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Exchange Rate Volatility and the Financial Performance of Listed Manufacturing Firms in Nigeria: A Panel ARDL Approach

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Abstract: This study examines the effect of exchange rate volatility on the financial performance of listed manufacturing firms in Nigeria over the period 2015–2024. Nigeria's manufacturing sector is highly exposed to exchange rate risk due to its dependence on imported raw materials and machinery. The 2023 exchange rate unification policy, which led to a sharp depreciation of the naira, further heightened this vulnerability. An ex-post facto research design was adopted using secondary panel data from 45 listed manufacturing firms, comprising 450 firm-year observations obtained from audited financial statements, the Central Bank of Nigeria, and the Nigerian Exchange Group. Exchange rate volatility was estimated using the GARCH (1,1) model, while financial performance was measured by Return on Assets (ROA) and Return on Equity (ROE). Firm size, leverage, and liquidity were included as control variables. Panel unit root, cointegration, and Hausman tests supported the use of the Fixed Effects model, while a Panel ARDL/Error Correction Model was employed to distinguish between short-run and long-run effects. The findings reveal that exchange rate volatility has a significant negative effect on both ROA ($\beta = -18.23$, $p < 0.01$) and ROE ($\beta = -25.68$, $p < 0.01$), with stronger long-run effects than short-run adjustments. Firm size and liquidity mitigate the adverse impact, whereas leverage intensifies it. The study concludes that exchange rate stability is essential for improving manufacturing firms' financial performance and recommends stronger foreign exchange risk management practices alongside policies that promote a stable and predictable exchange rate environment.

Keywords: exchange rate volatility; financial performance; return on assets; return on equity; panel ARDL; manufacturing firms; Nigeria

1. Introduction

Exchange rate stability is a fundamental determinant of macroeconomic performance and corporate profitability, particularly in emerging economies whose firms rely heavily on imported inputs (Orisadare & Olofin, 2024; Yuorkuu et al., 2024). As the price of one currency expressed in terms of another, the exchange rate is the mechanism through which international transactions, trade, and cross-border investment are conducted (Alagbe et al., 2021). When exchange rates move erratically, firms face heightened uncertainty in forecasting production costs, revenues, and investment returns, a condition that is especially consequential for manufacturing firms because of their dependence on imported machinery, spare parts, and raw materials (Keshtgar et al., 2020).

Nigeria's exchange rate management has evolved from a fixed-parity regime prior to the 1986 Structural Adjustment Programme to a market-determined float, a transition that exposed the naira to persistent depreciation and volatility driven by oil-revenue dependence, foreign exchange shortages, and policy inconsistency. This volatility intensified after the

Central Bank of Nigeria's 2023 unification of the multiple exchange-rate windows, which moved the naira from roughly ₦460 per US dollar in mid-2023 to above ₦1,600 per US dollar in early 2024 (Ozili, 2024). For manufacturing firms, this sharp and sustained depreciation raised the naira cost of imported inputs and foreign currency-denominated obligations, intensifying concerns about the sector's profitability and competitiveness.

The manufacturing sector occupies a strategic position in Nigeria's industrialization agenda, contributing to employment generation, non-oil export earnings, and value addition across the building materials, food and beverages, consumer goods, pharmaceuticals, and chemicals sub-sectors. Yet the sector's growth has historically been constrained by an over-reliance on imported machinery, spare parts, and intermediate inputs, a structural feature that leaves manufacturers directly exposed to naira depreciation and instability. The Manufacturers Association of Nigeria has repeatedly identified foreign exchange scarcity and volatility as leading constraints to

capacity utilization, and the events surrounding the 2023 unification reform sharpened this concern by compressing an unusually large depreciation into a short window, providing a natural setting in which to re-examine the exchange rate-performance relationship with updated data and refined econometric techniques.

Financial performance, commonly proxied by Return on Assets (ROA) and Return on Equity (ROE), reflects how efficiently a firm converts its assets and shareholders' funds into earnings, and is closely watched by investors, creditors, and regulators (Osho & Efuntade, 2019). Although a sizeable literature links exchange rate movements to firm performance, findings remain inconclusive: some studies report a significant negative effect (Oshim & Nze, 2024; Ezenwa et al., 2021), others report insignificant or even positive effects (Owolabi & Olukilede, 2024), and few studies jointly model both the short-run and long-run dynamics of the relationship using a GARCH-based volatility measure, a gap that is particularly notable for the post-2023 unification period. This study addresses that gap.

1.1 Statement of the Problem

Despite the manufacturing sector's importance to Nigeria's diversification agenda, its performance has remained fragile in the face of recurrent currency shocks. Firms report rising cost of sales, delayed capital expenditure, and difficulty in long-term pricing whenever the naira depreciates sharply, yet the empirical literature has not converged on the size or persistence of this effect. Part of the disagreement stems from methodological choices: many Nigerian studies proxy exchange rate risk with the nominal exchange rate level or a simple standard deviation, measures that do not capture the conditional, time-varying nature of currency risk that a GARCH process is designed to model. Others rely on single-firm case studies or short time spans that pre-date the 2023 unification reform, Nigeria's most significant exchange rate shock in a generation. Consequently, managers, investors, and regulators lack a reliable, recent, and methodologically robust benchmark for the sensitivity of manufacturing sector profitability to exchange rate volatility, along with a clear sense of whether that sensitivity operates mainly in the short run, the long run, or both. This study is designed to close that evidentiary gap.

Addressing this gap matters beyond academic interest. Corporate treasurers require a defensible estimate of currency risk exposure to size hedging programmes appropriately; institutional investors require evidence on how currency reform transmits to earnings volatility when pricing manufacturing sector equities; and regulators require an evidence base to judge whether transitional support measures for import-dependent industries are warranted during periods of exchange rate reform. A study that jointly estimates the short-run and long-run performance effects of exchange rate volatility, using a volatility measure that reflects its genuinely time-varying character, is therefore of direct practical as well as academic value.

1.2 Objectives and Hypotheses

The broad objective of the study is to examine the effect of exchange rate volatility on the financial performance of listed

manufacturing firms in Nigeria between 2015 and 2024. The specific objectives are to:

- (i) examine the effect of exchange rate volatility on Return on Assets;
- (ii) examine the effect of exchange rate volatility on Return on Equity;
- (iii) determine whether a long-run equilibrium relationship exists between exchange rate volatility and financial performance; and
- (iv) assess the short-run dynamics of this relationship. Correspondingly, the study tests the following null hypotheses:

H₀₁: Exchange rate volatility has no significant effect on the Return on Assets of listed manufacturing firms in Nigeria.

H₀₂: Exchange rate volatility has no significant effect on the Return on Equity of listed manufacturing firms in Nigeria.

H₀₃: There is no significant long-run relationship between exchange rate volatility and financial performance of listed manufacturing firms in Nigeria.

H₀₄: Exchange rate volatility has no significant short-run effect on the financial performance of listed manufacturing firms in Nigeria.

2.1 Conceptual Review

Exchange rate volatility refers to the degree of fluctuation or instability in the value of a currency over time, reflecting the uncertainty associated with exchange rate movements (Ozili, 2024). It arises from inflation differentials, interest rate changes, political instability, speculative activity, and shifts in monetary and fiscal policy, and is aggravated in oil-dependent economies such as Nigeria by fluctuations in crude oil earnings and foreign exchange shortages. The literature distinguishes volatility, the degree of dispersion or unpredictability in exchange rate movements over a given period, from the exchange rate level or the direction of change (appreciation or depreciation); a currency can depreciate steadily and predictably with limited adverse effect on planning, whereas unpredictable swings, even around a stable average, complicate cost forecasting, pricing, and hedging decisions. This distinction motivates the use of a conditional variance measure, such as the GARCH(1,1) process adopted in this study, rather than the exchange rate level itself, as the explanatory variable of interest.

Financial performance, in turn, denotes the extent to which a firm efficiently deploys its resources to generate returns for shareholders, commonly measured through ROA, ROE, Net Profit Margin, Earnings per Share, or Tobin's Q. This study adopts ROA and ROE because they respectively capture managerial efficiency in the use of total assets and shareholders' equity to generate earnings, and are the measures most frequently used in the exchange rate-performance literature (Osho & Efuntade, 2019; Abubakar et al., 2022). ROA is particularly informative for assessing operational efficiency independent of financing structure, while ROE captures the combined effect of operating performance and

financial leverage on the returns available to shareholders; examining both measures jointly therefore allows the study to separate the direct operational effect of exchange rate volatility from its leverage-amplified effect on equity returns.

2.2 Theoretical Framework

The study is anchored on the Exchange Rate Exposure Theory advanced by Adler and Dumas (1984), which holds that a firm's value is sensitive to unanticipated exchange rate changes to the extent that its cash flows are denominated in, or influenced by, foreign currency. Firms with import-dependent cost structures, such as manufacturers, are therefore exposed even without direct foreign currency transactions, because domestic input costs move with the exchange rate. This is complemented by Dornbusch's (1976) overshooting model, which explains why floating exchange rates can deviate sharply from long-run equilibrium in the short run because financial markets adjust faster than goods markets, producing the kind of transitory volatility captured in this study's short-run ARDL estimates. The Purchasing Power Parity theory (Cassel, 1918), which links relative price levels to equilibrium exchange rates, provides the long-run benchmark against which such overshooting and subsequent correction are understood, consistent with the cointegration and error-correction results reported in Section 4.

The inclusion of firm size, leverage, and liquidity as control variables is grounded in complementary strands of corporate finance theory. Trade-off and agency-cost perspectives on capital structure suggest that highly leveraged firms face amplified financial risk during macroeconomic shocks, since debt obligations are fixed in nominal terms while operating cash flows fluctuate with exchange rate movements, particularly where debt is foreign currency-denominated. The resource-based view similarly implies that larger firms, by virtue of scale economies, diversified supplier networks, and greater bargaining power, are better positioned to absorb input cost shocks arising from currency depreciation. Liquidity theory, in turn, predicts that firms holding more liquid assets face lower risk of financial distress during periods of cash-flow disruption, providing a buffer against the operational consequences of exchange rate volatility. These three theoretical strands jointly motivate the control variables specified in the empirical model and are consistent with the resource-based interpretation of the study's findings discussed in Section 4.6.

2.3 Empirical Review

International evidence on exchange rate exposure is well established. Jorion (1990) and Bodnar and Gentry (1993) documented that industry characteristics and the degree of import or export orientation shape the sensitivity of firm value to currency movements, while Bartram et al. (2010) showed that a large share of exposure operates indirectly through competitors' and suppliers' pricing responses rather than direct transactions. Hutson and Laing (2014) found that multinationality moderates exposure, and Choi and Kim (2015) reported that Korean manufacturing firms with higher import intensity display greater exchange rate sensitivity. More recently, Hassan et al. (2023) proposed a risk-based theory

linking exchange rate stabilization to firms' precautionary behaviour under currency risk.

Within Nigeria, the evidence is mixed but tilts toward a negative relationship. Osho and Efuntade (2019) found that exchange rate fluctuation significantly affected the financial performance of multinational companies in Nigeria, a result echoed by Ezenwa et al. (2021) for consumer goods manufacturers and by Alagbe et al. (2021) for listed oil and gas firms. Abubakar et al. (2022) linked exchange rate movements to the return on assets of deposit money banks, while Osho and Fagbamila (2022) confirmed a significant effect of exchange rate fluctuation on multinational performance evaluation using an extended set of economic factors. Oshim and Nze (2024) reported a significant negative effect of foreign exchange income on the performance of deposit money banks, David and Lewis (2024) found a significant short-run effect of exchange rate movements on the performance of Nigeria's leading listed companies, and Ani et al. (2024) linked foreign exchange rate disruptions to the stock market performance of manufacturing firms on the Nigerian Exchange Group. In contrast, Owolabi and Olukilede (2024), studying a single deposit money bank, reported a comparatively muted effect, illustrating the sector- and firm-specific heterogeneity that motivates a broader panel investigation such as this one.

Beyond firm performance, a related strand examines the macroeconomic consequences of Nigeria's exchange rate policy. Orisadare and Olofin (2024) linked exchange rate movements to productivity, Olabisi and Akeju (2024) examined the joint effect of exchange rate movements and inflation on the economy, and Ozili (2024) analysed the benefits and implications of the 2023 unification policy, noting that it increased short-term depreciation and volatility even as it aimed to improve price discovery in the foreign exchange market. Evidence from other emerging markets corroborates the Nigerian pattern: Sule et al. (2023) linked exchange rate movements to export performance in Nigeria; Komba et al. (2024) found that exchange and interest rate movements affected stock returns in Tanzania's financial sector; Koroma et al. (2023) reported a significant effect of exchange rate fluctuation on economic growth in Sierra Leone; and Yuorkuu et al. (2024), modelling volatility with a GARCH(1,1) framework similar to the present study, found that exchange rate volatility negatively affected economic growth in Ghana through inflation and interest-rate transmission channels, a modelling choice this study extends to firm-level performance in Nigeria.

A further strand of the literature situates firm-level exchange rate exposure within broader macro-financial dynamics. Adebisi and Jaji (2023) examined the relationship between inflation, price stability, and foreign investment in the context of Nigeria's dollar rate unification, arguing that exchange rate uncertainty raises the risk premium demanded by foreign investors and thereby constrains capital available for industrial expansion. Similarly, studies of the manufacturing sector's macro-level output response to exchange rate movements have generally found a negative relationship between currency depreciation and industrial productivity in import-dependent economies, reinforcing the firm-level evidence reviewed above

and suggesting that the effects documented in this study for individual firms are also visible in aggregate sectoral outcomes. This convergence between firm-level and macro-level evidence strengthens confidence that the negative exchange rate volatility-performance relationship identified in the Nigerian manufacturing sector reflects a genuine structural vulnerability rather than a statistical artefact of any single dataset or estimation technique.

3. Methodology

3.1 Research Design and Data

The study adopts an ex-post facto research design, appropriate because the exchange rate and firm-performance data already exist and cannot be manipulated by the researcher. Secondary panel data were obtained from the audited annual financial statements of sampled firms, the Central Bank of Nigeria Statistical Bulletin, and the Nigerian Exchange Group (NGX) for the period 2015-2024.

3.2 Population and Sample

The population comprises all manufacturing firms listed on the NGX. A sample of 45 firms was purposively selected on the basis of consistent data availability across the ten-year study period, yielding a balanced panel of 450 firm-year observations. The sampled firms span building materials, food and beverages,

consumer goods, pharmaceuticals, chemicals, and industrial goods sub-sectors (the full list appears in the Appendix), and their financial statements were sourced directly from company annual reports and the NGX corporate disclosure portal. Firms with incomplete annual reports, those suspended from trading for more than one financial year, and those that delisted before 2024 were excluded to preserve a balanced panel and avoid survivorship-related estimation bias.

3.3 Model Specification

The baseline panel regression model is specified as:

$$ROA_{it} = \beta_0 + \beta_1 EXRV_{it} + \beta_2 FSIZE_{it} + \beta_3 LEV_{it} + \beta_4 LIQ_{it} + \alpha_i + \varepsilon_{it} \quad (1)$$

$$ROE_{it} = \beta_0 + \beta_1 EXRV_{it} + \beta_2 FSIZE_{it} + \beta_3 LEV_{it} + \beta_4 LIQ_{it} + \alpha_i + \varepsilon_{it} \quad (2)$$

where subscripts i and t denote firm and year, α_i is the firm-specific effect, and ε_{it} is the idiosyncratic error term. To capture long-run and short-run dynamics, the study also estimates a panel ARDL/Error Correction Model:

$$\Delta Y_{it} = \theta(Y_{i,t-1} - \beta'X_{it}) + \Sigma \gamma_j \Delta X_{i,t-j} + v_{it} \quad (3)$$

where θ is the speed of adjustment toward long-run equilibrium and β' represents the vector of long-run coefficients.

3.4 Measurement of Variables

Table 1. Variable Definitions and Sources

Variable	Type	Measurement	Source
Return on Assets (ROA)	Dependent	Net profit after tax ÷ total assets	Audited financial statements
Return on Equity (ROE)	Dependent	Net profit after tax ÷ total equity	Audited financial statements
Exchange Rate Volatility (EXRV)	Independent	GARCH(1,1) conditional variance of naira/US\$ rate	CBN Statistical Bulletin
Firm Size (FSIZE)	Control	Natural log of total assets	Audited financial statements
Leverage (LEV)	Control	Total debt ÷ total assets	Audited financial statements
Liquidity (LIQ)	Control	Current assets ÷ current liabilities	Audited financial statements

Source: Compiled by the author (2026).

3.5 Estimation Technique

Three baseline estimators – Pooled OLS, Fixed Effects (FE), and Random Effects (RE) – were estimated for each dependent variable. Model choice was guided by the F-test (Pooled vs. FE), the Breusch-Pagan Lagrange Multiplier test (Pooled vs. RE), and the Hausman test (FE vs. RE). Where heteroskedasticity or serial correlation was detected, Huber-White (sandwich) robust standard errors were applied.

Long-run and short-run dynamics were then estimated using a panel Autoregressive Distributed Lag (ARDL)/Error Correction Model implemented through the Pooled Mean Group (PMG) estimator, which restricts long-run coefficients to be homogeneous across firms while allowing short-run coefficients, intercepts, and error variances to vary by firm. This approach is well suited to panels such as this one, where firms operate in the same macroeconomic (exchange rate) environment in the long run but may adjust to shocks at different speeds in the short run owing to firm-specific sourcing,

hedging, or financing arrangements. Prior to PMG estimation, all series were confirmed stationary at levels through the unit root tests reported in Section 4.3, satisfying the I(0)/I(1) requirement of the ARDL bounds approach, and the Pedroni and Kao cointegration tests were used to confirm the existence of a stable long-run relationship justifying the error-correction specification. Results were cross-checked against a Generalized Method of Moments dynamic panel estimator (Arellano & Bond, 1991), which uses lagged levels and differences of the regressors as instruments to address potential endogeneity between financial performance and exchange rate volatility, as an additional robustness step.

3.6 Diagnostic Tests

Prior to estimation, the study conducted descriptive and correlation analyses, Variance Inflation Factor (VIF) tests for multicollinearity, Levin-Lin-Chu (Levin et al., 2002) and Im-Pesaran-Shin (Im et al., 2003) panel unit root tests for

stationarity, and Pedroni (2004) and Kao panel cointegration tests for long-run equilibrium. The Modified Wald test, the Wooldridge test, and the Pesaran CD test were used to detect groupwise heteroskedasticity, serial correlation, and cross-sectional dependence, respectively, with a 5% significance threshold applied throughout.

Decision rules were applied consistently across all tests: for model selection, a Hausman p-value below 0.05 favours Fixed Effects, while a value at or above 0.05 favours Random Effects; for stationarity, a unit root test p-value below 0.05 indicates that the series is stationary; for cointegration, a test p-value below 0.05 indicates a long-run relationship; and for heteroskedasticity, serial correlation, and cross-sectional dependence, a p-value below 0.05 indicates the presence of the respective condition, in which case robust standard errors were applied to preserve valid inference. For all hypothesis tests, the null hypothesis was rejected where the associated p-value fell below the conventional 5% threshold.

4. Discussion of Results

4.1 Descriptive Statistics

Table 2 presents the descriptive statistics for the 450 firm-year observations.

Table 2. Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max	Skewness
ROA (%)	8.24	6.83	-15.34	28.67	-0.42
ROE (%)	15.67	12.45	-32.18	45.32	-0.18
EXRV	0.124	0.078	0.042	0.298	1.23
FSIZE	16.82	1.45	13.24	20.15	-0.08
LEV	0.42	0.24	0.03	0.89	0.31
LIQ	1.86	0.82	0.54	4.32	0.72

Source: Author's computation (2026). $N = 450$ firm-year observations.

The mean ROA of 8.24% (SD = 6.83%) indicates considerable variation in profitability across firms and over time, with a minimum of -15.34% confirming that some firms recorded losses during the review period and a maximum of 28.67% reflecting the presence of high-performing firms; the modest negative skewness (-0.42) suggests a slight concentration of observations below the mean. The mean ROE of 15.67% (SD = 12.45%) is higher than the mean ROA, consistent with the expected leverage effect whereby returns to equity exceed returns to total assets once debt financing is employed. Mean exchange rate volatility of 0.124 (SD = 0.078), ranging from 0.042 to 0.298 with a pronounced right skew (1.23), captures both relatively tranquil sub-periods and episodes of extreme instability, consistent with the sharp escalation in currency risk following the 2023 unification reform. Firm size, measured as the log of total assets, ranges from 13.24 to 20.15 (mean = 16.82, SD = 1.45), indicating a sample that spans small and large listed manufacturers; leverage averages 0.42, implying that debt finances roughly 42% of the typical firm's assets, with a range of 0.03 to 0.89 reflecting heterogeneous capital structures; and liquidity averages 1.86, indicating that sampled firms generally hold current assets sufficient to cover short-term obligations, though the range of 0.54 to 4.32 shows considerable variation in working-capital management across the sample.

4.2 Correlation and Multicollinearity Diagnostics

Table 3. Correlation Matrix

Variable	ROA	ROE	EXRV	FSIZE	LEV	LIQ
ROA	1.000					
ROE	0.724***	1.000				

Variable	ROA	ROE	EXRV	FSIZE	LEV	LIQ
EXRV	-0.385***	-0.341***	1.000			
FSIZE	0.214***	0.178***	-0.082*	1.000		
LEV	-0.298***	-0.267***	0.064	0.312***	1.000	
LIQ	0.245***	0.203***	-0.041	-0.184***	-0.256***	1.000

Note: *** $p < 0.01$, * $p < 0.10$. Source: Author's computation (2026).

Exchange rate volatility is negatively correlated with both ROA ($r = -0.385$) and ROE ($r = -0.341$), providing preliminary support for the study's hypotheses. All pairwise correlations among explanatory variables are well below the 0.80 threshold typically associated with problematic multicollinearity, a conclusion corroborated by the Variance Inflation Factor test, which yielded a mean VIF of 1.28 (range: 1.09-1.52), far below the conventional cut-off of 10.

4.3 Panel Diagnostics: Stationarity, Cointegration, and Model Selection

Levin-Lin-Chu and Im-Pesaran-Shin panel unit root tests reject the null of a unit root for all six variables at the 1% level, confirming that all series are stationary at levels, $I(0)$, and can be used in standard panel regressions without risk of spurious results. Despite level-stationarity, Pedroni and Kao cointegration tests both reject the null of no cointegration at the 1% level, indicating a long-run equilibrium relationship between exchange rate volatility and financial performance that justifies the panel ARDL/ECM specification.

Table 4. Model Selection Tests

Test	Statistic	p-value	Decision
F-test (Pooled vs. FE)	$F(44,401) = 18.34$	0.000	Fixed Effects preferred
Breusch-Pagan LM (Pooled vs. RE)	$\chi^2(1) = 245.67$	0.000	Random Effects preferred
Hausman test (FE vs. RE)	$\chi^2(4) = 34.56$	0.000	Fixed Effects preferred

Source: Author's computation (2026).

Because the Hausman test rejects the null that firm effects are uncorrelated with the regressors, the Fixed Effects model is the preferred baseline specification, consistent with the presence of firm-specific factors (such as management quality and import dependence) that plausibly correlate with leverage and firm size.

4.4 Regression Results

Table 5. Fixed Effects Regression Results

Variable	ROA Coef.	ROA t-stat	ROE Coef.	ROE t-stat
EXRV	-18.234***	-5.28	-25.678***	-6.06
FSIZE	0.045**	2.50	0.067***	2.91
LEV	-0.078***	-3.25	-0.145***	-4.68
LIQ	0.034**	2.27	0.056***	3.11
Constant	0.124	0.36	0.234	0.51

Model fit – ROA: R^2 (within) = 0.432, $F(4,401) = 28.45$ ($p < 0.01$); ROE: R^2 (within) = 0.456, $F(4,401) = 32.67$ ($p < 0.01$). $N = 450$; 45 firms; 10 years.

Note: *** $p < 0.01$, ** $p < 0.05$. Source: Author's computation (2026).

Exchange rate volatility has a statistically significant negative effect on both ROA ($\beta = -18.234$, $p < 0.01$) and ROE ($\beta = -25.678$, $p < 0.01$), rejecting H_{01} and H_{02} . The larger coefficient for ROE indicates that equity returns are more sensitive to currency risk than asset returns, consistent with the amplifying effect of financial leverage on shareholders' residual claims. Firm size is positively associated with performance, suggesting that larger firms better absorb currency shocks through economies of scale and diversified sourcing; leverage is negatively associated with performance, consistent with heightened financial risk under debt

financing; and liquidity is positively associated with performance, consistent with its role as a buffer against short-term currency shocks.

Table 6. Panel ARDL Long-Run and Short-Run Coefficients

Variable	Long-Run ROA	Long-Run ROE	Short-Run Δ ROA	Short-Run Δ ROE
EXRV	-15.456***	-22.123***	-21.234***	-28.456***
FSIZE	0.034**	0.048***	0.028*	0.035**
LEV	-0.065***	-0.112***	-0.089***	-0.145***
LIQ	0.028*	0.042**	0.031**	0.048***
Speed of adjustment (θ)	-0.234***	-0.198***	—	—

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Source: Author's computation (2026).

The long-run coefficients confirm a significant negative effect of exchange rate volatility on both ROA and ROE, rejecting H_{03} , with negative and significant speed-of-adjustment terms (-0.234 for ROA and -0.198 for ROE) indicating that approximately 20-23% of any deviation from long-run equilibrium is corrected within a year. The short-run coefficients are larger in magnitude than the long-run coefficients and are also statistically significant, rejecting H_{04} ; this pattern is consistent with Dornbusch's (1976) overshooting hypothesis, whereby exchange rate shocks initially transmit more forcefully to firm performance before partial equilibration over time.

4.5 Robustness Checks

To assess the sensitivity of the baseline findings to measurement and specification choices, the ROA model was re-estimated under four alternative conditions: replacing the GARCH-based volatility measure with a simple standard-deviation measure; substituting Random Effects for Fixed Effects estimation; splitting the sample into pre-reform (2015-2022) and post-reform (2023-2024) sub-periods; and excluding observations with standardized residuals beyond ± 3 . Table 7 summarizes the EXRV coefficient under each condition.

Table 7. Robustness Checks – EXRV Coefficient on ROA

Robustness Check	Baseline Estimate	Alternative Estimate
Volatility measure: GARCH(1,1) vs. Std. Dev.	-18.234***	-16.789***
Estimator: Fixed Effects vs. Random Effects	-18.234***	-17.456***
Period: Full sample vs. 2015-2022 (pre-reform)	-18.234***	-14.234***
Period: Full sample vs. 2023-2024 (post-reform)	-18.234***	-24.567***
Sample: Full sample vs. outliers excluded	-18.234***	-17.876***

Note: *** $p < 0.01$. Source: Author's computation (2026).

Across all four checks, the sign and statistical significance of the exchange rate volatility coefficient are preserved, and the magnitude remains within a comparatively narrow band, with the notable exception of the post-reform sub-period, in which the effect nearly doubles relative to the pre-reform period. This asymmetry indicates that the baseline full-sample estimate is not an artefact of measurement choice or estimator selection, but also that it understates the severity of currency exposure actually faced by manufacturing firms since the 2023 unification, an important nuance for both corporate risk managers and policymakers.

4.6 Discussion of Findings

The finding that exchange rate volatility significantly depresses both ROA and ROE aligns with the Exchange Rate Exposure Theory (Adler & Dumas, 1984) and corroborates Nigerian evidence from Oshim and Nze (2024), Ezenwa et al. (2021),

and David and Lewis (2024), as well as regional evidence from Yuorkuu et al. (2024) in Ghana. The transmission plausibly operates through four complementary channels:

First, a cost channel, whereby naira depreciation directly raises the domestic cost of imported raw materials, machinery, and spare parts, compressing profit margins for firms unable to pass costs fully through to consumers. Second, an investment channel, whereby uncertainty about future exchange rates discourages capacity expansion and capital modernization, as firms defer investment decisions until the currency environment stabilizes. Third, a financial channel, whereby firms carrying foreign currency-denominated debt face rising naira debt-service costs whenever the currency depreciates, a mechanism that helps explain the larger effect observed on ROE relative to ROA given leverage's role in amplifying shocks to shareholders' residual claims. Fourth, an operational channel, whereby volatility disrupts supply chain planning,

inventory valuation, and production scheduling, reducing overall operational efficiency.

The larger short-run than long-run coefficient, together with a rapid (20-23% annual) speed of adjustment, suggests that Nigerian manufacturing firms absorb currency shocks relatively quickly once adjustment mechanisms such as pricing pass-through, alternative sourcing, or hedging are activated, though the initial impact on profitability remains economically significant given a mean ROA of only 8.24%. This pattern is consistent with Dornbusch's (1976) overshooting model, in which exchange rates initially overreact to shocks before gradually reverting toward a path consistent with underlying fundamentals, and with the Purchasing Power Parity benchmark (Cassel, 1918) that anchors the long-run cointegrating relationship detected in the Pedroni and Kao tests. The intensification of the effect after the 2023 unification reform is consistent with Ozili's (2024) observation that the policy, while intended to improve price discovery and attract foreign capital, produced significant short-term depreciation and volatility with real costs for import-dependent firms, and reinforces the view that structural reforms of this nature carry transitional costs that fall disproportionately on real-sector firms with limited hedging capacity.

The positive and significant coefficients on firm size and liquidity, together with the negative coefficient on leverage, are consistent with a resource-based interpretation of exposure: larger firms can better diversify suppliers, negotiate import contracts, and absorb short-term cost shocks, while liquid firms possess a buffer of readily available resources to smooth operations through periods of currency instability. Highly leveraged firms, by contrast, face compounding pressure as both operating costs and financing costs rise simultaneously during depreciation episodes, a pattern that echoes findings from Bartram et al. (2010) and Hutson and Laing (2014) on the role of firm-specific financial structure in shaping exchange rate exposure internationally.

Taken together, the descriptive, correlation, diagnostic, and regression results present a coherent picture: exchange rate volatility is a first-order determinant of manufacturing sector profitability in Nigeria, its effect is detectable in both the short run and the long run, and its severity is conditioned by firm-specific characteristics that managers can, at least partially, influence through sourcing, financing, and liquidity-management decisions. This reinforces the theoretical expectation, common to the Exchange Rate Exposure Theory and the overshooting model, that currency risk is not a purely macroeconomic phenomenon but one whose ultimate impact on firm value is jointly determined by external shocks and internal firm-level responses to those shocks.

5. Conclusion and Recommendations

5.1 Summary and Conclusion

This study examined the effect of exchange rate volatility on the financial performance of 45 listed manufacturing firms in Nigeria over 2015-2024 using GARCH-based volatility measures within a Fixed Effects and panel ARDL/ECM framework. Exchange rate volatility was found to exert a

significant, economically meaningful negative effect on both ROA and ROE, in both the short run and the long run, with the effect intensifying after the 2023 exchange rate unification reform. Firm size and liquidity mitigate this vulnerability, while leverage exacerbates it. The results were robust across alternative volatility measures, estimators, sub-periods, and outlier treatments. The study concludes that exchange rate stability is a material precondition for the profitability and competitiveness of Nigeria's listed manufacturing sector, and that the transition costs of exchange rate reform, however necessary for long-run market efficiency, fall disproportionately on import-dependent real-sector firms in the short run.

For corporate managers, the findings underscore the need to treat foreign exchange risk as a core dimension of financial strategy rather than an incidental cost. Firms should strengthen natural hedging by increasing local sourcing of raw materials and components where feasible, and should consider financial hedging instruments, forward contracts, and multi-currency banking arrangements to smooth the cash-flow impact of naira depreciation. Given the amplifying effect of leverage on exposure, treasury functions should also reassess the currency composition of debt and prioritize naira-denominated financing where the cost differential does not outweigh the currency-risk savings, while maintaining sufficient liquidity buffers to absorb short-term cost shocks without disrupting operations.

5.2 Policy Implications

For policymakers, particularly the Central Bank of Nigeria and the Federal Ministry of Finance, the results suggest that the credibility and predictability of exchange rate policy matter as much as its long-run structural merits. Complementary measures, such as targeted foreign exchange intervention windows for critical manufacturing inputs, improved forward guidance on policy direction, and incentives for local input substitution, could help cushion the real-sector transition costs of reforms such as the 2023 unification without reversing their underlying market-efficiency objectives. Regulatory authorities such as the Nigerian Exchange Group and the Securities and Exchange Commission may also consider enhanced disclosure requirements around firms' foreign currency exposure to improve investor risk assessment.

5.3 Suggestions for Future Research

The study is limited to listed manufacturing firms with consistently available data over the study period and to a specific set of financial ratios and volatility measures; unlisted manufacturers, which may exhibit different exposure profiles, are outside its scope. Future research could extend the analysis to unlisted firms, incorporate firm-level foreign currency debt exposure directly rather than inferring it through aggregate leverage, or apply threshold and nonlinear panel techniques to examine whether the effect of volatility varies across different regimes or magnitudes of currency depreciation. Comparative studies across other import-dependent African economies undergoing similar exchange rate reforms would also help establish the generalizability of the channels identified here.

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