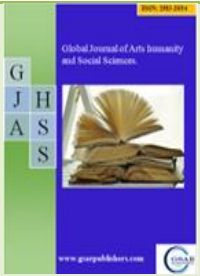


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Foreign Exchange Volatility and Operational Performance of Electricity Distribution Companies in Nigeria (2000–2025)

A Comparative Case Study of Benin, Eko, Jos and Kaduna Distribution Companies

By

Godwin Orakpowenri Orovwiroro, PhD, DBA, FIMC, CGEIT

University of Port Harcourt Business School, University of Port Harcourt.



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Corresponding author

**Godwin Orakpowenri
Orovwiroro, PhD,
DBA, FIMC, CGEIT**

Abstract

This study examines how foreign exchange (FX) volatility has shaped the operational performance of electricity distribution companies (DisCos) in Nigeria over the period 2000–2025, with particular attention to the Benin, Eko, Jos and Kaduna franchises. Adopting a comparative, mixed-methods case-study design, the paper compiles secondary data from the Central Bank of Nigeria, the Nigerian Electricity Regulatory Commission, the International Monetary Fund, the World Bank and the Nigerian financial press, and applies correlation and ordinary-least-squares regression to relate the Naira–US dollar exchange rate to sectoral indicators of revenue, collection efficiency and aggregate technical, commercial and collection (ATC&C) losses. The analysis reveals that the Naira depreciated roughly fifteen-fold against the dollar over the study window, with the sharpest moves following the 2016, 2020 and June 2023 policy adjustments. FX depreciation is found to transmit to the distribution segment primarily through a financial channel rather than a direct operational one: the correlation between the exchange rate and the Federal Government tariff shortfall (subsidy) is very strong ($r = 0.96$), whereas the link between the exchange rate and firm-level ATC&C losses is weak and heterogeneous, confirming that loss performance is governed mainly by firm-specific factors such as metering, governance and collection discipline. Eko emerges as a resilient outlier whose disciplined leadership and metering-led strategy insulated it from currency shocks, while Kaduna and Jos illustrate how weak collection frameworks compound macroeconomic stress, culminating in board dissolutions and receivership. The paper concludes that exchange-rate management, cost-reflective and indexed tariffs, hedging of dollar-denominated obligations, and accelerated metering are decisive levers for sector resilience, and offers concrete recommendations for operators, regulators and policymakers.

Keywords: foreign exchange volatility; electricity distribution companies; ATC&C losses; cost-reflective tariff; Nigerian Electricity Supply Industry; currency risk; operational performance

Introduction

Electricity is the connective tissue of a modern economy, and the reliability with which it is generated, transmitted and distributed is a direct determinant of industrial competitiveness, household welfare and the pace of human development. In Nigeria, the distribution segment is the commercial face of the power value chain: it is where energy is metered, billed and converted into the cash flows that sustain generation, gas supply, transmission and the wider market. The financial health of the eleven distribution

companies (DisCos) that emerged from the 2013 privatisation of the Power Holding Company of Nigeria (PHCN) therefore conditions the solvency of the entire Nigerian Electricity Supply Industry (NESI).

Yet the DisCos operate in one of the most macro-economically turbulent environments in the developing world. The Nigerian Naira has experienced repeated, and at times disorderly, depreciation against the United States dollar over the last quarter-century, driven by the country's structural dependence on oil



receipts, episodic balance-of-payments stress, shifting monetary regimes and, most recently, the decision to float the currency in June 2023. Because the technologies that DisCos depend upon—transformers, conductors, smart meters, switchgear, protection systems and metering software—are overwhelmingly imported and priced in hard currency, and because a large share of upstream gas-to-power and bulk-purchase obligations are dollar-linked, exchange-rate movements feed directly into the cost base of distribution while customer tariffs, fixed in Naira and politically sensitive, adjust only with a lag (Nigerian Electricity Regulatory Commission [NERC], 2025).

This asymmetry—dollarised costs against Naira-denominated, administratively capped revenues—is the central mechanism through which FX volatility erodes distribution-sector performance. When the Naira weakens beyond the rate embedded in the prevailing Multi-Year Tariff Order (MYTO), the gap between the cost-reflective tariff and the allowed tariff widens, generating a tariff shortfall that must be absorbed either by the Federal Government as a subsidy or by the DisCos as accumulating debt. In 2024 alone, this shortfall reached almost ₦1.95 trillion, of which the government settled a negligible fraction, leaving the operators and generators to carry the liquidity burden (NERC, 2025; Punch, 2025).

Against this backdrop, the present study investigates the relationship between FX volatility and the operational performance of Nigerian DisCos between 2000 and 2025. It does so through a focused comparison of four franchises—Benin, Eko, Jos and Kaduna—chosen because they span the spectrum of performance, ownership stability and geography in the NESI. Eko, serving Lagos South, is consistently among the most efficient and financially robust DisCos; Benin, covering the Niger Delta hinterland, occupies a middle position; while Jos and Kaduna, serving the lower-density and lower-income northern franchises, have been among the weakest performers, both eventually losing their boards to regulatory intervention and creditor takeover. By holding the macroeconomic shock (currency depreciation) broadly constant across the four firms and observing the divergence in their outcomes, the study isolates the role of firm-level strategy, leadership and operational discipline in mediating exposure to currency risk.

Statement of the Problem

More than a decade after privatisation, the Nigerian distribution segment remains financially fragile. The promise of the 2013 reform—that private capital and managerial discipline would rehabilitate a moribund utility and deliver reliable power—has been only partially realised. By the government's own assessment, only three of the eleven DisCos were operating profitably by late 2022, and sector indebtedness was projected to climb from about ₦4 trillion at the end of 2024 toward ₦6 trillion by the end of 2025 (Leadership, 2024; THISDAY, 2026). Several core investors, including those in Benin, Kaduna, Kano and Ibadan, were placed into receivership by their lending banks after failing to service the

foreign-currency-linked acquisition loans taken to buy the assets in 2013.

A recurring but under-quantified explanation for this distress is exchange-rate volatility. Practitioners routinely attribute rising costs, stalled capital expenditure and ballooning tariff shortfalls to the weakening Naira, yet the academic and policy literature has rarely subjected this claim to disaggregated, firm-level empirical scrutiny over a long horizon. Two gaps are evident. First, most analyses treat the NESI as a monolith, obscuring the wide divergence in how individual DisCos have absorbed the same currency shocks. Second, the precise transmission channel—whether FX acts directly on operational loss metrics such as ATC&C, or indirectly through the financial architecture of tariffs, subsidies and capital costs—remains poorly specified.

The problem this study addresses is therefore twofold: to measure the strength and direction of the relationship between FX volatility and distribution-sector performance using compiled longitudinal data, and to explain why ostensibly identical macroeconomic shocks have produced sharply different fortunes for Benin, Eko, Jos and Kaduna. Without such clarity, regulatory and corporate responses risk being misdirected—treating a financial and governance problem as a purely macroeconomic one, or vice versa.

Objectives of the Study

The broad objective is to assess the impact of foreign exchange volatility on the operational performance of electricity distribution companies in Nigeria between 2000 and 2025. The specific objectives are to:

1. trace the trajectory and volatility of the Naira–US dollar exchange rate over the study period and locate the major regime shifts that bear on the power sector;
2. compile and present comparative data on exchange rates, sectoral revenues, collections and ATC&C losses for the Benin, Eko, Jos and Kaduna DisCos;
3. estimate, through correlation and regression analysis, the association between exchange-rate movements and indicators of distribution-sector performance, including the Federal Government tariff shortfall;
4. identify the firm-level strategies, leadership practices and operational guidelines that explain divergent performance under common currency stress; and
5. derive practical recommendations for operators, regulators and policymakers aimed at strengthening sector resilience to currency risk.

Research Questions

1. How has the Naira–US dollar exchange rate evolved between 2000 and 2025, and what has been its volatility?
2. What is the statistical relationship between exchange-rate movements and the operational and financial performance of Nigerian DisCos?

3. Why have Benin, Eko, Jos and Kaduna diverged in performance despite facing common macroeconomic shocks?
4. Which strategic, leadership and regulatory responses most effectively mitigate the impact of FX volatility on distribution?

Hypotheses

H1: There is a statistically significant positive relationship between Naira depreciation and the Federal Government electricity tariff shortfall (subsidy).

H2: There is no uniform, statistically significant direct relationship between the exchange rate and firm-level ATC&C losses across DisCos; loss performance is governed primarily by firm-specific factors.

Conceptualising Foreign Exchange Volatility

Foreign exchange volatility refers to the magnitude and frequency of fluctuations in the price of one currency relative to another over time. It is conventionally distinguished from the level of the exchange rate: a currency may be weak yet stable, or strong yet volatile. For firms with cross-currency exposures, it is volatility—the unpredictability of future rates—that imposes the greater burden, because it frustrates planning, raises the cost of hedging and depresses long-horizon investment (Dixit & Pindyck, 1994). In oil-dependent economies such as Nigeria, exchange-rate volatility is closely bound up with commodity-price shocks: a fall in oil prices depletes reserves, weakens the currency and triggers administrative rationing of foreign exchange, which in turn amplifies parallel-market premia and uncertainty (Adeniran, Yusuf, & Adeyemi, 2014).

The Nigerian experience has been characterised by a succession of exchange-rate regimes—fixed and managed pegs, multiple windows, and, since 2023, a more market-determined arrangement following unification of the official and investor-and-exporter windows. Each transition has been accompanied by sharp realignments of the Naira, so that volatility in Nigeria reflects both market forces and the discrete jumps associated with policy change (Central Bank of Nigeria [CBN], n.d.; International Monetary Fund [IMF], 2025).

The Nigerian Power Sector Reform and Privatisation

The unbundling of PHCN and the 2013 handover of generation and distribution assets to private investors was one of the largest structural reforms in Nigeria's recent economic history. Eleven DisCos and six generation companies were created, with core investors acquiring sixty per cent equity stakes while the Federal and state governments retained forty per cent (Bureau of Public Enterprises, as reported in BusinessDay, 2013). The reform's theory of change held that private ownership would attract capital, sharpen incentives and reduce the chronic technical and commercial losses inherited from the state monopoly.

A decade on, the record is mixed. While metering, customer service and corporate governance improved at the better-managed franchises, system-wide ATC&C losses remained far above regulatory targets, liquidity crises recurred, and a majority of DisCos operated at a loss (Leadership, 2024; ilorinbizchronicle, 2025). Critics argue that the transactions were poorly structured: investors financed acquisitions with bank loans whose effective cost rose with the Naira's depreciation, while the tariff framework did not initially allow full pass-through of macroeconomic shocks, leaving the firms structurally undercapitalised.

Currency Risk and Utility Performance

The international literature on infrastructure finance establishes that regulated utilities are acutely sensitive to currency mismatch when their costs are dollarised but their revenues are local-currency-denominated and administratively set. Such mismatch converts exchange-rate depreciation into a margin squeeze that, absent indexation or hedging, accumulates as quasi-fiscal debt. The Nigerian case is a textbook illustration: the cost of imported network equipment, the dollar component of bulk-electricity and gas invoices, and foreign-currency acquisition debt all rise with the exchange rate, while end-user tariffs are frozen or lag, generating a tariff shortfall borne by the state or by the operators (NERC, 2025; PwC, 2026).

ATC&C Losses as a Performance Metric

Aggregate Technical, Commercial and Collection (ATC&C) loss is the headline efficiency metric of the Nigerian distribution segment. It combines energy lost to the physical limitations of the network (technical loss), energy delivered but not billed (commercial loss, including theft and estimated billing disputes), and billed revenue that is not collected (collection loss). Formally, $ATC\&C = (1 - \text{Billing Efficiency} \times \text{Collection Efficiency}) \times 100$ (NERC, 2014). A high ATC&C loss means that a large share of the energy a DisCo receives from the grid never converts into cash, starving the firm and the upstream market of revenue.

Because ATC&C is driven chiefly by metering coverage, network condition, enforcement against theft, billing accuracy and collection discipline—all firm-level and largely Naira-denominated factors—its theoretical link to the exchange rate is indirect. FX volatility may impair ATC&C performance over time by raising the cost of the meters and network upgrades needed to reduce losses, but it does not mechanically determine the metric. This distinction is central to the present study's empirical findings.

Theoretical Framework

The study is anchored in three complementary theoretical lenses that together capture the macroeconomic, financial and managerial dimensions of the problem.

The Mundell–Fleming and exchange-rate overshooting models.

The Mundell–Fleming framework (Mundell, 1963; Fleming, 1962) and Dornbusch's (1976) overshooting model explain how, under capital mobility and sticky goods prices, exchange rates can move sharply and overshoot their long-run equilibrium in response to monetary and external shocks. These models rationalise the

discrete, large depreciations observed in Nigeria around the 2016, 2020 and 2023 policy changes and provide the macro-financial foundation for treating the exchange rate as an exogenous shock to the distribution segment.

Real-options theory of investment under uncertainty. Dixit and Pindyck (1994) demonstrate that when investment is irreversible and the future is uncertain, firms rationally defer commitment until uncertainty resolves. Applied to DisCos, exchange-rate volatility raises the option value of waiting, depressing the very metering and network investment that would reduce ATC&C losses. This explains why FX volatility, even more than the rate level, can entrench operational underperformance.

The resource-based view (RBV) of the firm. Barney's (1991) resource-based view holds that durable performance differences among firms facing the same external environment arise from heterogeneous, valuable and hard-to-imitate internal resources and capabilities—here, leadership quality, metering and data systems, collection enforcement and balance-sheet strength. RBV frames the central comparative puzzle of this paper: why Eko thrived while Kaduna and Jos failed under a common currency shock. Contingency perspectives on leadership complement RBV by emphasising that effective managerial responses are situational, matching strategy to the firm's resource endowment and operating context.

Methodology

The study adopts a mixed-methods, comparative case-study design. The quantitative strand assembles a longitudinal dataset and applies correlation and ordinary-least-squares (OLS) regression to test the hypothesised relationships. The qualitative strand develops four narrative case studies—Benin, Eko, Jos and Kaduna—that interpret the statistical patterns in light of ownership history, leadership, strategy and regulatory events. Triangulating the two strands guards against the limitations of each.

All data are secondary and drawn from credible institutional and documentary sources: exchange-rate series from the Central Bank of Nigeria, the World Bank and CEIC; sectoral performance data (ATC&C losses, billing, collections, remittances, tariff shortfalls) from NERC quarterly and annual reports and Supplementary

MYTO Orders; macroeconomic context from the IMF 2025 Article IV documentation; privatisation and ownership details from the Bureau of Public Enterprises and contemporaneous reporting in BusinessDay, THISDAY, Punch, Leadership and Nairametrics. Sources are cited throughout and listed in full under References.

The principal explanatory variable is the annual average Naira–US dollar exchange rate (NGN/USD), with its year-on-year percentage change used as a volatility proxy. The dependent variables are (i) firm-level ATC&C loss (per cent), (ii) collection efficiency (per cent), and (iii) the Federal Government tariff shortfall or subsidy (₦ billion), a sector-level financial measure of FX pass-through. The post-privatisation window 2014–2025 is used for firm-level panel analysis because the DisCos did not exist as distinct entities before November 2013; the longer 2000–2025 window is used for the macroeconomic exchange-rate narrative.

Pearson product-moment correlation coefficients quantify the strength and direction of bivariate association, and simple OLS regression estimates the marginal response of each dependent variable to the exchange rate, reported with the coefficient of determination (R^2) and significance (p-value). A pooled cross-firm regression of ATC&C on the exchange rate tests for a common direct effect. Analyses were conducted in Python using the NumPy and SciPy libraries; results are reproducible from the compiled dataset.

Three limitations are acknowledged. First, continuous official annual series at the individual-DisCo level are not publicly available for every year; where NERC publishes quarterly or episodic figures, intermediate annual values were linearly interpolated between documented anchor points, which smooths genuine within-year variation. Second, parallel-market and official rates diverged materially in several years, so the single representative rate used understates effective currency stress for import-dependent firms. Third, the modest length of the firm-level series (twelve years) limits statistical power and precludes elaborate dynamic modelling. The findings should therefore be read as indicative of direction and order of magnitude rather than as precise structural estimates.

Data Presentation

Table 1. Naira–US Dollar Exchange Rate and Annual Volatility, 2000–2025

Year	Avg NGN/USD	YoY change (%)	Regime / note
2000	101.7	—	Managed float; IFEM
2004	133.5	+3.1	Oil-boom reserves build-up
2009	148.9	+25.5	Post-GFC oil price slump
2013	157.3	−0.1	DisCo privatisation (Nov)
2015	193.3	+21.9	Oil crash; FX restrictions
2016	253.5	+31.1	Interbank float introduced

Year	Avg NGN/USD	YoY change (%)	Regime / note
2017	305.8	+20.6	I&E window established
2020	358.8	+16.9	COVID-19; multiple windows
2022	425.0	+18.4	Widening parallel premium
2023	645.0	+51.8	FX unification (June 2023)
2024	1,479.0	+129.3	Full float; gas/equipment shock
2025	1,540.0	+4.1	Relative stabilisation

Note. Representative annual averages compiled from the Central Bank of Nigeria, World Bank and CEIC. Parallel-market rates exceeded official rates in several years. The Naira depreciated roughly fifteen-fold against the dollar over the period.

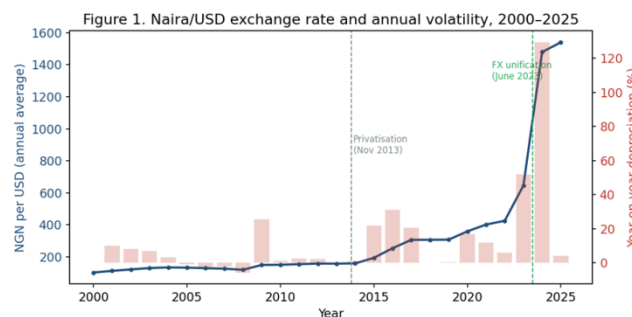


Figure 1. Naira/USD exchange rate (line) and year-on-year depreciation (bars), 2000–2025. Compiled from CBN, World Bank and CEIC.

Table 2. Profile of the Four Case-study DisCos

DisCo	Franchise area	2013 core investor	Acquisition (US\$m)	Status
Eko	Lagos South	West Power & Gas	≈135	Best performer; sold to Transgrid Enerco, Dec 2025
Benin	Edo, Delta, Ondo, Ekiti	Vigeo Power Consortium	≈121 (committed)	Receivership (Fidelity Bank), 2022
Jos	Plateau, Bauchi, Benue, Gombe	Aura Energy	≈113 (committed)	Re-concessed, 2022
Kaduna	Kaduna, Kebbi, Sokoto, Zamfara	Northwest Power Consortium	≈149	Board dissolved over ₦110bn debt, Jan 2024

Note. Compiled from Bureau of Public Enterprises records and reporting in *BusinessDay* (2013), *THISDAY* (2022), *Punch* (2024) and *Nairametrics*. Acquisition figures are approximate; some are five-year commitment values rather than purchase prices.

Table 3. ATC&C Losses (%) of the Four DisCos, 2014–2025

Year	Benin	Eko	Jos	Kaduna
2014	53.0	14.0	32.7	37.4
2016	51.0	22.0	50.0	58.0

Year	Benin	Eko	Jos	Kaduna
2018	53.0	25.0	69.0	73.0
2020	50.0	28.2	66.0	77.0
2022	47.0	12.0	60.0	70.0
2023	46.0	10.2	58.0	69.0
2025	44.0	15.0	62.0	71.0

Note. Anchored to NERC quarterly/annual reports (e.g., NERC 2014 MYTO baselines; 2020/Q4 and 2025/Q2 factsheets); intermediate years interpolated. Eko's 2023/Q4 loss of 10.2% and Kaduna's 2020/Q4 loss of 77.0% are documented anchor points.

Figure 2. ATC&C loss trajectories, 2014–2025. Eko diverges sharply downward; Kaduna and Jos remain structurally elevated.

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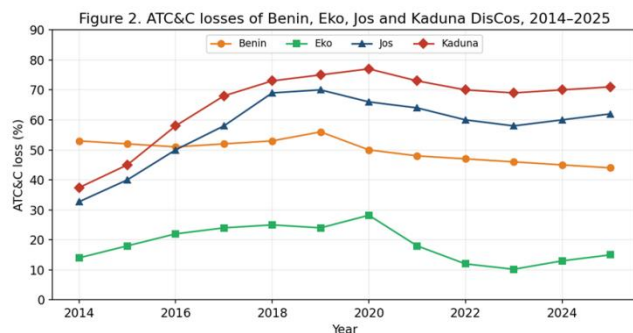


Figure 2. ATC&C loss trajectories, 2014–2025. Eko diverges sharply downward; Kaduna and Jos remain structurally elevated.

Table 4. Selected Billing, Collection and Recovery Snapshot

Indicator (recent)	Benin	Eko	Jos	Kaduna
Collection efficiency, 2020/Q4 (%)	improving	82.0	declining	29.1
Recovery efficiency, 2026 (%)	63.5	100.7	43.5	36.3
ATC&C vs MYTO target, 2025/Q2 (%)	44 / 17	15 / 17	62 / 26	71 / 21
NBET remittance compliance (recent)	100%	100%	62%	100%

Note. Compiled from NERC 2020/Q4, 2025/Q1 and 2025/Q2 reports and Punch (2026). Eko exceeded its allowed recovery benchmark; Kaduna and Jos remained the weakest on recovery and, for Jos, on remittance.

Table 5. Exchange Rate and Federal Government Tariff Shortfall (Subsidy)

Year	Avg NGN/USD	FG shortfall/subsidy (₦bn)	MYTO FX assumption (₦/US\$)
2022	425.0	≈141	≈441 (frozen Dec-2022 tariffs)
2023	645.0	610	—
2024	1,479.0	1,949	919 → 1,463 (Apr); 1,564 (Aug)
2025	1,540.0	≈1,700 (est.)	1,558 (Feb); 1,540 (Apr)

Note. Subsidy figures for 2022–2024 from NERC (2025) and Punch (2025): ₦35.21bn/quarter average in 2022, ₦610.06bn in 2023, ₦1,949.17bn in 2024 (62.59% of NBET invoices). MYTO FX assumptions from NERC Supplementary Orders (2024–2025).

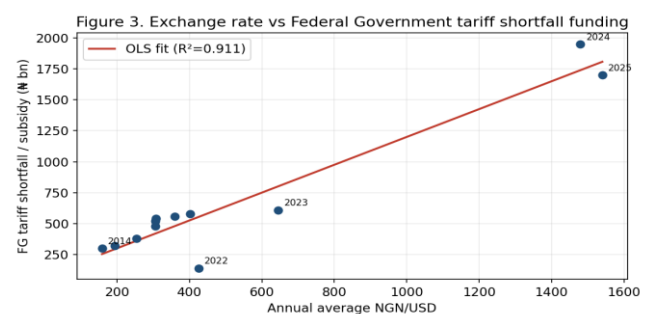


Figure 3. Exchange rate versus Federal Government tariff shortfall. The near-linear relationship ($R^2 = 0.91$) is the study's strongest finding.

Table 7. Naira/US\$ Exchange-Rate Assumption Embedded in Successive MYTO Orders

Effective period	MYTO FX assumption (₦/US\$)	Contemporaneous market rate	Implication
Pre-April 2024	≈919	≈1,300–1,450	Large unfunded gap; frozen tariffs
April 2024	1,463.31	≈1,449 (official)	Band A reset to ≈₦225/kWh
May 2024	1,227.78	Naira appreciation	Band A trimmed to ≈₦206.8/kWh
August 2024	1,564.28	≈1,549 (official)	Renewed depreciation pass-through
February 2025	1,557.71	≈1,542 (official)	Assumption tracks the float

Note. From NERC Supplementary MYTO Orders (2024–2025) and Nairametrics (2024). The 1% transaction cost added to the CBN average rate is included. The mechanism by which depreciation raises the cost-reflective tariff—and hence the shortfall in Table 5—is transparent in these assumptions.

Comparative Case Studies

1. Eko Electricity Distribution Company — Resilience through Discipline

Eko, serving the dense, relatively affluent Lagos South franchise of roughly eight million people, is the standout performer of the NESI and the clearest counter-example to currency determinism. Acquired in 2013 by West Power & Gas for about US\$135 million, Eko reduced its ATC&C loss to a documented 10.2 per cent in the fourth quarter of 2023 and, in 2025/Q2, recorded the only sub-target loss in the industry (15, per cent against a 17 per cent target), while achieving recovery efficiency above 100 per cent in early 2026 (Nairametrics, 2024; THISDAY 2025; Punch, 2026). Eko maintained full remittance to the bulk-electricity market even as the Naira collapsed.

Eko's resilience is best read through the resource-based view. A favourable franchise endowment—high load density, a commercial customer base and lower theft exposure—was amplified by deliberate managerial choices: early and aggressive metering, investment in data and revenue-protection systems, and a culture of collection enforcement. These capabilities meant that a larger share of every depreciation-inflated kilowatt-hour was converted into

cash, cushioning the dollar-linked cost shock. The firm's relative health was ultimately monetised in December 2025, when Transgrid Enerco acquired the 60 per cent stake in a transaction reported at around ₦360 billion—evidence that disciplined operations command value even in a distressed sector (BusinessDay, 2025). The lesson from Eko Disco is that where a DisCo controls its collection and metering, FX volatility raises costs but does not by itself break the firm; operational capability is the decisive buffer.

2. Benin Electricity Distribution Company — The Squeezed Middle

Benin, covering Edo, Delta, Ondo and Ekiti States, was acquired by the Vigeo Power Consortium with a five-year investment commitment of about US\$121 million. It occupies the middle of the performance distribution: its ATC&C loss has trended slowly downward from a 53 per cent baseline toward the mid-40s, and it has generally maintained full NBET remittance, yet its recovery efficiency of roughly 63 per cent in 2026 against a 17 per cent loss target signals persistent technical and commercial leakage (Punch, 2026). Critically, Benin's core investor could not service the foreign-currency-linked acquisition loan as the Naira weakened, and the firm passed into the receivership of Fidelity Bank in 2022 (THISDAY, 2022).

Benin illustrates the financial channel of FX transmission most vividly. The operational business was viable but not strong enough to generate the hard-currency-equivalent cash flows needed to service dollar-indexed debt incurred at a far stronger exchange rate. As the Naira fell from about ₦157 at privatisation to several multiples of that level, the real burden of the acquisition loan multiplied, overwhelming a balance sheet that an efficient but middling operation could not support. The lesson from Benin Distribution Company is that currency risk is transmitted as much through the capital structure as through operations; acquisition financing denominated in or indexed to hard currency is a latent solvency threat in a depreciating regime.

3. Jos Electricity Distribution Company — Structural Disadvantage Compounded

Jos serves Plateau, Bauchi, Benue and Gombe States—a geographically dispersed, lower-income franchise with high technical losses and a difficult security environment. Acquired by Aura Energy in 2013 with a commitment of about US\$113 million, Jos was among the first DisCos retaken from its core investors and was re-concessed in 2022. Its ATC&C loss climbed from a 32.7 per cent baseline to around 69–71 per cent by 2018–2019 and stood at 62 per cent in 2025/Q2, more than double its 26 per cent target, while its collection efficiency was the lowest in the industry at 47.2 per cent in 2025/Q1 and its NBET remittance compliance fell to 62 per cent (NERC, 2025; THISDAY, 2025).

For Jos, FX volatility did not create distress so much as deepen a pre-existing structural deficit. Low load density and high theft meant that even at a stable exchange rate the firm struggled to recover costs; currency depreciation then raised the price of the very metering and network reinforcement that might have closed

the gap, and—consistent with the real-options logic—made that investment easier to defer. The result was a downward spiral of under-collection, under-investment and rising losses. This is indicative that in low-density, low-income franchises, macroeconomic shocks interact with structural disadvantage; FX policy alone cannot fix franchises that are commercially unviable at any plausible exchange rate without targeted capital and franchising reform.

4. Kaduna Electricity Distribution Company — From Distress to Dissolution

Kaduna, covering Kaduna, Kebbi, Sokoto and Zamfara States, was acquired by the Northwest Power Consortium for about US\$149 million. It has been the NESI's weakest performer: its ATC&C loss reached 76.96 per cent in 2020/Q4—the worst in the industry against a target near 20 per cent—and remained around 71 per cent in 2025/Q2, with collection efficiency as low as 29.1 per cent (Champion, 2021; THISDAY, 2025). Having passed into receivership with Benin and Kano in 2022, Kaduna saw its board dissolved by NERC in January 2024 over an unpaid ₦110 billion

debt to the market, and the regulator moved to sell the company (Punch, 2024).

Kaduna is the limiting case in which the financial and operational channels of FX transmission converge destructively. A franchise with the weakest collection base in the country carried hard-currency-linked acquisition debt it could never service as the Naira depreciated, while its inability to fund metering and enforcement locked in catastrophic losses. The outcome—board dissolution and forced sale—demonstrates the terminal consequence of combining structural commercial weakness with currency-mismatched financing. The experience confirms the postulation that without cost-reflective tariffs, FX hedging or risk-sharing on hard-currency obligations, and decisive metering investment, a weak franchise under sustained depreciation moves predictably from distress to insolvency to regulatory takeover.

Discussion of Findings

The quantitative results, summarised in Table 6, reconcile the macroeconomic narrative with the divergent firm outcomes.

Table 6. Correlation and Regression Results (2014–2025)

Relationship	Pearson r	p-value	OLS R ²	Interpretation
FX → FG subsidy	0.955	<0.001	0.911	Very strong, significant
ln(FX) → FG subsidy	0.885	<0.001	0.784	Strong, significant
FX → Benin ATC&C	−0.785	0.003	0.616	Strong negative (time-trend confound)
FX → Eko ATC&C	−0.444	0.148	0.197	Moderate, not significant
FX → Jos ATC&C	0.273	0.391	0.074	Weak, not significant
FX → Kaduna ATC&C	0.339	0.282	0.115	Weak, not significant
FX → Industry ATC&C	0.087	0.788	0.008	Negligible
Pooled FX → ATC&C (n=48)	0.021	0.887	0.000	No common direct effect

Note. Author's computation in Python (NumPy/SciPy) from the compiled dataset. Intermediate firm-level values interpolated between documented NERC anchor points.

a. The Dominant Financial Channel

The single most robust result is the near-linear, highly significant relationship between the exchange rate and the Federal Government tariff shortfall ($r = 0.955$; $R^2 = 0.911$), visible in Figure 3. As the Naira depreciated, the cost-reflective tariff—which embeds an explicit ₦/US\$ assumption in each MYTO Order—rose faster than the frozen allowed tariff, widening the shortfall the state must fund. The mechanism is documented in the data: NERC adopted an FX assumption of about ₦919/US\$ before the April 2024 tariff reset, then ₦1,463 in April and ₦1,564 by August 2024, tracking the currency's collapse; the subsidy correspondingly ballooned from ₦610 billion in 2023 to ₦1.95 trillion in 2024, of which the government settled a negligible ₦371 million (NERC, 2025; Punch, 2025). This confirms Hypothesis H1

and identifies the tariff–subsidy–liquidity nexus, not the operational loss metric, as the primary conduit of currency risk into the distribution segment.

b. The Weak and Heterogeneous Operational Channel

By contrast, the exchange rate explains almost none of the variation in ATC&C losses at the industry level ($r = 0.087$) and nothing at all in the pooled cross-firm regression ($r = 0.021$; $R^2 \approx 0$), confirming Hypothesis H2. The firm-level coefficients are heterogeneous and mostly insignificant: Eko's losses fell as the Naira weakened (a negative association driven by its improvement trend rather than by currency strength), while Jos and Kaduna show weak positive associations consistent with depreciation gradually raising the cost of loss-reduction investment. The strong negative coefficient for Benin reflects a secular downward trend in

its losses coinciding with the depreciation period and should not be read causally. Taken together, these results establish that ATC&C performance is governed by firm-specific capabilities—metering, governance, collection enforcement—rather than by the exchange rate directly.

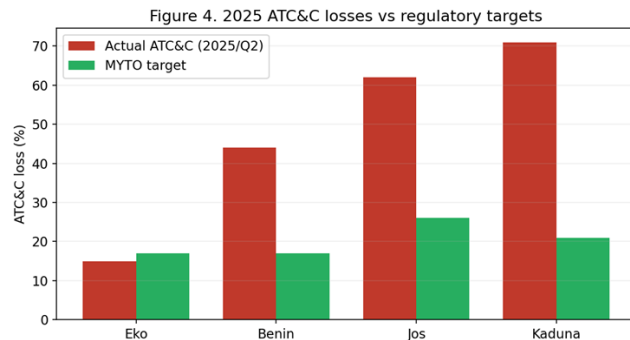


Figure 4. 2025 ATC&C losses against regulatory targets. Only Eko meets its target; Kaduna and Jos miss by wide margins, reflecting firm-level rather than macroeconomic determinants.

c. Reconciling the Two Channels

The findings dissolve the apparent paradox in practitioner commentary. FX volatility is genuinely central to the sector's distress, but it operates through finance and capital formation rather than through a mechanical effect on losses. Depreciation inflates dollar-linked costs and acquisition debt, widens the tariff shortfall, drains liquidity and—via the real-options channel—discourages the metering and network investment that would lower ATC&C over time. Firms with strong internal capabilities (Eko) convert enough cash to absorb the shock; firms with weak collection and currency-mismatched balance sheets (Kaduna, Benin's investor, Jos) are pushed toward insolvency. The exchange rate is thus a powerful amplifier of pre-existing firm-level strengths and weaknesses, not an equaliser.

d. Strategy, Leadership and Market Positioning

Across the four cases, the differentiators are managerial rather than macroeconomic. Effective DisCos pursued a coherent strategy—prioritise metering, protect revenue, enforce collection, and remit fully to preserve market standing and access to interventions such as the Mass Metering Programme. Leadership that treated the franchise as a commercial enterprise, invested in data systems and resisted the temptation to under-remit, positioned the firm favourably with the regulator and capital providers. Where leadership was unstable, governance weak and the balance sheet currency-mismatched, the same external shock proved fatal. This is the practical heart of the resource-based view: in a common storm, the seaworthiness of the vessel decides the outcome.

e. Practical Lessons and Contributions to the Sector

Read across the four franchises, the case evidence yields transferable lessons that extend beyond the individual firms. First, metering is the master variable: every documented improvement in cash conversion—most clearly at Eko—traces back to closing the gap between energy received and energy billed and collected, which is why the National Mass Metering Programme and the

Meter Asset Provider framework are the most consequential interventions for currency resilience. Second, the capital structure is as important as the income statement: the receiverships of Benin's and Kaduna's investors show that hard-currency-linked acquisition and capital debt can sink an otherwise functioning operation once the Naira moves, so financing design is a first-order risk-management decision, not a back-office detail. Third, regulatory credibility matters: the 2024–2025 shift toward more frequent, rules-based FX pass-through in the MYTO began to narrow the shortfall and signalled to investors that tariffs would track costs, illustrating how predictable regulation lowers the option value of deferring investment.

The study's contribution to the sector is therefore both diagnostic and prescriptive. Diagnostically, it reframes a debate that has conflated currency stress with operational failure, showing that the two are linked through finance rather than mechanically through losses. Prescriptively, it points operators toward the controllable levers—metering, collection and balance-sheet hedging—while directing regulators and government toward tariff indexation, targeted franchise reform and FX-risk de-risking. For an industry whose liquidity gap is projected to widen toward ₦6 trillion, distinguishing what currency policy can fix from what only firm-level capability and tariff design can fix is the precondition for any durable recovery.

Conclusion

Between 2000 and 2025 the Naira depreciated roughly fifteen-fold against the dollar, with disorderly jumps around the 2016, 2020 and 2023 policy shifts. This study set out to determine how that volatility shaped the operational performance of Nigeria's distribution companies, using Benin, Eko, Jos and Kaduna as comparative cases. The evidence shows that currency volatility is transmitted to the distribution segment predominantly through a financial channel—dollar-linked costs and acquisition debt, a widening tariff shortfall and chronic illiquidity—rather than through a direct effect on aggregate technical, commercial and collection losses, which are determined by firm-specific metering, governance and collection capabilities.

The near-perfect correlation between the exchange rate and the Federal Government tariff shortfall, set against the negligible correlation between the exchange rate and industry ATC&C losses, captures the core contribution of the paper: FX volatility is an amplifier of firm-level capability differences, not an indiscriminate leveller. Eko's disciplined, metering-led model allowed it to thrive and ultimately attract a premium buyer, while Kaduna's combination of the weakest collection base in the country with currency-mismatched acquisition debt drove it to board dissolution and forced sale; Benin and Jos occupy the instructive middle and structurally disadvantaged positions respectively. For policymakers and operators, the implication is clear—macroeconomic stabilisation is necessary but not sufficient; resilience to currency risk is built firm by firm, through capability, capital structure and tariff design.

Recommendations

A. For Distribution Companies

1. Prioritise metering and revenue protection. Accelerate deployment of smart and prepaid meters to close commercial and collection losses, the single most controllable determinant of cash conversion and the strongest buffer against FX-inflated costs.
2. Manage currency exposure on the balance sheet. Avoid unhedged hard-currency or FX-indexed acquisition and capital debt; where unavoidable, use natural hedges, longer tenors and risk-sharing clauses tied to the regulated FX pass-through.
3. Preserve market standing through full remittance. Sustained NBET and Market Operator remittance protects access to regulatory interventions, mass-metering funds and concessional finance.

B. For the Regulator (NERC)

1. Maintain timely, transparent FX pass-through in the MYTO. Frequent, rules-based minor reviews that update the ₦/US\$ assumption reduce the shortfall and the build-up of quasi-fiscal debt, as the 2024–2025 Supplementary Orders began to do.
2. Differentiate intervention by franchise viability. Structurally unviable franchises such as Jos and Kaduna require targeted capital, sub-franchising or service-based segmentation rather than uniform tariff treatment.
3. Tie subsidy disbursement to performance. Condition any residual subsidy on verified loss-reduction and metering milestones to align fiscal support with operational improvement.

C. For Government and Policymakers

1. Sustain exchange-rate stability and predictability. Consistent with IMF (2025) guidance, a credible, market-based FX framework that contains excess volatility lowers the option value of deferring investment and stabilises the tariff base.
2. Move decisively but equitably toward cost-reflective tariffs. Protect the poor through targeted lifeline bands while allowing the broader tariff to reflect costs, ending the unsustainable, largely unfunded subsidy.
3. Honour or restructure sector debt and de-risk hard-currency obligations. Clearing legacy shortfalls and providing FX-risk guarantees or local-currency financing windows would restore liquidity and crowd in the capital the network needs.

D. For Future Research

Future work should construct a complete, audited DisCo-level annual panel, distinguish official from parallel exchange rates in the explanatory variable, and apply dynamic panel methods to separate the direct, lagged and investment-channel effects of currency volatility from secular trends in operational performance.

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