is anchored in the Mundell–Fleming model, an open-economy extension of the Keynesian IS–LM framework. The model's central proposition is that an economy cannot simultaneously maintain a fixed exchange rate, free capital mobility and an independent monetary policy. It thereby links the nominal exchange rate, the interest rate and output, and explains why a country pursuing exchange-rate stability under open capital accounts must surrender monetary autonomy, and vice versa. This trilemma is precisely the bind Nigeria has faced, and it provides the structural rationale for treating exchange-rate volatility, interest rate and growth jointly.

Three complementary theories inform the volatility–growth link. Purchasing Power Parity holds that exchange rates adjust to equalise the relative purchasing power of currencies, so that persistent deviations signal misalignment with consequences for competitiveness [3]. The International Fisher Effect connects interest-rate differentials to expected currency movements, clarifying how interest-rate policy and exchange-rate expectations interact [13]. The Keynesian macroeconomic tradition supplies the demand-side mechanism through which monetary and fiscal actions transmit to aggregate output. Together these frameworks justify a specification in which growth responds to volatility, interest rate, inflation and credit to the private sector.

2.3. Empirical Literature

Studies of the exchange-rate–growth nexus in Nigeria are numerous but predominantly symmetric. Using a GARCH–GMM design over 1980–2017, results show persistent exchange-rate volatility exerted a significant negative effect on growth [7, 17, 24]. By applying ARCH/GARCH and ARDL methods over samples ending in 2020, findings reached broadly similar conclusions, using a vector error-correction model [5, 21]. However, other empirical studies reported adverse long-run effects of currency instability on output [14, 22]. Across CEE economies, evidenced documented a negative volatility–growth relationship [12]. While on the other hand, it reveals a comparable results for Zambia using ARDL and NARDL models [27].

The asymmetric strand is thin. To apply a NARDL model on the exchange-rate level (not its volatility) and found that depreciation retarded output in the short run while neither appreciation nor depreciation mattered in the long run [8, 24]. On the interest-rate side, numerous studies generally reported negative and significant effects of lending rates on real-sector output [2, 9, 11, 16, 28]. Whereas, others found the negative lending-rate effect to be statistically insignificant [1, 29]. On thresholds, empirical evidence shows a growth-consistent interest-rate ceiling of 22.6 per cent [10]. Other literature reported 21–21.46 per cent for Nigeria, while 23.59–24 per cent for Ghana, respectively [18, 26].

2.4. Gap in the Literature

Three gaps emerge. First, the literature overwhelmingly treats the sample as a single regime and therefore cannot speak to whether volatility persistence differs between strong-growth and slowdown periods, the question at the heart of growth-stability analysis. Second, with the partial exception of dynamic effects of exchange rate movements on productivity levels, studies impose symmetry and so cannot distinguish the growth consequences of upside from downside volatility [8]. Third, no Nigerian study integrates a conditional-variance characterisation of volatility (its persistence and clustering) with an asymmetric conditional-mean model of the growth response. This paper fills these gaps by disaggregating the sample into two growth regimes, applying the partial-sum NARDL decomposition to the volatility series itself, and pairing it with regime-specific E-GARCH estimation.

3. Data and Methodology

3.1. Data and Variables

The study uses quarterly secondary time-series data spanning 2000Q1 to 2023Q4, yielding 96 observations. The series are sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin, the National Bureau of Statistics (NBS), and the World Development Indicators (WDI). Economic growth is proxied by the real GDP growth rate (GDPR); the exchange rate (EXR) is the Naira–US dollar rate, from which the volatility series (EXRV) is generated; interest rate (INT) is the commercial-bank maximum lending rate; inflation (INF) is the year-on-year change in the consumer price index; and credit to the private sector as a share of GDP (CPS) proxies financial deepening. Table 1 below reports the variable set; Table 2 (descriptive statistics) characterises their distributions.

Table 1. *Variables, definitions and data sources.*

Symbol	Definition	Role	Source
GDPR	Real gross domestic product growth rate (%)	Dependent	NBS / WDI
EXR	Nominal exchange rate (Naira per US$)	Volatility input	CBN
EXRV	Exchange-rate volatility (E-GARCH conditional series)	Explanatory	Author's computation
INT	Commercial-bank maximum lending rate (%)	Explanatory	CBN
INF	Inflation rate, year-on-year CPI change (%)	Control	NBS

Symbol	Definition	Role	Source
CPS	Credit to the private sector (N' billion)	Control	CBN

Source: Author's compilation (2025).

3.2. Analytical Framework and Model Specification

Following the Mundell–Fleming structure, output is expressed as a function of a vector of monetary-policy instruments (Q), physical-investment instruments (Z) and control variables (P). Mapping Q to exchange-rate volatility and interest rate, Z to private-sector credit and P to inflation gives the functional form:

$$GDPR = f(EXRV, INT, INF, CPS)$$

which, in stochastic econometric form, becomes:

$$GDPR_t = \beta_0 + \beta_1 EXRV_t + \beta_2 INT_t + \beta_3 INF_t + \beta_4 CPS_t + \varepsilon_t \quad (1)$$

A priori, β_1 and the credit coefficient are expected positive when growth-enhancing, while higher volatility, lending rate and inflation are expected to bear negatively on current growth. To recover the asymmetric effect of volatility, the volatility series is decomposed into partial sums of positive and negative changes following a modelling asymmetric cointegration and dynamic multipliers in a nonlinear ARDL framework as presented:

$$EXRV^{t+} = \Sigma \max(\Delta EXRV_i, 0) \text{ and } EXRV^{t-} = \Sigma \min(\Delta EXRV_i, 0) \quad (2)$$

Substituting these partial sums into an error-correction representation yields the NARDL model, whose long-run block measures the asymmetric equilibrium effect of upside and downside volatility on growth and whose short-run block measures the corresponding dynamic adjustment. To establish the lending-rate ceiling, a threshold least-squares regression of growth on the lending rate (with a regime-switching dummy and the same controls) is estimated; the optimal threshold is the value that minimises the residual sum of squares and maximises the adjusted coefficient of determination.

3.3. Estimation Strategy

Estimation proceeds in four steps. First, the Augmented Dickey–Fuller (ADF) test establishes the integration order of each series [6]. Other test confirms stationarity in the presence of an endogenously dated structural break, guarding against the critique that breaks can masquerade as unit roots [23, 31]. Second, an E-GARCH model estimated separately for the two regimes, characterises volatility persistence and clustering and generates the EXRV series; the exponential form ensures positive conditional variances and admits leverage effects [19, 25]. Third, the NARDL bounds testing approaches to the analysis of level relationships checks for an asymmetric long-run relationship before the long- and short-run coefficients are estimated; the model accommodates a mixture of I(0) and I(1) regressors [25, 32]. Fourth, the threshold regression identifies the growth-consistent lending rate. The model is validated through serial-correlation, heteroscedasticity, specification and parameter-stability (CUSUM) tests. All estimations are performed in EViews 9.

4. Results and Discussion

4.1. Descriptive Statistics

Table 2 summarises the distributional properties of the series over the full sample. Real GDP growth averaged 4.94 per cent per quarter but ranged from a peak of 15.33 per cent to a trough of −12.38 per cent during the 2016 recession, signaling considerable instability. The exchange rate averaged N217.72/US$ but reached N843.80/US$ by 2023, a span that mirrors the depreciation episodes documented above. Inflation averaged 13.16 per cent and lending rates 24.70 per cent. The volatility index is right-skewed and highly leptokurtic (kurtosis 6.12), and the Jarque–Bera statistics reject normality for every series at the one per cent level, a pattern consistent with the heavy tails and clustering that motivate the GARCH approach.

Table 2. *Descriptive statistics, 2000Q1–2023Q4.*

Statistic	GDPR	INF	EXR	INT	EXRV	CPS
Mean	4.9364	13.1644	217.7195	24.7038	0.2278	15204.34
Median	6.0450	12.6300	156.5170	24.2250	−0.0121	12691.69
Maximum	15.3300	27.3200	843.8000	31.5500	3.4728	62538.68
Minimum	−12.3800	5.3800	99.8754	18.3400	−2.8669	478.19
Std. Dev.	3.7474	4.4695	136.3228	4.1110	0.9778	14031.90
Skewness	−1.2042	0.5988	2.0622	0.0481	1.1081	1.1412
Kurtosis	7.5174	3.3513	8.3996	1.7260	6.1207	4.1972
Jarque–Bera	104.83	6.23	184.67	6.53	57.99	26.57
Probability	0.0000	0.0444	0.0000	0.0382	0.0000	0.0000
Observations	96	96	96	96	95	96

Source: Author's computation (2025). EXRV has 95 observations because the first quarterly change is undefined.

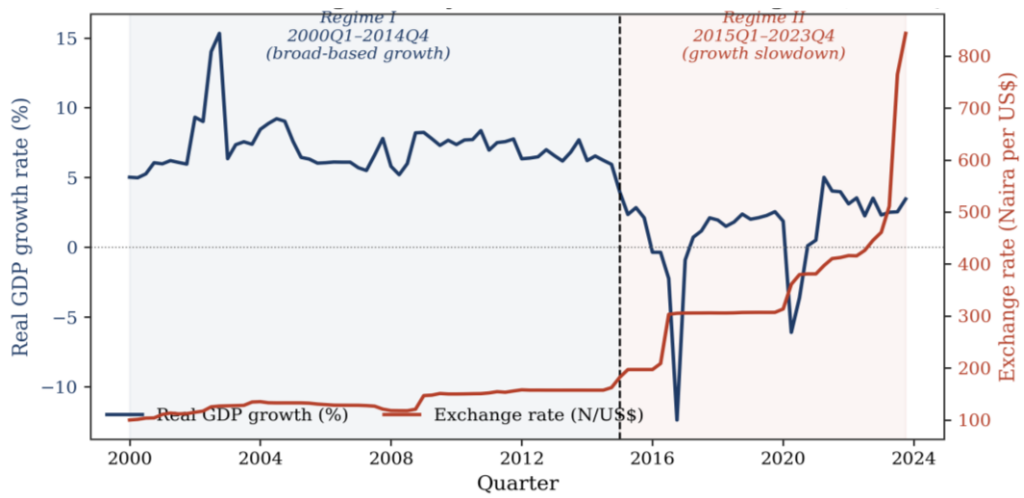

Figure 1. *Real GDP growth and the Naira–US$ exchange rate, 2000Q1–2023Q4. The dashed line marks the 2015Q1 regime break; the shaded panels distinguish the broad-based growth regime (left) from the slowdown regime (right). Source: Author's computation (2025).*

4.2. Unit-root and Structural-break Tests

The ADF results in Table 3 show that GDPR and EXRV are stationary in levels, I(0), while INF, EXR, INT and CPS attain stationarity after first differencing, I(1). The mixed integration order rules out the Johansen and Engle–Granger procedures and justifies the bounds-testing approach. Table 4 reports the Zivot–Andrews test: the unit-root null is rejected for every series once an endogenous break is permitted, and the break dates cluster around episodes of macroeconomic stress—most notably 2015Q1 for growth, confirming the empirical relevance of the regime split adopted here.

Table 3. *Augmented Dickey–Fuller unit-root test.*

Variable	ADF statistic	5% critical	10% critical	Prob.	Order
GDPR	−3.3386	−3.5022	−2.8929	0.0159	I(0)
INF	−8.5418	−2.8925	−2.5834	0.0000	I(1)

Variable	ADF statistic	5% critical	10% critical	Prob.	Order
EXRV	−7.0216	−2.8929	−2.5836	0.0000	I(0)
EXR	−5.9031	−3.5014	−2.8925	0.0000	I(1)
CPS	−5.4161	−3.5014	−2.8925	0.0000	I(1)
INT	−10.2634	−2.8925	−2.5834	0.0000	I(1)

Source: Author's computation using EViews 9 (2025). Test conducted with constant and trend at the 5% level.

Table 4*. Zivot–Andrews unit-root test with a structural break.*

Variable	Break	ZA statistic	5% critical	Prob.	Decision
GDPR	2015Q1	−5.0019	−4.93	0.0012	Stationary
INF	2020Q1	−4.9663	−4.42	0.0057	Stationary
EXRV	2008Q2	−7.9472	−5.08	0.0144	Stationary
EXR	2020Q1	−5.2723	−4.42	0.0010	Stationary
CPS	2020Q2	−5.3728	−5.08	0.0342	Stationary
INT	2009Q1	−5.4457	−5.08	0.0307	Stationary

Source: Author's computation using EViews 9 (2025).

4.3. Regime-dependent Volatility: Persistence and Clustering

The E-GARCH estimates in Table 5 are reported separately for the two regimes. In the mean equation, a one per cent rise in the lagged exchange rate raised volatility by about 99 per cent in the growth regime and 112 per cent in the slowdown regime—a 13-percentage-point intensification. In the variance equation, the ARCH and GARCH coefficients are statistically significant in both regimes, confirming that the models capture genuine relationships between past shocks and current volatility (the ARCH effect) and between past and current conditional variance (the GARCH effect). The positive ARCH coefficients indicate that larger past shocks raise current volatility, with the effect substantially stronger in the slowdown regime (1.78 versus 0.79).

The decisive result concerns persistence. In the growth regime the volatility process is covariance-stationary, since the sum of the ARCH and GARCH coefficients is below unity ($0.79 - 1.04 < 1$), so shocks eventually die out. In the slowdown regime the same sum exceeds unity ($1.78 - 0.20 > 1$), rendering the process covariance-non-stationary: volatility shocks persist indefinitely and the conditional variance diverges. In plain terms, the very regime in which growth weakened is also the regime in which currency turbulence became near-permanent, so that the two pathologies reinforced one another. This regime-dependence of persistence is the paper's central empirical finding and is consistent with the clustering visible in the data.

Table 5*. E-GARCH estimates of exchange-rate volatility by regime.*

Coefficient	Coef.	Prob.	Coef.	Prob.	Δ
Mean equation					
EXR (−1)	0.9858	0.0000	1.1160	0.0000	0.1301
Constant	1.6839	0.0742	−28.8577	0.1009	—
Variance equation					
ARCH (−1)	0.7886	0.0000	1.7786	0.0000	0.9900

Coefficient	Coef.	Prob.	Coef.	Prob.	Δ
GARCH (−1)	−1.0409	0.0000	−0.2027	0.0007	−0.8382
Persistence (ARCH + GARCH)					
Sum	−0.2523	< 1	1.5759	> 1	—

Source: Author's computation using EViews 9 (2025). A persistence sum below unity implies covariance stationarity (Regime I); above unity implies non-stationarity and indefinitely persistent shocks (Regime II).

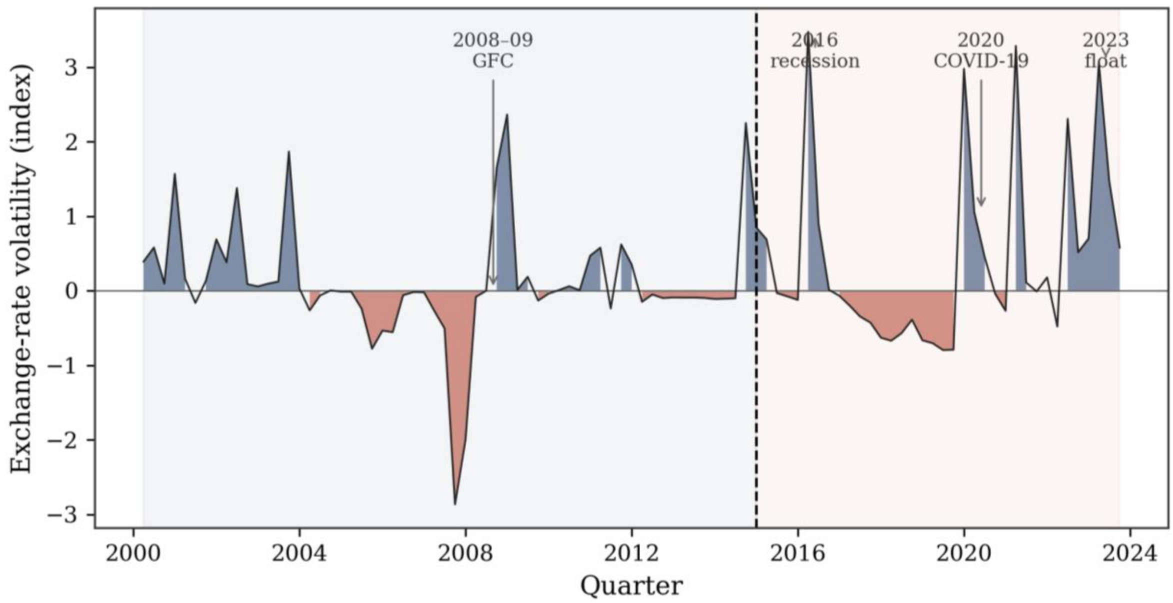

Figure 2. *Exchange-rate volatility series, 2000Q2–2023Q4. Alternating tranquil and turbulent episodes—around the 2008–09 global financial crisis, the 2016 recession, the 2020 pandemic and the 2023 float—illustrate volatility clustering. Source: Author's computation (2025).*

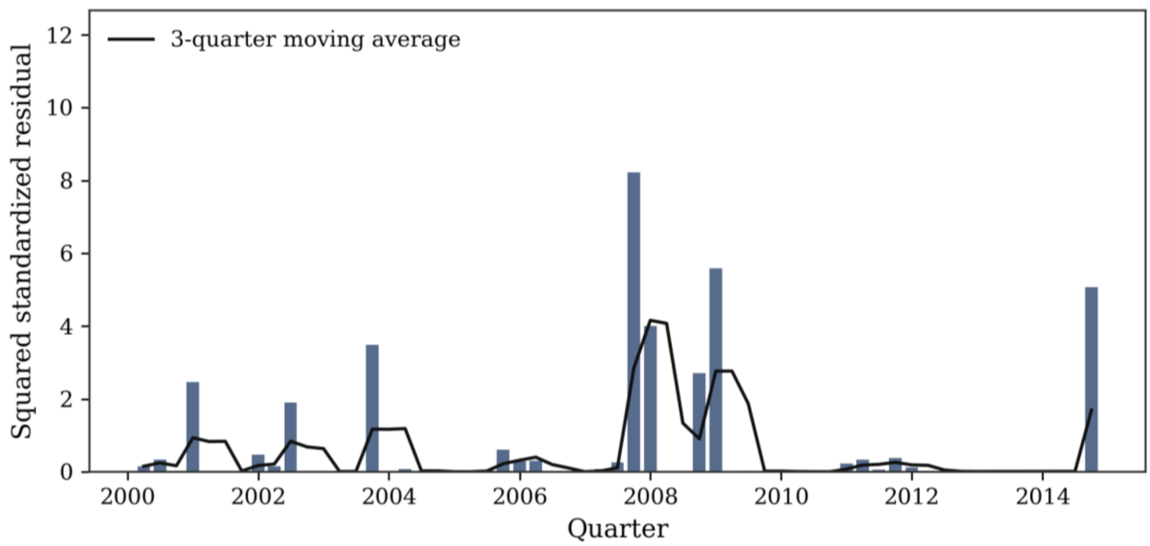

Figure 3. *Conditional volatility of the exchange rate in Regime I (2000Q1–2014Q4). Quiet stretches dominate, punctuated by the 2008–09 episode; the moving average reverts toward a stable mean. Source: Author's computation (2025).*

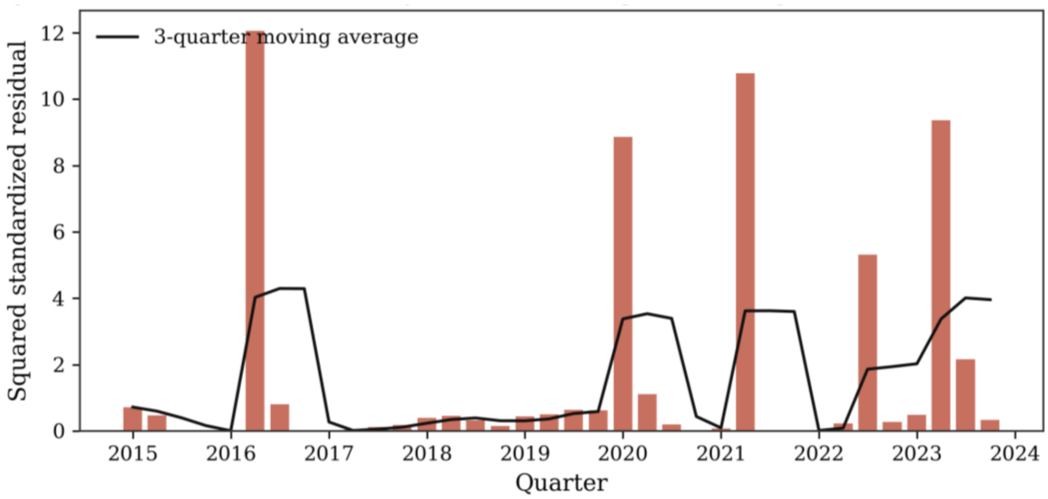

Figure 4. *Conditional volatility of the exchange rate in Regime II (2015Q1–2023Q4). Spikes are larger and more frequent and the process does not settle, consistent with the non-stationary persistence in Table 5. Source: Author's computation (2025).*

4.4. Growth Effects of Volatility: NARDL Estimates

With a mixed integration order established, the NARDL bounds test in Table 6 examines whether a long-run relationship links growth, volatility, interest rate and the controls. The computed F-statistic of 3.81 exceeds the five per cent upper bound of 3.79, so the null of no cointegration is rejected: an asymmetric long-run equilibrium relationship exists. The optimal specification, selected by the Akaike criterion, is reported in Figure 5's underlying model; the long-run coefficients follow in Table 7.

Table 6. *NARDL bounds test for cointegration.*

Test statistic	Value	Significance	I(0) bound	I(1) bound
F-statistic	3.8148	10%	2.26	3.35
K	5	5%	2.62	3.79

Source: Author's computation using EViews 9 (2025). The F-statistic exceeds the 5% I(1) bound, rejecting the no-cointegration null.

Table 7 reports the long-run coefficients. Interest rate carries a negative and statistically significant coefficient (−0.51, $p = 0.041$): a one-percentage-point rise in the lending rate is associated with about a half-percentage-point reduction in long-run growth, consistent with a binding cost-of-capital channel. The volatility partial sums display clear asymmetry: positive volatility raises growth by 0.51 while negative volatility lowers it by 0.10, so the upside response is roughly five times the downside response in absolute terms. Neither partial effect is individually significant at five per cent, however, indicating that while the direction of volatility matters for the sign of the response, its magnitude is not strong enough for either branch alone to be a reliable, independent driver of growth. Inflation and private-sector credit enter negatively, the latter approaching significance ($p = 0.055$). The model explains about 73 per cent of the variation in growth, and the Durbin–Watson statistic of 1.83 indicates no autocorrelation.

Table 7. *NARDL long-run coefficients.*

Variable	Coefficient	Std. error	t-statistic	Prob.
INF	−0.1030	0.2246	−0.4586	0.6479
INT	−0.5114	0.2459	−2.0794	0.0410

Variable	Coefficient	Std. error	t-statistic	Prob.
EXRV (positive)	0.5103	1.1829	0.4314	0.6674
EXRV (negative)	−0.1004	1.2154	−0.0826	0.9344
LOG (CPS)	−4.3050	2.2050	−1.9524	0.0546
Constant	51.1620	19.7790	2.5867	0.0116

Source: Author's computation using EViews 9 (2025). Adjusted R^2= 0.73; F-statistic = 18.35 (p = 0.000); Durbin–Watson = 1.83.

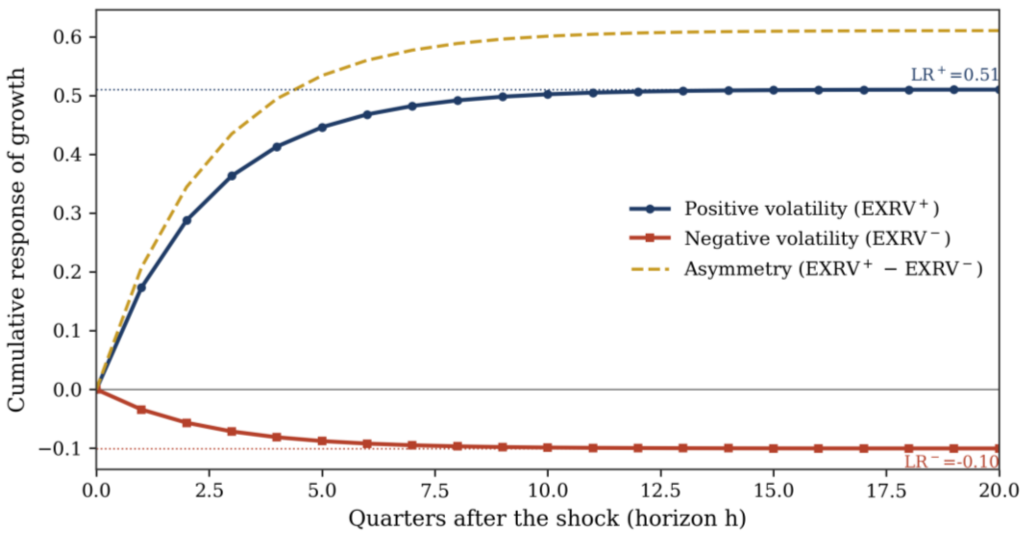

Figure 5. *Cumulative dynamic multipliers showing the asymmetric response of growth to positive and negative exchange-rate volatility. The paths converge to the estimated long-run multipliers (LR^+ = 0.51, LR^- = −0.10) at the estimated adjustment speed; the dashed line traces the persistent positive asymmetry. Source: Author's computation (2025).*

Table 8 reports the short-run dynamics. Lagged growth is positive and highly significant, confirming strong output inertia. The error-correction term is negative and significant (−0.34, p = 0.0001), so about 34 per cent of any deviation from long-run equilibrium is corrected each quarter—a moderate adjustment speed. Among the volatility terms, the two-quarter lag of positive volatility is significant and positive, while the contemporaneous and two-quarter-lagged negative volatility terms are significant and negative, reproducing the asymmetric pattern of the long-run block in the short run.

Table 8. *NARDL short-run dynamics.*

Variable	Coefficient	Std. error	t-statistic	Prob.
GDPR (−1)	0.6603	0.0812	8.1362	0.0000
INF	−0.0350	0.0767	−0.4561	0.6496
INT	0.4105	0.1602	2.5630	0.0124
INT (−1)	−0.3789	0.2029	−1.8676	0.0657
INT (−4)	−0.2983	0.1559	−1.9128	0.0596
$EXRV^+$	0.2127	0.2964	0.7177	0.4752
$EXRV^+$ (−2)	0.9449	0.4487	2.1060	0.0386
$EXRV^-$	−0.2045	0.5425	−0.3769	0.7073
$EXRV^-$ (−1)	1.2915	0.6411	2.0146	0.0475

Variable	Coefficient	Std. error	t-statistic	Prob.
$EXRV^{-}(-2)$	−1.1211	0.3462	−3.2380	0.0018
LOG (CPS)	−1.4625	0.7036	−2.0785	0.0411
ECT	−0.3397	0.0812	−4.1862	0.0001

Source: Author's computation using EViews 9 (2025). Selected terms reported; ECT is the error-correction term.

4.5. Interest-rate Threshold for Growth Stability

Because the long-run results identify interest rate as the one variable with a significant adverse growth effect, a threshold regression locates the lending-rate ceiling consistent with growth. Table 9 shows that below 26.69 per cent the lending rate carries a positive and significant coefficient (0.063), so credit at or below this level supports growth; above the threshold the coefficient turns negative and significant (−0.238), so each additional point of lending rate beyond the ceiling subtracts about 0.24 percentage points from growth in the following period. The estimated threshold of 26.69 per cent lies above earlier Nigerian estimates (Evans, 2019: 22.6 per cent; Moses et al., 2015: 21–21.46 per cent), a divergence plausibly attributable to the more recent, higher-rate sample used here.

Table 9*. Threshold regression of growth on the lending rate.*

Variable	Coefficient	Std. error	t-statistic	Prob.
Regime 1: INT < 26.69% (56 observations)				
INT	0.0629	0.0305	2.0660	0.0458
Constant	5.4499	3.4945	1.5596	0.1224
Regime 2: 26.69% ≤ INT < 29.95% (23 observations)				
INT	−0.2384	0.0609	−3.9174	0.0254
Constant	7.7317	21.1727	0.3652	0.7158

Source: Author's computation using EViews 9 (2025). Estimated threshold = 26.69%.

4.6. Diagnostic and Stability Tests

Table 10 confirms the model's adequacy. The Breusch–Godfrey test finds no serial correlation (p = 0.547); the Breusch–Pagan–Godfrey test finds no heteroscedasticity at five per cent (p = 0.052); and the Ramsey RESET test finds no specification error (p = 0.088). The Jarque–Bera statistic rejects residual normality, a common and largely innocuous feature of macroeconomic models with structural breaks. The CUSUM plot in Figure 6 remains within the five per cent bands throughout the sample, confirming parameter stability.

Table 10*. Diagnostic test results.*

Test	Null hypothesis	F-statistic	Prob.	Decision
Breusch–Godfrey LM	No serial correlation	0.6085	0.5469	Fail to reject
Breusch–Pagan–Godfrey	No heteroscedasticity	2.8274	0.0519	Fail to reject
Ramsey RESET	No misspecification	2.9989	0.0875	Fail to reject
Jarque–Bera	Normal residuals	400.22	0.0000	Reject

Source: Author's computation using EViews 9 (2025).

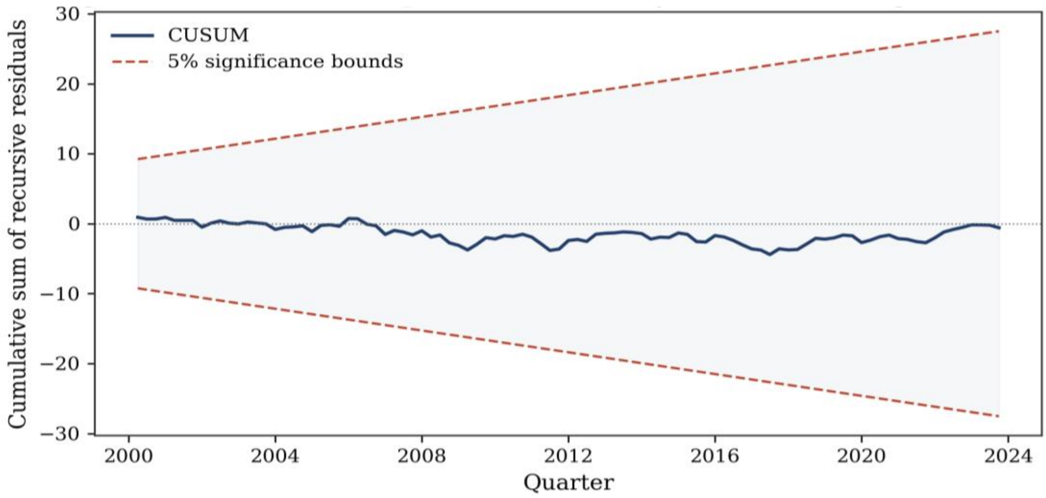

Figure 6. *CUSUM test of parameter stability. The cumulative sum of recursive residuals stays within the 5% critical bounds, indicating that the estimated coefficients are stable over the sample. Source: Author's computation (2025).*

4.7. Discussion

Read together, the results tell a coherent story about growth stability. The regime-specific E-GARCH estimates show that volatility persistence is not a fixed structural parameter but a state-contingent one: in the strong-growth regime it is bounded and shocks decay, whereas in the slowdown regime it becomes unbounded and shocks endure. Because persistent, clustered volatility raises the option value of delaying irreversible investment, this finding explains how a weakening growth environment and an unstable currency can lock into a self-reinforcing cycle. The evidence aligns and documented persistent conditional variance and clustering in the Naira series [5, 7, 22, 33].

The NARDL results sharpen the interpretation. The headline asymmetry is intuitive for an oil-dependent economy, in which currency depreciation can transfer purchasing power toward the non-oil tradable sector. Yet because neither branch is individually significant while the overall volatility effect is negative, the operative message is that it is the existence of volatility, not its direction that constrains growth. Stability is the policy-relevant objective. This nuance distinguishes the present study from the symmetric literature and complements the level-based asymmetric evidence as shown in other studies [8, 12, 21, 33].

Finally, the significant negative long-run interest-rate effect and the 26.69 per cent threshold together identify a concrete, actionable lever. The cost-of-capital channel is the clearest transmission route from policy to growth in the sample, and the threshold gives policymakers a quantitative ceiling against which to calibrate the policy rate. This finding is consistent and qualifies the insignificant-effect results obtained in the literature [1, 16, 28].

5. Conclusion and Policy Implications

This paper asked whether exchange-rate volatility in Nigeria is regime-dependent and how its persistence and clustering bear on growth stability between 2000 and 2023. Using regime-disaggregated E-GARCH estimation, an asymmetric NARDL model and a threshold regression, it reached three conclusions. First, volatility persistence is regime-dependent: it is covariance-stationary in the broad-based growth regime but becomes non-stationary and indefinitely persistent in the slowdown regime, so that weakening growth and currency turbulence reinforce one another. Second, the growth response to volatility is asymmetric in sign but statistically weak in either direction, while the overall volatility effect is negative—implying that volatility itself, rather than its direction, is the binding constraint on growth stability. Third, interest rate exerts a significant negative long-run effect on growth, with a growth-consistent lending-rate ceiling of 26.69 per cent.

Three policy implications follow. First, to attenuate volatility at its structural source, the authorities should deepen the economy's integration into global trade through export diversification, reduce reliance on external borrowing, and rebuild external reserves; a more diversified foreign-exchange earning base would lessen the single-commodity dependence that amplifies persistence. Second, the Central Bank should retire the multiple-window exchange-rate architecture in favour of a transparent, market-based regime, which would compress the parallel-market premium, lower uncertainty and allow firms to plan investment with greater confidence. Third, the Monetary Policy Committee should anchor the policy rate so that market lending rates remain at or below the estimated 26.69 per cent threshold, thereby protecting private-sector credit from the contractionary effects of rates beyond the ceiling.

The study is bounded by its exclusion of institutional-quality variables that condition both the efficiency of the foreign-exchange market and the potency of monetary policy. Future research could incorporate these dimensions and explore their interaction with volatility, extending the regime-dependent framework developed here toward a fuller account of the institutional foundations of growth stability in Nigeria.

Abbreviations

NARDL	Non-linear Autoregressive Distributed Lag
E-GARCH	Exponential Generalized Autoregressive Conditional Heteroscedasticity
ARCH	Autoregressive Conditional Heteroscedasticity
GARCH	Generalized Autoregressive Conditional Heteroscedasticity
CBN	Central Bank of Nigeria
GMM	General Method of Moments
ADF	Augmented Dickey–Fuller
CUSUM	Cumulative Sum of Square
WDI	World Development Indicators
NBS	National Bureau of Statistics

Author Contributions

Abdul Drisu: Conceptualization, Funding acquisition, Resources, Writing – original draft

Miftahu Idris: Data curation, Formal Analysis, Methodology, Supervision

Conflicts of Interest

The authors declare no conflicts of interest.

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