IJAAR PUBLISHING®

African Journal of Business and Economic Development | ISSN: 2782-7658
Vol. 6, Issue 1 (March, 2026) | www.ijaar.org/ajbed

A CRITICAL ANALYSIS OF EXCHANGE RATE VARIATION AND ECONOMIC OUTPUT IN NIGERIA FROM 1999 TO 2026

By

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Abstract

This study examines the relationship between exchange rate variation and economic output in Nigeria from 1999 to 2026. Relying time-series data from the Central Bank of Nigeria, National Bureau of Statistics, World Bank, and International Monetary Fund, the analysis adopted the Autoregressive Distributed Lag (ARDL) bounds testing approach to assess both short-run dynamics and long-run equilibrium. Findings reveal a substantial negative short-run impact of exchange rate depreciation on real GDP growth, with a pass-through elasticity of –0.34 in the first year. In the long run, 10 per cent sustained depreciation reduces output by roughly 1.8 per cent, principally due to a high import dependence (over 60 per cent of manufacturing inputs imported) and low non-oil export diversification. The structural break in 2016 strengthened this negative relationship, while the post-2023 merger incidence has so far delivered modest output gains. Policy recommendations highlight productive-base diversification and a credible, unified exchange rate regime with a maximum quarterly depreciation below 2.4 per cent.

Keywords: Exchange rate variation, economic output, Nigeria, ARDL, structural break, currency depreciation

https://doi.org/10.46654/gz1hwy75

INTRODUCTION

From the inception of Nigeria's fourth republic which began since 1999, marking the end of military rule, exchange rate policy has wavered between managed floats, fixed adjustments, and multiple-window systems. From approximately ₦92/USD in 1999, the naira depreciated to over ₦1,900/USD in 2023–2024 – an aggregate decline exceeding 1,900 per cent (Central Bank of Nigeria, 2026). With the introduction of several reforms, the currency strengthened to close at ₦1,435/$ as at 31 December 2025, marking its first annual appreciation in 13 years by about 6.87 per cent (Comercio Partners, 2026, pp. 1-3). However, over the same period under review, real GDP growth averaged 4.3 per cent between 1999 and 2014 but declined to just 1.9 per cent between 2015 to 2025, before bouncing back to 3.87 per cent in 2025 (National Bureau of Statistics, 2026). As a result of the fact that the economy has become increasingly more import-dependent, the traditional export-boosting effect of depreciation (the Marshall-Lerner condition) has failed to work out. According to Central Bank of Nigeria, (2022, p. 45), Nigeria's estimated trade-balance elasticity is only 0.6, well below the unity threshold required for a positive net-export effect. This paper provides a detailed examination covering a period of 27 years, including the oil booms of 2000-2014, the recessions of 2016 and 2020, the COVID-19 crisis, and the 2023 exchange-rate unification, and it includes the most recent data for 2025-2026.

Literature Review

Theoretical Framework

Three main theories guide the analysis:

- Elasticities Approach: Depreciation improves the trade balance only if the sum of export and import demand elasticities exceeds one (Marshall-Lerner condition). For Nigeria, the estimated long-run elasticity is 0.6, implying that a one-per-cent depreciation reduces the trade balance (Central Bank of Nigeria, 2022, p. 45).
- Absorption Approach: Depreciation reduces real income when the import content of production is high (Alexander, 1952, pp. 263-278). Nigerian manufacturing relies on imported machinery, raw materials, and refined fuels, making the economy highly susceptible to adverse absorption effects.
- Monetary Approach: In a flexible-price setting, exchange-rate changes mirror relative money-supply growth, with only nominal long-run effects (Frenkel, 1976, pp. 200-224). Yet in Nigeria, price and wage rigidities generate real output effects, necessitating a structural-econometric framework.

Empirical Evidence from Nigeria

Earlier studies (2000-2014) found mixed results. Odularo and Adeniyi (2011, pp. 279-284) reported no long-run relationship, while Onwuka and Eze (2013, pp. 232-239) found a positive output effect after two years. However, post-2015 studies have reached a consensus of negative impact. Udeh, Ugwu and Onwuka (2019, pp. 55-64) estimated a short-run elasticity of –0.28. Babatunde and Olaniyan (2021, pp. 245-258) showed that a one-per-cent depreciation reduces industrial output by 0.45 per cent within six months.

More recent work using advanced time-series techniques confirms these findings. Kolawole and Seyingbo (2025, pp. 113-124) employed ARDL on annual data from 1990-2024 and found that inflation and exchange-rate changes had "inconsistent and short-lived effects,"

with significant path dependence – past GDP strongly affecting present growth. Oyadeyi, Osinubi, Simatele and Oyadeyi (2025, pp. 2-7) used threshold regression and established that a quarterly official depreciation beyond 2.4 per cent (or 2.5 per cent for the unofficial rate) becomes harmful to growth. Moses, Ademonon, Abubakar and Enweze (2025, pp. 2-4) reported an ARDL long-run coefficient of –0.0106 ($p = 0.0048$) for the effect of past GDP on current GDP, an interest-rate coefficient of –0.0364 ($p = 0.0004$), and an exchange-rate coefficient of +0.0168 ($p = 0.0778$) – the last indicating a weakly positive but statistically insignificant long-run effect, suggesting that depreciation may bring some long-run benefit if kept within tight bounds.

Literature Gap

Most of the existing studies on exchange-rate variation stop before the 2023 exchange-rate unification and the 2025-2026 stabilisation period. This paper fills that gap by extending the analysis to 2026 and by incorporating a qualitative assessment of the post-unification episode.

Methodology

This study adopts a quantitative, longitudinal research design to analyze the relationship between exchange rate variation and economic output in Nigeria from 1999 to 2026. An ex post facto causal-comparative approach is employed as a result of the fact that the independent variable (exchange rate movements) is not experimentally manipulable. Annual time-series data are sourced mainly from the Central Bank of Nigeria (2026) *Statistical Bulletin*, the National Bureau of Statistics (2026) *GDP Reports*, the World Bank (2025, 2026) *World Development Indicators*, and the International Monetary Fund (2025, 2026) *World Economic Outlook*.

To justify the probability that some variables are stationary at level while others are stationary at first difference, the Autoregressive Distributed Lag (ARDL) bounds testing procedure advanced by Pesaran, Shin and Smith (2001, pp. 289-326) is adopted. This technique is mostly appropriate for small-sample time series (27 annual observations) and produces both short-run dynamics (via an error-correction model) and long-run elasticities. In addition, the Zivot-Andrews (1992, pp. 251-270) unit-root test with an endogenous structural break is utilized to detect regime shifts – especially the 2016 forex restriction experience. Threshold regression results from Oyadeyi et al. (2025, pp. 32-36) are incorporated to identify optimal quarterly depreciation rates. Robustness checks include the substitution of the nominal exchange rate with the Real Effective Exchange Rate (REER) and a sub-period analysis (1999-2015 with the 2016-2025). All econometric estimations are executed using EViews 13 and Stata 18, with statistical impact assessed at the 1 per cent and 5 per cent levels.

Data

Periods: 1999 – 2025 (annual); monthly data used for robustness checks (2007-2025).

Sources: Central Bank of Nigeria (2026) *Statistical Bulletin*; National Bureau of Statistics (2026) *GDP Reports*; World Bank (2025, 2026) *World Development Indicators*; International Monetary Fund (2025, 2026) *World Economic Outlook*.

Variables:

- *Dependent*: Real GDP growth rate (*RGDPgr*)
- *Independent*: Official exchange rate (₦/USD, annual average) (*EXR*)
- *Controls*: Oil price (USD/barrel, Brent) (*OIL*), inflation (CPI annual %) (*INF*), monetary policy rate (*INT*), trade openness (exports+imports/GDP) (*OPEN*)

All variables were converted into natural logarithms with the exception of growth rates and percentages.

Model Specification

Following Pesaran, Shin and Smith (2001, pp. 289-326), the ARDL bounds testing approach is adopted:

$\Delta RGDPgr_t = \alpha + \beta_1 RGDPgr_{t-1} + \beta_2 EXR_{t-1} + \Sigma\gamma_i \Delta RGDPgr_{t-i}$

- $\Sigma\delta_j \Delta EXR_{t-j} + \theta Controls_t + \varepsilon_t$

An error-correction representation is estimated when cointegration is confirmed.

Structural Break and Threshold Analysis

Zivot-Andrews (1992, pp. 251-270) unit-root test with an endogenous break is used to identify the 2016 break (when forex restrictions was introduced). Additionally, the threshold regression of Oyadeyi et al. (2025, pp. 32-36) is used to benchmark optimal quarterly depreciation rates.

Robustness Checks

- Alternative measure: Real Effective Exchange Rate (REER)
- Sub-period analysis: 1999-2015 vs. 2016-2025
- Instrumental variables: lagged oil price for *EXR*

Results

The results are organised into seven subsections. First, descriptive statistics and correlation matrices provide an overview of the data properties and bivariate relationships. Second, unit-root tests (augmented Dickey-Fuller and Zivot-Andrews) establish the order of integration of each variable and identify potential structural breaks. Third, the ARDL bounds test confirms the presence of a long-run cointegrating relationship among exchange rate, economic output, and the control variables. Fourth, long-run elasticities derived from the ARDL model quantify the magnitude and direction of the effects. Fifth, the error-correction model (ECM) reports short-run dynamics and the speed of adjustment back to equilibrium. Sixth, the structural break analysis distinguishes the pre-2016 and post-2016 periods, comparing the estimated coefficients. Seventh, the post-unification period (2023-2025) is examined separately, with a counterfactual simulation to isolate the output impact of the 2023 depreciation. Finally, threshold regression results (adapted from recent literature) are used to develop optimal quarterly depreciation bounds. All significance tests are reported at the 1 per cent, 5 per cent, and 10 per cent levels, with standard errors corrected for heteroskedasticity where appropriate.

Descriptive Statistics (1999-2025)

Variable	Mean	Std. Dev.	Min	Max
RGDP growth (%)	4.0	3.1	–1.8 (2020)	8.0 (2002)
EXR (₦/USD)	403.2	468.1	92.5 (1999)	1,950 (2025)
Parallel premium (%)	12.4	18.3	0.1 (2005)	86 (2017)
Oil price (USD/bbI)	68.2	31.5	19.3 (1999)	114 (2012)

Source: Central Bank of Nigeria (2026); National Bureau of Statistics (2025).

The correlation between *EXR* and *RGDPgr* is –0.62 ($p < 0.01$), indicating a strong negative association. The parallel-market premium averaged 12.4 per cent but spiked to 86 per cent in 2017, reflecting the severe dislocation following the 2016 forex restrictions.

Unit Root and Cointegration

Unit-root tests (ADF and Zivot-Andrews):

EXR, *OIL*, *INF* are I(1); *RGDPgr* is I(0) at 5 per cent significance. The Zivot-Andrews test identifies a structural break in August-September 2016 (t-statistic = –5.92, $p < 0.01$), confirming the regime shift after the introduction of the 43-item import ban.

ARDL Bounds Test: F-statistic = 5.82 > upper-bound critical value (4.01) at 1 per cent → cointegration exists.

Long-Run Elasticities (ARDL)

Variable	Coefficient	Std. Error	t-statistic	p-value
EXR (log)	–0.183	0.042	–4.36	0.000
Oil price (log)	0.094	0.021	4.48	0.000
Inflation	–0.067	0.018	–3.72	0.001
Trade openness	0.022	0.009	2.44	0.018

Interpretation: A 10 per cent sustained depreciation reduces long-run real GDP by 1.83 per cent, holding other factors constant. This is consistent with the high import intensity of production and the low non-oil export elasticity. The positive oil-price coefficient (0.094) highlights Nigeria's continued dependence on oil revenue, even as the non-oil share of GDP reached 97.13 per cent in Q4-2025 (National Bureau of Statistics, 2026, p. 22).

Short-Run Dynamics (ECM)

$\Delta RGDPgr_t = -0.41\ ECM_{t-1} - 0.34\ \Delta EXR_t - 0.12\ \Delta EXR_{t-1}$

- $0.07\ \Delta OIL_t + 0.03\ \Delta INF_t$
- ECM term: –0.41 ($p < 0.01$) → 41 per cent of disequilibrium corrected annually.

Short-run elasticity: A 10 per cent depreciation in the current year reduces output growth by 3.4 percentage points (e.g., from a 3 per cent growth rate to –0.4 per cent).

Structural Break Results (Zivot-Andrews)

- Break date: 2016 (August-September window).
- Pre-break (1999-2015): Long-run *EXR* elasticity = –0.09 (p = 0.12, insignificant).
- Post-break (2016-2025): Long-run *EXR* elasticity = –0.31 (p < 0.001).

Thus, the negative output effect of depreciation tripled after 2016, as forex shortage and multiple exchange windows created insecurity and discouraged investment.

Post-Unification Episode (2023-2025)

In 2023, the naira depreciated from ₦461 to over ₦1,900 – a 310 per cent fall – before stabilizing. Real GDP growth decelerated from 3.1 per cent (2022) to 2.5 per cent (2023), then improved to 3.38 per cent (2024) and 3.87 per cent (National Bureau of Statistics, 2026, pp. 4-6). A counterfactual model suggests that without the unification depreciation, 2023-2025 average growth would have been 0.9 percentage points higher.

By 2025, many of the negative effects began to reverse. The naira closed the year at ₦1,435/, an appreciation of 6.87 per cent, supported by, *an appreciation of* 6.87 *per cent, supported by* 45.49 billion in gross external reserves – an 11 per cent increase from 2024 (Central Bank of Nigeria, 2026, p. 18). Monthly FX turnover rose by 56.4 per cent to about 8.6 billion in 2025, up from 8.6 *billion in* 2025, *up from* 5.5 billion in 2024 (Business Day, 2026, p. 35). Non-oil exports jumped from 2.696 billioninH1-2024to2.696 *billioninH*1-2024*to*3.225 billion in H1-2025 – a 19.62 per cent year-on-year growth – the first tangible export response to depreciation in two decades (The Eagle Online, 2025, p. 12). Foreign portfolio inflows neared $21 billion in the first ten months of 2025, a 70 per cent surge from 2024 (Comercio Partners, 2026, p. 30).

Threshold Analysis (Oyadeyi et al., 2025)

Applying the threshold regression results of Oyadeyi et al. (2025, pp. 32-36), the official exchange rate is not expected to depreciate by more than 2.4 per cent per quarter to be growth-enhancing. Between 2023-2024, quarterly depreciation often surpassed 10-15 per cent, well above this threshold, explaining the serious output losses in those years. Contrarily, throughout 2025, quarterly depreciation averaged less than 1.2 per cent, stable with the observed growth recovery to 3.87 per cent.

Discussion: Why Depreciation Hurts Nigerian Output

The following reasons respond to why depreciation hurts Nigerian Output:

High import intensity: Over 60 per cent of manufacturing inputs are imported (National Bureau of Statistics, 2024, p. 16). Depreciation directly raises production costs, which crushes margins, reduces output, or forces price increases that diminish demand.

Low export response: Non-oil exports (agriculture, solid minerals) face infrastructural and quality restrictions; the price elasticity of export volume is less than 0.2. Meanwhile, non-oil exports grew by 19.6 per cent in 2025, their portion of total exports remains under 15 per cent (National Bureau of Statistics, 2026, p. 8).

Currency substitution and hoarding: Once there is a weakness in the naira, domestic agents shift into dollars or foreign assets rather than invest in productive capacity, intensifying the harmful real effect.

Policy inconsistency: Frequent changes (pegged rate, I&E window, multiple windows, 2023 unification) construct uncertainty, deferring fixed investment. The 2016-2021 period of multiple exchange rates, with premiums as high as 86 per cent, was mostly destructive.

Comparison with Other Oil Exporters

In contrast with Indonesia which adopted a managed float and diversified manufacturing, after the 1997-98 crisis, depreciation in Indonesia improved output after six quarters (World Bank, 2025, p. 34). Nigeria lacks the productive base for such modification; the non-oil sector is controlled by low-productivity services, not tradable goods.

The 2016 Structural Break Explained

The Central Bank's introduction of 41 (later 43) items banned from official forex access in 2015-2016 pushed demand to the parallel market, where the premium flew to 86 per cent. This dual-rate regime stimulated rent-seeking, diverted foreign direct investment, and made long-term planning difficult. The long-run elasticity of output to depreciation moved from –0.09 (pre-break) to –0.31 (post-break), indicating that the same depreciation now resulted three times more damage because the economy was already distorted.

The Post-2023 Reforms: Successes and Persistent Challenges

The 2023 unification eradicated the official-parallel premium, which had exceeded 100 per cent. This was an essential first step. The 2025 results – first annual naira appreciation in 13 years, $45.49 billion reserves, growth at 3.87 per cent – show that credible, market-clearing rates can reinstate confidence. However, the World Bank (2026, pp. 4-6) warns that poverty rose from 56 per cent in 2023 to 63 per cent in 2025, equivalent to 140 million Nigerians below the poverty line, and inflation remains at 15.38 per cent (March 2026). The current account surplus narrowed from 9.2 per cent of GDP in 2024 to an estimated 4.7 per cent in 2025 (African Development Bank, 2025, p. 32). Thus, macroeconomic stabilization has not yet interpreted into broad-based prosperity.

Summary of Findings

Exchange rate variation has a significant negative long-run effect on Nigeria's economic output (elasticity –0.18). Short-run effects are larger (–0.34), suggesting hysteresis: output does not quickly recover after depreciation. The negative relationship intensified after 2016 and, despite the favorable effects of the 2023 unification, remains effective because the economy lacks supply-side flexibility. Depreciation that exceeds 2.4 per cent per quarter is robustly risky, as shown by threshold analysis.

Recommendations

i. Maintain a unified, credible exchange rate regime. Avoid reintroducing multiple windows. The 2025 experience of naira appreciation and improved liquidity should be locked in through continued transparency.

ii. Keep quarterly depreciation below 2.4 per cent. The threshold established by Oyadeyi et al. (2025) provides a clear policy anchor.
iii. Implement supply-side reforms before future depreciation. Improve power supply, transport logistics, and customs efficiency so that firms can substitute local inputs for imported ones.
iv. Expand export processing zones. Agro-processing and light manufacturing should be targeted to raise the non-oil export elasticity above the current 0.2.
v. Build fiscal buffers. The current reserve level of $50.45 billion (February 2026) provides 9.68 months of import cover, which should be preserved to prevent panic depreciation.
vi. Tighten monetary-fiscal coordination. Avoid monetising fiscal deficits; the reduction of the Monetary Policy Rate from 27 per cent to 26.5 per cent (February 2026) should be followed by further easing only if inflation remains on a downward path (Central Bank of Nigeria, 2026).
vii. Targeted social protection. With 63 per cent of Nigerians living in poverty, the gains from exchange-rate stability must be complemented by direct cash transfers or subsidised inputs for agriculture, otherwise reforms will lack popular legitimacy.

Limitations and Further Research

This study could not capture informal-sector output (estimated at 50-60 per cent of GDP), possibly concealing some resilience. Future research should use firm-level panel data to estimate mixed effects by sector, firm size, and ownership structure. In addition, the long-run effects of the Dangote refinery, which saved $10 billion in annual fuel imports (Dangote Group, 2025), require a full general-equilibrium analysis.

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