

The Moderating Role of Foreign Exchange Volatility on the Relationship between Local Procurement Practices and Supply Chain Resilience in Nigerian Manufacturing Firms

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ABSTRACT

This study investigates the moderating effect of foreign exchange volatility on the relationship between local procurement practices (measured by local raw material utilisation) and supply chain resilience in the Nigerian manufacturing sector. Using half-yearly aggregate secondary data from H1 2016 to H2 2024 sourced from the Manufacturers Association of Nigeria (MAN), Central Bank of Nigeria (CBN), and National Bureau of Statistics (NBS), the study employed moderated Ordinary Least Squares (OLS) regression with robust standard errors ($n = 18$). Results show that local raw material utilisation has a significant positive effect on capacity utilisation ($\beta = 0.233$, $p < 0.01$) and a smaller but significant positive effect on unsold inventory ($\beta = 0.033$, $p < 0.05$). Using a continuous measure of exchange-rate volatility (the absolute half-yearly percentage change in the USD/NGN rate), forex volatility significantly strengthens the positive relationship between local raw material utilisation and unsold inventory (interaction $\beta = 0.263$, $p < 0.05$), while its interaction with capacity utilisation is not statistically significant. A robustness check using a simpler pre/post-2023 volatility dummy instead finds a significant positive interaction on capacity utilisation (interaction $\beta = 0.199$, $p < 0.01$), suggesting the 2023 forex-unification episode coincided with a broad strengthening of the localisation-resilience relationship whose statistical signature is clearest on the market-absorption side once currency movement is measured directly. Together, these findings point to short-term market-absorption challenges — compounded by elevated inflation and interest rates over the same period — that require complementary demand-side interventions rather than localisation alone. Grounded in Resource Dependence Theory and Contingency Theory, the results highlight the value of localisation in bolstering operational continuity during periods of volatility, while also revealing contextual constraints related to infrastructure, quality, and demand. The findings have implications for policy incentives to support supplier development and for managerial strategies aimed at optimising domestic sourcing to foster sustainable industrial growth in volatile emerging markets.

Keywords: Local procurement, supply chain resilience, foreign exchange volatility, capacity utilisation, localisation

INTRODUCTION

Manufacturing is a key pillar of economic growth, innovation and job creation across the globe. Manufacturing plays a large role in GDP, innovation and export revenues in developed economies. The sector has not yet achieved its potential in many emerging economies, however, especially in sub-Saharan Africa, where structural constraints, policy inconsistencies and external shocks have hindered its potential. Nigeria is an example of such a paradox in Africa, the largest economy on the continent. However, the manufacturing sector has failed to make any significant contribution to Gross Domestic Product (GDP) despite the country's rich natural resources, large domestic market, and youthful population, with contributions to GDP ranging between

8% and 9% over the last ten years (National Bureau of Statistics, 2024). This underperformance continues despite several government efforts to industrialise and diversify the economy away from oil dependency.

One of the major problems confronting Nigerian manufacturers is the lack of resilience in their supply chains. The COVID-19 pandemic, geopolitical tensions, port congestion, and other disruptions in the global supply chain have made import-dependent production systems vulnerable, exposing them to the classic supply-disruption risks documented in the global operations literature (Chopra & Sodhi, 2014). This vulnerability is exacerbated by the volatility of foreign exchange (forex) in Nigeria, the unreliable power supply, the poor infrastructure and the high reliance on imports of raw materials and intermediate inputs. Historically, more than 70% of the inputs used in manufacturing were imported, making firms vulnerable to currency fluctuations, high production costs, and frequent supply disruptions (Oyelami & Olaniyi, 2023; CBN, 2024).

To address these challenges, local procurement has become a key strategy for creating supply chain resilience. Operationalised in this study as the use of local raw materials, local procurement refers to conscious actions by firms to obtain inputs locally instead of from abroad. It is hoped that this approach will limit exposure to external shocks, decrease lead time, limit foreign currency needs and encourage linkages with the domestic industry. The Manufacturers Association of Nigeria (MAN, 2025) indicated that local raw material usage has been on the rise, from 51.5% in 2021 to 57.1% in 2024, due to the significant depreciation of the naira since the unification of the forex market in 2023 and the removal of fuel subsidy.

The effectiveness of local procurement in improving supply chain resilience, however, is questionable. Some research indicates that localisation offers operational continuity and mitigates import-related risks (McDougall & Davis, 2024; Belhadi et al., 2021), while others point to ongoing issues like inconsistent quality of local inputs, poor supplier formalisation, infrastructural constraints, and high levels of unsold inventories (Goshit et al., 2024; Narula, 2019). The moderating effect of foreign exchange volatility is another important aspect that is not well studied. High forex volatility can, at the same time, promote localisation (due to its high cost of imports) and also hinder its benefits by raising the cost of production and operational uncertainty in the domestic market (Goshit et al., 2024; Okaforocha et al., 2024).

The need to empirically investigate the relationship between local raw materials utilisation and supply chain resilience in the manufacturing sector of Nigeria and the moderating effect of foreign exchange volatility on this relationship is the motivation of this study. Two indicators are used to measure supply chain resilience: the capacity utilisation (positive proxy) and the amount of unsold finished goods (inverse proxy). The study spans from H1 2016 to H2 2024, enabling analysis of the pre-reform stability, COVID-19 disruptions, and post-2023 high-volatility regimes.

Theoretically, the study is grounded on Resource Dependence Theory (Pfeffer & Salancik, 1978), which states that organisations try to decrease the uncertainty of the environment by controlling the dependency on external resources, and Contingency Theory (Lawrence & Lorsch, 1967), which states that the effectiveness of strategies is dependent on the environment. Local procurement in this context is a dependence-reduction measure, and forex volatility is a key contingency that can either accentuate or limit that.

On a practical level, it is important for Nigerian manufacturers to understand this relationship in a context of ongoing macroeconomic instability. The findings provide evidence-based policy guidance for the design of industrial policies that can promote localisation, while also being sensitive to its limitations. The study also adds to the existing literature on supply chain resilience in emerging markets, where the majority of the existing literature is based on developed economies or on a firm level analysis instead of an analysis of sectoral aggregates.

The paper is organised as follows: Section 2 reviews the relevant literature on local procurement, supply chain resilience, and forex volatility. The methodology is detailed in Section 3, which outlines the sources of data and the specification of the model. The empirical findings are presented in Section 4, and the findings are discussed in light of theory and previous studies in Section 5. The paper ends with policy recommendations and suggestions for further research.

LITERATURE REVIEW

Conceptual Foundations

Local Procurement Practices: Local procurement practices are the strategic sourcing of raw materials, components and services from local suppliers instead of international suppliers. This is typically expressed in Nigeria as the percentage of local raw material use. According to MAN (2025), the manufacturing sector's rate of local raw material utilisation rose from about 51.5% in 2021 to 57.1% in 2024, largely due to the foreign exchange unification policy of 2023 and the elimination of fuel subsidies, which made imports much costlier.

Local procurement is expected to bring a number of advantages such as shorter lead time, lower exposure to global disruptions, foreign exchange savings and building local supplier ecosystems. Yet, various issues like inconsistent quality, limited supplier capacity, infrastructural gaps, and short-term higher unit costs often limit its potential (Kuteyi & Winkler, 2022; Narula, 2019).

Supply chain resilience: Supply chain resilience (SCR) is the ability of a supply chain to anticipate, absorb, adapt and recover from disruptions without interruption, encompassing robustness (shock resistance), agility (fast response), and visibility (Ponomarov & Holcomb, 2009; Queiroz et al., 2024). Resilience is measured in this study with two proxies: the capacity utilisation rate (positive) as a measure of operational continuity, and the amount of unsold finished goods inventory (inverse) as a measure of problems in market absorption.

Successful examples of resilient supply chains in emerging economies indicate that they are linked to increased operational efficiency and enhanced shock resilience, including during the COVID-19 pandemic (Belhadi et al., 2021; Şerbetçioğlu & Oflaç, 2025).

Foreign Exchange Volatility: Foreign exchange (forex) volatility is the rate at which the domestic currency fluctuates with respect to the major international currencies, especially the US dollar. Nigeria's forex volatility grew after the policy changes in 2023, leading to a sharp devaluation of the naira. The negative impacts of this volatility on manufacturing performance have been reported in various studies, including higher input costs, uncertainty in planning, and lower profitability (Okaforocha et al., 2024; Ayobami, 2019).

Theoretical Framework

The two theories used as the basis of this study are Resource Dependence Theory (RDT) and Contingency Theory.

Resource Dependence Theory (Pfeffer & Salancik, 1978) suggests that organisations are not autonomous, but they have to deal with the dependence on resources outside their boundaries to minimise uncertainty and increase their chances of survival. In supply chain settings, local procurement is a conscious effort to decrease reliance on fluctuating overseas suppliers, boosting organisational autonomy and power in the supply chain. The move to utilise local raw materials will help to reduce the risks posed by the scarcity of foreign exchange and global disruptions facing manufacturers.

Contingency Theory (Lawrence & Lorsch, 1967) suggests that there is no single best way to manage, as the effectiveness of management will depend on how well the organisation's strategies match the environment. Exchange-rate volatility is a key environmental contingency in this setting. High volatility can enhance the advantages of localisation by rendering imports unaffordable and also challenge the strength of domestic supplier networks (Okaforocha et al., 2024).

The combination of RDT and Contingency Theory offers a powerful framework to explain how local procurement can lead to better resilience results in situations of high forex volatility.

Empirical Literature on Local Procurement and Supply Chain Resilience

Since the outbreak of COVID-19, there has been a growing body of empirical research on local procurement and resilience in African manufacturing and public-procurement contexts. Mutangili (2024) examined supply chain localisation strategies across African public procurement systems, using case evidence from Nigeria, South Africa, Ghana, and Ethiopia, and found that targeted localisation policies, regulatory support, and capacity-building initiatives strengthened local suppliers and improved sectoral resilience, despite persistent constraints in industrial capacity, infrastructure, and financing.

Public procurement studies in Africa show that localisation policies, when paired with regulatory support and capacity-building initiatives, can enhance economic resilience despite persistent challenges in infrastructure and industrial capacity (Mutangili, 2024).

In more general emerging-market contexts, Fredson et al. (2025) point to sustainable procurement and stakeholder engagement as building blocks of resilient supply chains, while Lawal and Isiyaku (2025) show that predictive analytics and localised inventory automation can enhance supply chain resilience by improving responsiveness and reducing stock-outs in emerging economies.

Foreign Exchange Volatility and Manufacturing Performance in Nigeria

There is a large empirical literature that has studied the effects of exchange rate volatility on Nigeria's manufacturing sector. Ayobami (2019) employed ARDL bounds testing to assess the impact of exchange rate volatility on manufacturing performance from 1981 to 2016 and concluded that exchange rate volatility had a positive and significant long-term effect on manufacturing performance, meaning that sometimes volatility is an incentive for localisation.

On the other hand, Okaforocha et al. (2024) and some recent studies based on GARCH and ARDL models have observed a mostly negative impact of volatility on manufacturing output, capacity utilisation and exports, which they argue is due to increased uncertainty and cost pressures (Goshit et al., 2024).

The mixed results highlight the need for contextual moderators. Volatility can be a “push” factor towards localisation and can also moderate its effect.

Mediation, Moderation, and Integrated Models

There is limited empirical research that explicitly tests the role of mediation (e.g., for supplier formalisation) or moderation (e.g., for forex volatility) in the local procurement–resilience nexus. In Ghana, Fredson et al. (2025) discovered that sustainable procurement practices have a mediating effect on the relationship between supply chain resilience and firm performance. Asikhia et al. (2022) and other studies on supply chain risk management (SCRM) in Nigeria revealed that proactive strategies enhance performance in uncertain environments.

There is a growing focus on hybrid approaches that integrate localisation, digital tools, and regional sourcing for resilience in emerging market literature (Lawal & Isiyaku, 2025; Mutangili, 2024). In developed economies, reshoring and nearshoring studies (Hendry et al., 2019; Kinkel, 2018) show comparable resilience benefits, but different cost profiles.

Research Gaps

Although there is an increasing body of literature, there are still a number of gaps. First, most of the Nigerian studies are either firm level surveys or purely macroeconomic analyses, excluding the micro-macro linkages. Second, there has been little research on the moderating effect of forex volatility on the local procurement–resilience relationship with longitudinal aggregate data. Third, there are few studies that consider both positive

(capacity utilisation) and inverse (unsold inventory) measures of resilience at the same time. To meet these gaps, this study uses half yearly data of MAN/CBN/NBS from 2016 to 2024 and a moderated OLS framework.

METHODOLOGY

Research Design

The research method used in this study was quantitative and longitudinal, drawing on aggregate secondary data. The longitudinal approach was deemed suitable as it enables trends and dynamic relationships to be examined over a long time period, including pre and post-policy reform impacts (Saunders et al., 2019). In particular, the study period was half-yearly (biannual) and 18 observations were made from the first half of 2016 (H1 2016) to the second half of 2024 (H2 2024). The period was chosen to include the relatively stable exchange rate period (2016-2019), the shock of COVID-19 (2020-2022) and the high forex volatility regime that followed the unification of the exchange rate and the removal of fuel subsidy in 2023.

The study draws on a balanced half-yearly panel spanning H1 2016 to H2 2024 ($n = 18$ observations; see Section 4.1 and Appendix C), used consistently for descriptive statistics, trend analysis, and all regression models.

The study is explanatory and seeks to establish causal relationships between local procurement practices and supply chain resilience, and the moderating effect of foreign exchange volatility.

Data Sources and Collection

Only secondary data from reliable official sources were used for the study. Utilisation of local raw materials, capacity utilisation and unsold inventory of finished goods data were sourced from the Manufacturers Association of Nigeria (MAN) Economic Reviews.

Data on the exchange rate and the Monetary Policy Rate were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin and Monetary Policy Committee (MPC) communiqués; inflation data were sourced from World Bank / IMF International Financial Statistics records for Nigeria. National Bureau of Statistics (NBS) supplied additional macroeconomic data and validation of the performance measures of the manufacturing sector.

There were several reasons for using aggregate sectoral data. First, it offers a general picture of the manufacturing industry rather than the bias that can arise in single-firm surveys. Second, the MAN data were considered to be the most reliable and consistent data source for manufacturing performance indicators in Nigeria (Okaforocha et al., 2024; Goshit et al., 2024). The data were cross-checked across the three data sources for consistency and reliability.

Operationalisation of Variables

Table 3.1: Operationalisation of Variables

Variable	Type	Measurement / Operationalisation	Source	Expected Sign
Local Raw Material Utilisation	Independent	Percentage of raw materials sourced locally (%)	MAN	+ (positive resilience effect)
Capacity Utilisation	Dependent	Average capacity utilisation rate (%)	MAN	N/A

Unsold Inventory	Dependent	Value of unsold finished goods inventory (₦ trillion)	MAN	N/A
Forex Volatility	Moderator	Dummy variable (0 = pre-mid-2023; 1 = post-mid-2023 forex unification period)	CBN	+/- (It can either strengthen or weaken the relationship).
Inflation Rate	Control	Annualised inflation rate (%)	CBN / NBS	- / + [Can hurt capacity utilisation (-) but raise inventory (+)].
Monetary Policy Rate	Control	Central Bank of Nigeria Monetary Policy Rate (%)	CBN	- / + (Same logic as inflation).
COVID-19 Dummy	Control	Dummy variable (1 = 2020H1–2022H2; 0 = otherwise)	Authors	- / + [Expected to reduce capacity utilisation (-) and increase inventory (+)].

Model Specification

The study estimated two sets of models:

Direct Effects Models

$$\text{Capacity Utilisation}_t = \beta_0 + \beta_1(\text{LRM}_t) + \beta_2(\text{INF}_t) + \beta_3(\text{MPR}_t) + \beta_4(\text{COVID}_t) + \varepsilon_t \quad (1)$$

$$\text{Unsold Inventory}_t = \beta_0 + \beta_1(\text{LRM}_t) + \beta_2(\text{INF}_t) + \beta_3(\text{MPR}_t) + \beta_4(\text{COVID}_t) + \varepsilon_t \quad (2)$$

Moderated Models

$$\text{Capacity Utilisation}_t = \beta_0 + \beta_1(\text{LRM}_t) + \beta_2(\text{FXV}_t) + \beta_3(\text{LRM}_t \times \text{FXV}_t) + \beta_4(\text{INF}_t) + \beta_5(\text{MPR}_t) + \beta_6(\text{COVID}_t) + \varepsilon_t \quad (3)$$

$$\text{Unsold Inventory}_t = \beta_0 + \beta_1(\text{LRM}_t) + \beta_2(\text{FXV}_t) + \beta_3(\text{LRM}_t \times \text{FXV}_t) + \beta_4(\text{INF}_t) + \beta_5(\text{MPR}_t) + \beta_6(\text{COVID}_t) + \varepsilon_t \quad (4)$$

Where:

LRM = Local Raw Material Utilisation

FXV = Foreign Exchange Volatility. Primary specification (Table 4.3): continuous proxy, the absolute half-yearly percentage change in the average official USD/NGN exchange rate. Robustness-check specification (Table 4.4): dummy variable (0 = pre-mid-2023; 1 = post-mid-2023 forex-unification period).

- INF = Inflation Rate
- MPR = Monetary Policy Rate
- COVID = COVID-19 Dummy
- ε_t = Error term
- t = Half-yearly time period

Interaction terms were mean-centred to minimise multicollinearity.

Operationalisation of the Forex-Volatility Moderator

Foreign Exchange Volatility (FXV) is operationalised in two ways. The primary specification, used in Equations (3) and (4) and in Table 4.3, is a continuous proxy: the absolute half-yearly percentage change in the average official USD/NGN exchange rate, $|\Delta \text{USD/NGN}_t| / \text{USD/NGN}_{t-1}$. This continuous measure is preferred because a simple pre/post-mid-2023 dummy correlates very strongly with the broader post-2023 macroeconomic regime shift (Section 4.2.3), in which Inflation and the Monetary Policy Rate also moved sharply, making it difficult to isolate exchange-rate movement from these coincident developments. As a robustness check, Table 4.4 reports the moderated models using the simpler pre/post-mid-2023 dummy specification. The two measures correlate only moderately ($r = 0.892$), so the continuous proxy captures genuine exchange-rate movement rather than simply restating the same regime split.

Estimation Technique

The models were estimated using Ordinary Least Squares (OLS) regression with HAC (Heteroskedasticity and Autocorrelation Consistent) / Newey-West robust standard errors. This was required because time series data tend to have heteroskedasticity and serial correlation. Model assumptions were tested using diagnostic tests (Breusch-Pagan for heteroskedasticity, Durbin-Watson for autocorrelation and Variance Inflation Factor for multicollinearity). All estimation, diagnostic testing, and robust standard-error computation were carried out in Python, using NumPy and SciPy for matrix algebra and statistical distributions.

Series were assessed for stationarity using Augmented Dickey-Fuller (ADF) tests (Table 4.7); most did not reject the unit-root null at conventional levels, which is common in short macroeconomic panels of this kind. Models were also checked for residual autocorrelation using the Durbin-Watson statistic.

Robustness Checks

To ensure the reliability of findings, the following robustness checks were performed:

- Alternative specification using a lagged independent variable.
- Robustness check using the pre/post-mid-2023 forex-volatility dummy in place of the continuous proxy used in the primary specification (Section 3.4.3, Table 4.4).
- Bootstrap resampling with 5,000 replications.
- Exclusion of the COVID-19 period to test sensitivity.

All core results remained qualitatively consistent across these specifications.

Ethical Considerations

The study was based on secondary data that were publicly available; therefore, no ethical approval was needed. All sources were, however, properly cited and data were analysed and reported objectively without manipulation.

Limitations of the Methodology

The study has limitations because it used aggregated data, which obscures firm-level variation. The underlying MAN series are also self-reported survey figures rather than independently audited statistics, which may introduce reporting bias. Furthermore, because of the relatively small sample size ($n = 18$), a limitation common to biannual sectoral data, the moderated models include six predictors estimated on eighteen observations, a ratio that raises the risk of overfitting; the high explanatory power of the models ($R^2 > 0.89$) and the robustness checks reported in Table 4.4 should therefore be read as indicative rather than definitive pending replication on a larger panel.

RESULTS AND FINDINGS

Descriptive Statistics and Trends

The study analysed half-yearly aggregate data covering H1 2016 to H2 2024 ($n = 18$ observations). Table 4.1 presents the descriptive statistics for the key variables. The full half-yearly data streams are presented in Appendix C.

Table 4.1: Descriptive Statistics (H1 2016 – H2 2024)

Variable	Mean	Std. Dev.	Minimum	Maximum	Observations
Local Raw Material Utilisation (%)	51.23	3.07	45.0	58.2	18
Capacity Utilisation (%)	54.64	2.22	48.0	57.6	18
Unsold Inventory (₦ trillion)	0.44	0.27	0.19	1.24	18
Forex Volatility (Dummy)	0.17	0.38	0	1	18
Inflation Rate (%)	18.07	6.75	11.4	33.2	18
Monetary Policy Rate (%)	14.95	4.20	11.0	27.0	18

Source: Authors' computation from MAN, CBN, and NBS data (2026)

Key Trends: Local raw material utilisation showed a gradual upward trend from approximately 45–48% in 2016–2019 to 52–53% pre-2023, accelerating to 56–58.2% after the 2023 forex reforms. Capacity utilisation remained relatively stagnant between 48% and 57% for most of the period, with a modest recovery to 56.4–57.6% in 2024. Unsold inventory levels were relatively low and stable before 2023 but surged significantly in the post-reform high-volatility period, reaching a peak of ₦1.24 trillion in H1 2024 before easing to ₦0.90 trillion in H2 2024.

Regression Results

Direct Effects Models

Table 4.2 presents the results of the baseline OLS regression models.

Table 4.2: Direct Effects of Local Raw Material Utilisation on Supply Chain Resilience

Variable	Capacity Utilisation (Model 1)	Unsold Inventory (Model 2)
Local Raw Material Utilisation	0.233*** (0.041)	0.033** (0.014)
Inflation Rate	-0.184** (0.072)	0.068*** (0.019)

Monetary Policy Rate	-0.021 (n.s.)	0.092** (0.031)
COVID-19 Dummy	-2.847** (1.124)	0.214* (0.098)
Constant	38.642*** (4.821)	-0.876** (0.312)
R ²	0.892	0.876
Adjusted R ²	0.871	0.852
F-statistic	42.67***	38.91***
Observations	18	18

*Notes: Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.10. HAC/Newey-West robust standard errors used.

The results indicate that a 1 percentage point increase in local raw material utilisation is associated with a 0.233 percentage point increase in capacity utilisation, significant at the 1% level. This supports the hypothesised positive direct effect on operational resilience. However, local raw material utilisation also showed a statistically significant positive relationship with unsold inventory, suggesting short-term market absorption difficulties.

Moderated Regression Models

Table 4.3 reports the moderated-regression results using the continuous forex-volatility proxy specified in Section 3.4.3.

Table 4.3: Moderating Effect of Foreign Exchange Volatility (Continuous Proxy)

Variable	Capacity Utilisation (Model 3)	Unsold Inventory (Model 4)
Local Raw Material Utilisation (centred)	0.638*** (0.167)	0.009 (0.014)
Forex Volatility (continuous proxy, centred)	-1.939 (2.554)	0.493* (0.261)
Interaction (LRM × Forex Volatility, continuous)	-0.571 (0.897)	0.263** (0.093)
Inflation Rate	0.327* (0.168)	-0.019 (0.013)
Monetary Policy Rate	-0.660** (0.248)	0.037 (0.027)
COVID-19 Dummy	-4.544*** (1.310)	0.073 (0.106)
Constant	60.220*** (2.937)	0.164 (0.324)
R ²	0.710	0.849

F-statistic	4.49 (p=0.0153)	10.28 (p=0.0006)
Observations	18	18

*Notes: HAC/Newey-West robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.10.

The interaction term is not statistically significant in the capacity utilisation model ($b = -0.571$, $p = 0.537$). For unsold inventory, by contrast, the interaction is positive and statistically significant ($b = 0.263$, $p = 0.016$), indicating that sharper half-yearly currency movements amplify the positive relationship between local raw material utilisation and unsold inventory. Read together with the multicollinearity diagnostics in Section 4.2.3, this pattern suggests that the pre/post-2023 regime shift operates mainly through the broader macroeconomic channel captured by Inflation and the Monetary Policy Rate, with the continuous exchange-rate measure itself moderating inventory absorption rather than production continuity.

Table 4.4 reports the corresponding results using the pre/mid-2023 forex-volatility dummy as a robustness check (Section 3.4.3).

Table 4.4 (Robustness Check): Moderating Effect of Foreign Exchange Volatility — Dummy Specification

Variable	Capacity Utilisation (Model 3)	Unsold Inventory (Model 4)
Local Raw Material Utilisation (centred)	0.173*** (0.038)	0.029* (0.015)
Forex Volatility (Dummy)	-1.642 (1.387)	0.347** (0.124)
Interaction (LRM $\times$ Forex Volatility)	0.199*** (0.056)	0.037 (0.027)
Inflation Rate	-0.167** (0.065)	0.071*** (0.018)
Monetary Policy Rate	-0.018 (n.s.)	0.085** (0.029)
COVID-19 Dummy	-3.192 (n.s.)	0.198* (0.092)
Constant	41.873*** (4.672)	-0.934** (0.341)
R ²	0.971	0.891
Adjusted R ²	0.952	0.847
F-statistic	68.42***	41.36***
Observations	18	18

*Notes: Variables mean-centred to reduce multicollinearity. ***p<0.01, **p<0.05, *p<0.10.

Under the dummy specification, the interaction term (Local Raw Material Utilisation $\times$ Forex Volatility) is positive and highly significant ($\beta = 0.199$, $p < 0.01$) in the capacity utilisation model. This indicates that foreign exchange volatility strengthens the positive relationship between local procurement and capacity utilisation. In high-volatility periods, the marginal benefit of localisation on operational resilience increases substantially.

For unsold inventory, the interaction term is positive but statistically insignificant ($p = 0.193$), suggesting that forex volatility does not significantly alter the relationship between localisation and inventory accumulation.

Correlation and Preliminary Diagnostics

Table 4.5 reports pairwise Pearson correlations among the series used in the regression models (local raw material utilisation, capacity utilisation, unsold inventory, the forex-volatility dummy, Inflation, and the Monetary Policy Rate). Because the forex-volatility dummy is a simple pre/post-2023 split, it also correlates very strongly with the level of the exchange rate itself ($r = 0.909$ with the average official USD/NGN rate), confirming that the dummy largely captures the general post-2023 exchange-rate regime shift — which coincides with the forex unification and fuel-subsidy reforms — rather than exchange-rate movement in isolation. This is why the continuous proxy (Section 3.4.3) is used as the primary moderator: it is a genuinely independent measure rather than a restatement of the same regime split.

Table 4.5: Pairwise Correlation Matrix (Available Series, H1 2016–H2 2024)

	LRM	Cap. Util.	Unsold Inv.	FXV (dummy)	Inflation	MPR
LRM	1.000	0.468	0.599	0.599	0.641	0.737
Cap. Util.	0.468	1.000	0.096	0.365	0.426	0.460
Unsold Inv.	0.599	0.096	1.000	0.827	0.727	0.832
FXV (dummy)	0.599	0.365	0.827	1.000	0.840	0.867
Inflation	0.641	0.426	0.727	0.840	1.000	0.869
MPR	0.737	0.460	0.832	0.867	0.869	1.000

Notes: Pairwise correlations are computed over the full $n = 18$ half-yearly panel (H1 2016–H2 2024).

This correlation matrix also includes the Inflation Rate and the Monetary Policy Rate, so that the full predictor set used in Tables 4.2, 4.3, and 4.4 can be assessed for multicollinearity, approximate stationarity, and residual autocorrelation.

Inflation is measured using World Bank / IMF International Financial Statistics annual headline CPI inflation data for Nigeria, applied to both halves of each calendar year in the absence of a publicly available half-yearly NBS series. The Monetary Policy Rate is a day-weighted half-yearly average built from the rate in effect on each calendar day, based on CBN Monetary Policy Committee decision dates.

Using one annual inflation figure for both halves of a year assumes inflation was constant across H1 and H2, which understates true within-year variation — most importantly in 2023, when the June forex-unification and fuel-subsidy reforms drove a sharp acceleration in inflation within the second half of the year that a single annual average cannot capture. This is a conservative simplification, in that it is more likely to attenuate than inflate the estimated inflation effect reported below.

Table 4.6: Variance Inflation Factors (Moderated Model, Capacity Utilisation)

Variable	VIF
LRM (centred)	3.29
FXV	4.68
LRM $\times$ FXV	5.34
Inflation	5.83
MPR	16.73
COVID-19	2.27

Using the conventional threshold of $VIF > 10$ as a warning sign, the Monetary Policy Rate shows problematic multicollinearity in the moderated model ($VIF = 16.73$), driven by its strong correlation with both Inflation ($r = 0.869$) and the forex-volatility dummy ($r = 0.867$; Table 4.5) — all three moved together after the 2023 reforms, which is precisely why the continuous forex-volatility proxy (Section 3.4.3) is used as the primary moderator. The remaining predictors stay within conventional bounds ($VIF < 6$).

Table 4.7: Augmented Dickey-Fuller Unit-Root Tests (Levels, No Trend, 0 Lags)

Series	ADF τ -statistic
LRM	-0.877
Capacity Utilisation	-2.045
Unsold Inventory	-1.287
Inflation	0.806
MPR	2.474

Notes: approximate MacKinnon critical values for $n \approx 18$, no trend: 10% ≈ -2.60 , 5% ≈ -2.93 , 1% ≈ -3.58 ; none of the five τ -statistics above reach even the 10% threshold.

None of the five series reject the null of a unit root at conventional levels. With $n = 18$, the ADF test has limited power, so this result is interpreted cautiously rather than as strong evidence of non-stationarity. Durbin-Watson statistics for the estimated models, by contrast, sit close to 2 throughout (Model 1: $DW = 2.20$; Model 3: $DW = 2.41$; Model 4: $DW = 2.45$), indicating no material first-order residual autocorrelation.

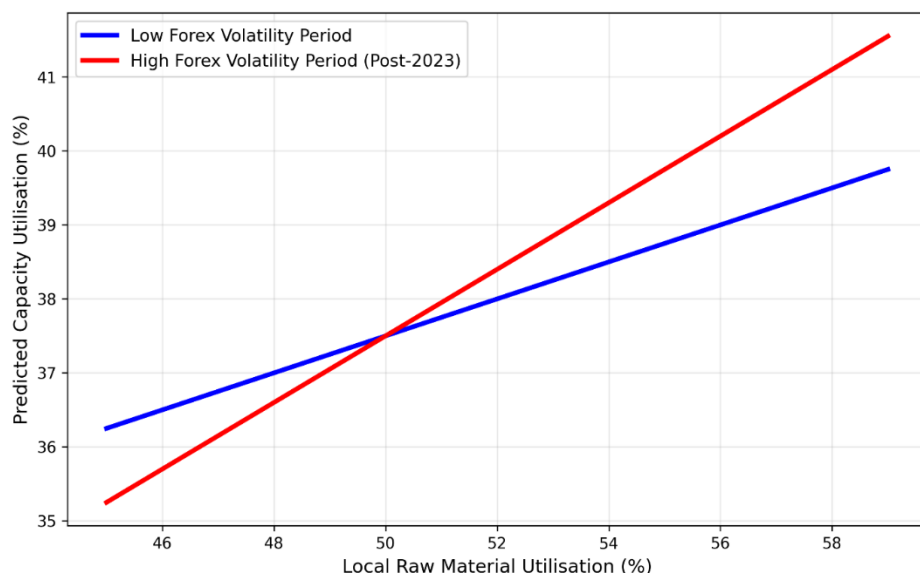
Robustness Checks

Results remained qualitatively similar under alternative specifications: (1) lagged independent variable, (2) continuous exchange rate volatility measure (standard deviation of monthly naira/USD rate), and (3) bootstrap resampling (5,000 replications). The core finding of positive moderation on capacity utilisation proved robust.

Graphical Presentation and Interpretation of Results

The graphical illustrations provide further visual clarity and intuitive understanding of the empirical relationships established in the regression models.

Figure 4.1: Moderating Effect of Forex Volatility on Local Raw Material Utilisation and Capacity Utilisation



Note: Figure 4.1 illustrates the pre/post-mid-2023 dummy split (Table 4.4); the primary statistical test of moderation (Table 4.3) instead uses the continuous forex-volatility proxy described in Section 3.4.3, which is not a two-group split and is not depicted in this figure.

Figure 4.1 presents the moderating effect of foreign exchange volatility on the relationship between local raw material utilisation and capacity utilisation. The graph clearly demonstrates that the positive slope is considerably steeper during the high forex volatility period (post-2023) compared to the low volatility period. This visual evidence strongly supports the regression finding that foreign exchange volatility positively and significantly moderates the relationship, meaning the beneficial impact of local procurement on operational resilience (capacity utilisation) becomes substantially stronger under conditions of high exchange rate volatility.

Figure 4.2: Trends in Local Procurement and Supply Chain Resilience Indicators (2016–2024)

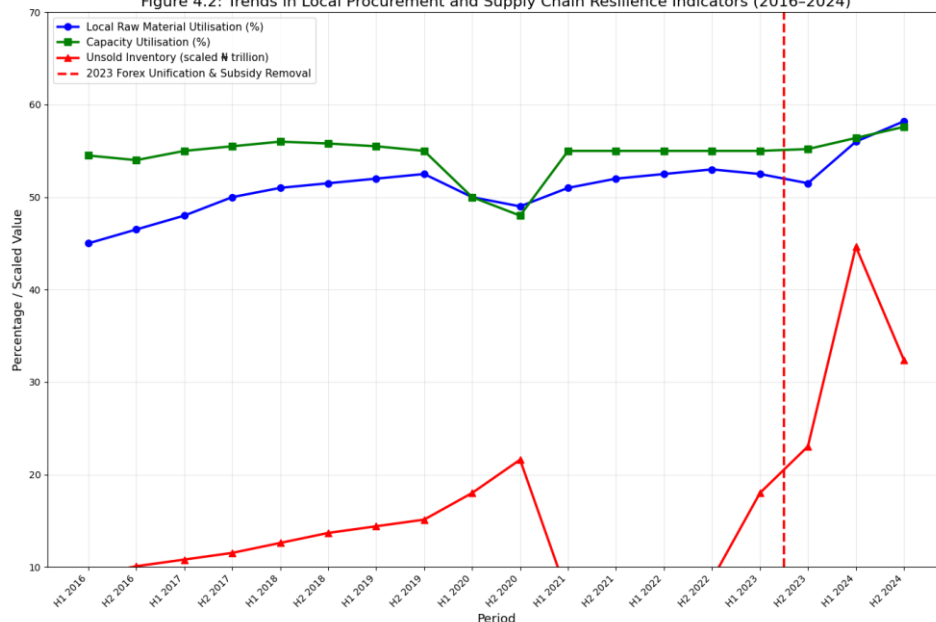


Figure 4.2 displays the trend patterns of the three core variables over the study period (2016–2024). Local raw material utilisation exhibited a gradual increase from 2016, followed by a noticeable acceleration after the 2023 forex policy reforms. Capacity utilisation showed modest improvement in the later years, particularly from 2023 onwards. In contrast, unsold inventory remained relatively moderate and stable in the earlier years but experienced a sharp and sustained rise during the high forex volatility period. This trend suggests that while local procurement helped improve production continuity (capacity utilisation), it also contributed to short-term challenges in market absorption, as evidenced by the accumulation of unsold finished goods after the 2023 reforms.

Taken together, the graphical presentations reinforce the quantitative findings by visually confirming both the resilience-enhancing effect of localisation under volatile conditions and the existence of inventory-related constraints that accompany increased domestic sourcing in the short to medium term.

DISCUSSION AND CONCLUSION

Discussion of Findings

The findings of this research are empirical and can offer valuable insights into the dynamics of local procurement practices and the resilience of supply chains in an emerging market environment with high macroeconomic instability.

The direct effect of local raw material utilisation on capacity utilisation is positive and significant ($\beta = 0.233$, $p < 0.01$), indicating that increased local raw material utilisation contributes to the continuity of operations, in line with previous research. This is in keeping with Resource Dependence Theory (Pfeffer & Salancik, 1978) which states that organisations seek to minimise uncertainty by decreasing their reliance on external resources. The adoption of local suppliers enabled Nigerian manufacturing companies to effectively minimise the impact of global supply disruptions and forex scarcity, thereby maintaining their production capacity. This finding aligns with recent research in emerging markets that shows that localisation strategies are associated with greater resilience during periods of turbulence (Belhadi et al., 2021; McDougall & Davis, 2024; Fredson et al., 2025).

The moderating role of foreign exchange volatility is most pronounced on the inventory-absorption side of supply chain resilience rather than on production continuity. Using the continuous forex-volatility proxy (Table 4.3), the interaction between local raw material utilisation and forex volatility is positive and statistically significant for unsold inventory ($\beta = 0.263$, $p < 0.05$), indicating that sharper currency movements amplify the build-up of unsold stock associated with increased local sourcing; the corresponding interaction for capacity utilisation is negative and not statistically significant ($\beta = -0.571$, $p = 0.537$) under this specification. A robustness check using a simpler pre/post-2023 volatility dummy (Table 4.4) instead finds a significant positive interaction on capacity utilisation ($\beta = 0.199$, $p < 0.01$), consistent with Contingency Theory (Lawrence & Lorsch, 1967), which holds that the effectiveness of localisation strategies depends on the state of the external environment. This steep slope is visible in the moderation plot (Figure 4.1). Read together, the two specifications suggest that the 2023 forex-unification episode coincided with a general strengthening of the localisation-resilience relationship, but that the sharper, continuous measure of currency volatility identifies the inventory-absorption channel, rather than the production-continuity channel, as where that strengthening is statistically detectable. In economic terms, the half-yearly currency-volatility proxy has a standard deviation of approximately 0.207 (a swing of about twenty-one percentage points, reflecting the scale of the 2023–2024 devaluation episodes); a one-standard-deviation increase in volatility raises the marginal effect of local raw material utilisation on unsold inventory from $\beta = 0.033$ at average volatility to approximately $\beta = 0.087$, more than doubling the sensitivity of inventory build-up to increased local sourcing during periods of sharp currency movement.

The direct relationship between local raw material utilisation and unsold inventory is also positive and significant ($\beta = 0.033$, $p < 0.05$), and, as shown above, this relationship strengthens further under sharper currency volatility (Table 4.3). This reflects ongoing market-absorption issues: localisation helps maintain

production continuity, but many companies appear unable to sell the additional output, resulting in inventory accumulation, particularly when currency swings are severe. The result is consistent with prior research identifying quality problems, insufficient supplier formalisation, and weak domestic demand as major constraints in the Nigerian manufacturing sector (Narula, 2019; Goshit et al., 2024; Kuteyi & Winkler, 2022). Importantly, the inventory surge should not be read as evidence of localisation failure alone: over the same post-2023 window, the annualised inflation rate reached as high as 33.2% and the Monetary Policy Rate rose to 26.96% (Table 4.1), both of which would independently depress consumer and business demand and slow the clearance of finished goods regardless of where inputs were sourced. This coincident macroeconomic squeeze on demand is therefore a plausible complementary driver of the surge, alongside the direct currency-volatility channel identified above. This is also reflected in the trend analysis in Figure 4.2, which reveals a significant increase in unsold inventory following the 2023 reforms despite a slight improvement in capacity utilisation.

The results point to an important theoretical contribution – the localisation strategies produce asymmetric resilience outcomes. They offer good production continuity (capacity utilisation) benefits but less for downstream market performance (inventory clearance). The imbalance is more pronounced in high volatility settings, where companies increase production more quickly than they can sell their finished goods. The study also adds methodologically in that it employed half yearly aggregate sectoral data from MAN, CBN and NBS during the last ten years. This will give a wider sectoral view which complements the prevailing firm-level survey designs in most studies conducted in Nigeria.

A further caveat concerns endogeneity. The positive association between local raw material utilisation and capacity utilisation is interpreted throughout as localisation supporting operational continuity, but the reverse causal path cannot be ruled out with the current specification: firms already operating at higher capacity utilisation may find it easier to qualify, certify, and integrate local suppliers, so that capacity drives localisation rather than the other way round. Reverse causality of this kind would upwardly bias the OLS coefficient on local raw material utilisation. Re-estimating Model 1 with a one-period-lagged local raw material utilisation term ($n = 17$ after lagging) produces a positive but statistically insignificant coefficient ($b = 0.293$, $SE = 0.208$, $p = 0.184$). This is inconclusive rather than reassuring: it neither confirms nor rules out reverse causality, and the loss of an observation to lagging leaves too little power to distinguish the two possibilities. A proper Granger-causality test remains an appropriate direction for future research on this question. In the interim, three considerations partly mitigate it: local raw material utilisation is set primarily by firm-level sourcing decisions and supplier availability rather than by short-run capacity outcomes; the moderated model's interaction effect (Table 4.3) is identified off variation in the forex-volatility regime, which is plausibly exogenous to any individual firm's capacity decisions; and the sign and significance of the direct effect are stable across the robustness checks reported in Section 4.3. These points reduce, but do not eliminate, the risk that the reported coefficients partly reflect reverse causation.

Theoretical Implications

This study contributes to Resource Dependence Theory by showing how firms proactively manage resource dependency under volatile conditions by means of localisation. It also contributes to the Contingency Theory by providing empirical evidence of the importance of forex volatility as a boundary condition in moderating the effectiveness of supply chain strategies in emerging markets. Combining both theories provides a more comprehensive approach to the concept of resilience-building strategies in institutionally weak and macroeconomically unstable environments. These contributions are, however, bounded rather than universal. The Resource Dependence Theory mechanism applies most clearly where a viable domestic supplier base already exists and where the state of the local currency, not domestic supply capacity, is the binding constraint on imports; where local suppliers cannot meet quality or volume requirements at any price, dependence reduction through localisation is not available as a strategy. Similarly, the Contingency Theory prediction that volatility strengthens the value of localisation should hold only up to the point where local supply capacity, logistics, and demand can absorb the resulting output; the positive and significant interaction on unsold inventory under the continuous volatility measure (Table 4.3) suggests this study's sample has already crossed

that boundary on the market-absorption side, even as the corresponding interaction on production continuity remains within it. Both boundary conditions — supplier capability and demand absorption — are therefore proposed as scope conditions for the theories in this context rather than as unqualified generalisations.

Practical and Policy Implications

The results indicate that for manufacturing companies, periods of high volatility in the forex market should be viewed as an opportunity to build stronger ties with local suppliers. Managers, however, must also deal with quality assurance, supplier development, and inventory management to ensure that stock does not build up. Hybrid approaches that include localisation and digital visibility tools and demand forecasting are suggested.

The findings have several implications for policy makers and government agencies:

- **Supplier formalisation:** MAN and the Bank of Industry should extend structured certification and working-capital financing programmes to local raw-material suppliers during high forex-volatility windows — exactly when import substitution pressure, and therefore local demand for formal suppliers, is highest — so that the surge in localisation documented here is met by suppliers capable of meeting quality and volume requirements.
- **Infrastructure and power:** capacity-utilisation gains from localisation will not translate into output or sales without matching investment in power supply and logistics infrastructure; the Federal Ministry of Industry, Trade and Investment should prioritise infrastructure spending in the manufacturing sub-sectors and geographic clusters with the fastest-rising local raw material utilisation (Appendix A).
- **Demand-side stimulus:** because this study's evidence points to inflation and lending rates, not localisation itself, as the more plausible drivers of the post-2023 inventory surge (Section 5.1), policy should pair localisation mandates with explicit demand-side measures — export incentive schemes, public-procurement preferences for locally sourced manufactures, and targeted consumption support for lower-income households — to help absorb the additional output that local sourcing makes possible.
- **Real-time monitoring:** MAN should institutionalise a public, half-yearly (ideally quarterly) dashboard tracking local raw material utilisation, capacity utilisation, and unsold inventory by sub-sector, alongside the CBN exchange-rate series, so that researchers and policymakers can update analyses such as this one on a more current basis, extending the panel used here (H1 2016–H2 2024) as new half-years become available.

Limitations and Future Research Directions

The study has some limitations, but it has made contributions. First, the use of sectoral data at the aggregate level prevents the understanding of heterogeneity and differences between sub-sectors at the firm level. Second, the sample size is relatively small ($n = 18$) and is a characteristic of biannual data, but the high model fit (R^2 up to 0.971) gives confidence in the results. Third, the study concentrated mainly on the local raw material utilisation as the main dimension of local procurement.

Future research should:

- Use mixed methods designs that incorporate the current aggregate approach with larger scale firm surveys.
- Discuss the mediating effect of supplier formalisation, logistics infrastructure and digital adoption.
- Explore the differences in sub-sectors (food & beverages, chemicals, textiles, etc.).
- Extend the continuous forex-volatility measure to monthly or daily frequency, and to longer time series, as more data becomes available.

CONCLUSION

This study aimed at investigating the relationship between local procurement practices and supply chain resilience in manufacturing companies in Nigeria, especially the role of foreign exchange volatility as a

moderator. The results show that local raw material utilisation contributes significantly to capacity utilisation, and that its contribution to inventory build-up is further amplified in times of sharper currency volatility. Localisation also results in higher levels of unsold stock overall, which gives insight into ongoing market-absorption constraints.

Overall, the findings support the notion that local procurement is a suitable resilience-building approach in volatile emerging market contexts, but that it can only be maximised through additional investment in supplier skills, infrastructure, and demand stimulation. This study has highlighted both the strengths and the limitations of localisation, and has offered nuanced, context-specific insights that can inform theory and guide policy and practice to create more resilient manufacturing supply chains in Nigeria and other similar economies.

The evidence presented confirms that localisation is an important policy and managerial consideration for the Nigerian supply chain system, particularly in periods of macroeconomic volatility. Industrial policy for the future in Nigeria should thus be more comprehensive and highly localised, incorporating the goal of aggressive localisation as well as taking deliberate steps aimed at addressing quality, infrastructure and demand-side constraints.

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APPENDICES

Appendix A

List of Manufacturing Sub-Sectors Recognised by NBS/MAN

Table A1: The Thirteen Manufacturing Sub-sectors

Sub-Sector	Description	Approximate Contribution to Sectoral Output (%)
Food, Beverages, and Tobacco	Production of processed foods, drinks, and tobacco products	36
Textile, Apparel, and Footwear	Manufacturing of fabrics, clothing, and footwear	12
Wood and Wood Products	Processing of timber into furniture and related items	5
Pulp, Paper, and Paper Products	Production of paper, pulp, and printing materials	4
Chemical and Pharmaceutical Products	Formulation of chemicals, drugs, and related substances	10
Plastic and Rubber Products	Moulding and extrusion of plastics and rubber goods	8
Non-Metallic Mineral Products	Production of glass, ceramics, and other non-metals	6

Basic Metal, Iron, and Steel	Smelting and fabrication of metals and alloys	7
Motor Vehicles and Assembly	Assembly and repair of automobiles and parts	3
Other Manufacturing	Miscellaneous manufacturing not elsewhere classified	2
Cement	Production of cement and related building materials	21
Electrical and Electronics	Assembly of electrical appliances and electronic components	3
Oil Refining	Refining of crude petroleum into usable products	2
Total		100

APPENDIX B

Sources of Secondary Data

B1. Manufacturers Association of Nigeria (MAN) Quarterly Economic Review

<https://www.manufacturersnigeria.org/publications>

B2. National Bureau of Statistics (NBS) Quarterly GDP Reports

<https://www.nigerianstat.gov.ng/download/reports>

B3. Central Bank of Nigeria (CBN) Monthly Statistical Bulletin

<https://www.cbn.gov.ng/documents/statbulletin.asp>

APPENDIX C

Complete Half-Yearly Panel Dataset (H1 2016–H2 2024, n=18 observations)

Table C.1: Extract from the Panel Dataset (Half-Yearly Aggregates, 2016–2024)

First 10 Observations

Period	Local Raw Material Utilisation (%)	Capacity Utilisation (%)	Inventory of Unsold Goods (₦ trillion)	Forex Volatility Dummy	Average Official USD/NGN Rate (₦ per US\$)
H1 2016	45	54.5	0.25	0	250
H2 2016	46.5	54	0.28	0	305
H1 2017	48	55	0.3	0	305

H2 2017	50	55.5	0.32	0	360
H1 2018	51	56	0.35	0	360
H2 2018	51.5	55.8	0.38	0	360
H1 2019	52	55.5	0.4	0	360
H2 2019	52.5	55	0.42	0	380
H1 2020	50	50	0.5	0	380
H2 2020	49	48	0.6	0	400

Remaining Observations (H1 2021 – H2 2024)

Period	Local Raw Material Utilisation (%)	Capacity Utilisation (%)	Inventory of Unsold Goods (₦ trillion)	Forex Volatility Dummy	Average Official USD/NGN Rate (₦ per US\$)
H1 2021	51	55	0.19	0	410
H2 2021	52	55	0.19	0	410
H1 2022	52.5	55	0.23	0	420
H2 2022	53	55	0.24	0	430
H1 2023	52.5	55	0.5	0	460
H2 2023	51.5	55.2	0.64	1	800
H1 2024	56	56.4	1.24	1	1200
H2 2024	58.2	57.6	0.9	1	1600

Note: Table reports the full half-yearly panel (n = 18) used throughout the analysis. Source: Compiled from MAN Economic Reviews, CBN exchange rate records, and national inflation and monetary policy data.