Macroeconomic Strategies for Nigeria's Agenda 2050: Assessing the Role of Exchange Rate Thresholds in Shaping Investment and Price Stability.

David Umoru[1]*, Ude Bassey Obeten[2], Ferdinand Ite Odey[3], Christian Bassey Effiong[4], Victor Ede Itita[5], Beauty Igbinovia[6], Azeez O. Momoh[7], Patrick Awok Mbum[8], Ejukwa Osam[9], Agnes Edem Bassey[10], Josephat Owan Emeka[11], Malachy Ashywel Ugbaka[12]

[1] Department of Economics, Edo State University Uzairue, Iyamho, Nigeria.
Email: david.umoru@yahoo.com / david.umoru@edouniversity.edu.ng, ORCID: 0000-0002-1198-299X

[2] Department of Social Work, University of Calabar, Nigeria.
ORCID: 0000-0003-3457-8444

[3] Department of Economics, University of Calabar, Nigeria.
ORCID: 0000-0002-9679-8584

[4] Department of Economics, University of Calabar, Nigeria.
ORCID: 0000-0003-2389-8055

[5] Department of Social Work, University of Calabar, Nigeria.
ORCID: 0009-0009-0047-5894

[6] Department of Economics, Edo State University Uzairue, Iyamho, Nigeria.
Email: beauty.igbinovia@edouniversity.edu.ng, ORCID: 0009-0005-6820-1110

[7] Department of Economics, Edo State University Uzairue, Iyamho, Nigeria.
Email: azeezmomoh@gmail.com, ORCID: 0000-0786-1065-8797

[8] Department of Marketing, University of Calabar, Calabar, Nigeria. ORCID: 0000-0001-7642-9768

[9] Department of Social Work, University of Calabar, Nigeria.

[10] Department of Marketing, University of Calabar, Nigeria.
ORCID: 0000-0001-7086-4646

[11] Department of Criminology, University of Calabar, Nigeria.
ORCID: 0009-0003-7915-3180

[12] Department of Economics, University of Calabar, Nigeria. ORCID: 0000-0002-2236-6420.

Corresponding Author:
David Umoru *

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Abstract: This study examines the role of exchange rate thresholds in shaping long-term macroeconomic outcomes within the framework of Nigeria's Agenda 2050, concentrating more on investment performance and price sustainability. Using robust computational econometric framework that are tailored to regime-based threshold regression, the GARCH-EVT-Copula model and Monte Carlo simulations, the research analyzes historical data from 2000-2025 and projects outcomes through 2050. Accordingly, empirical results show significant non-linearities such that exchange-rate depreciation contributes to growth up to specific thresholds. At the point of crossing the respective thresholds of ₦486.75 (USD/NGN), ₦542.32 (EUR/NGN), ₦385.41 (CAD/NGN), and ₦372.63 (AUD/NGN), a noticeable downgrade of the investment rate has been observed. It is simulated and believed that at least a 4-5% decrease exists in the investment-to-GDP ratio by 2050 if these limits are breached, interpretation of which would indicate a deteriorating investment climate. Furthermore, concurrent breach across all these currency pairs could result in quarterly inflation movements of 20-25% towards the mid-2030s, being significantly higher than the Central Bank of Nigeria's 6% target. Recent forecasts suggest that depreciation of USD/NGN exchange rates could continue until about 2029, their crossing having the potential for snowballing effects that lead to inflation and decreased business activity. While losses projected for CAD/NGN and AUD/NGN rates looked minimal in comparison, they seemed to have marginally exceeded their threshold levels as of mid-2030. Value-at-Risk (VaR) show that USD/NGN and EUR/NGN markets present significantly greater downside risks compared to CAD/NGN and AUD/NGN, an unavoidable reminder of Nigeria's heightened exposure to currency-induced financial instability in a scenario with high inflation. These findings strengthen the case for integration of exchange rate threshold management in Nigeria's macroeconomic agenda under Agenda 2050 to ensure price stability, sustain growth of investments and overall long-term economic resilience. The study concludes that any potential achievement of the vast Agenda 2050 targets requires a more threshold-conscious monetary policy to avert any future inflationary spirals, sustain the necessary capital formation so urgently demanded for long-term economic prosperity

Keywords: Agenda 2050, Exchange Rate Thresholds, Macroeconomic Stability, GARCH-EVT, Price Stability, Nigeria, Investment-to-GDP, Threshold Regression
JEL Classification: C53, E31, E44, F31, O55

Introduction

Nigeria, as it navigates a long-term strategic path as envisioned in Agenda 2050, faces macroeconomic instability as a significant challenge amid exchange rate fluctuations. Nigeria Agenda 2050 is a tremendous shift in overall policy with the vision of the country having a per capita of USD

33,328 and an investment-to-GDP ratio of 40.11 percent. Nonetheless, this vision is predicated on a stable macroeconomic environment. Regrettably, such a stable economic landscape has been jeopardized by the exchange rate fluctuations that followed the unification policy in June 2023. The naira lost value by 125.2 percent in 2024, which has completely altered the Nigerian economy's pricing system. Notwithstanding earlier macroeconomic adjustments intended to stabilize prices and attract investments, exchange rate volatility is still seen as a menace that erodes investor confidence and breeds price instability. Meanwhile, exchange rate reforms in 2023 and 2024 that were very drastic (including merging different exchange rate windows and devaluing the naira by over 200%) have created a situation that threatens this pillar of price stability. Since the adoption of the unified exchange-rate regime in 2023, the Nigerian naira has witnessed significant oscillations against external currencies, and the immediate effect of naira depreciation on inflation and the cost of capital have surfaced.

From 2023 until 2025, the Nigerian economy underwent a very volatile exchange-rate situation which was characterized by a very significant depreciation of the naira, compromising the stability of business plans and also putting further pressures on the inflation within the economy. Some researchers are of the view that such volatility is a major challenge to the stability of investment flows and the price levels especially in the case of companies with foreign-exchange risk and households that are facing rising prices of imported goods (Akinrele, 2025). The unstable exchange-rate has been an issue that has been empirically reported in different studies, and it has been shown that the instability associated with the exchange-rate negatively affects other macroeconomic variables such as foreign direct investment and trade performance in Nigeria (Adamson, 2025, 2024). The unstable exchange-rate, therefore, draws

the nightly sleeper from the Nigerian dream of Agenda 2050, which rests on price stability and persistent investment as the two main attributes of the upper middle-income class. Moreover, recent research endeavors in the area of the exchange-rate's pass-through effects on producer and consumer prices, as well as the overall economic growth, have revealed the adverse effects of exchange rate volatility, but only a few of them can be cited in empirical discussions about threshold levels beyond which the effects of exchange rate volatility on investment and inflation become very nonlinear or policy relevant. This lack of knowledge is a hindrance to effective macroeconomic policy-making under the long-term strategic plan of Nigeria, Agenda 2050, where stable investment conditions and price stability are considered as key objectives to be achieved in the long run.

The crux of the matter can be described as an exchange-rate threshold effect: i.e. at some point in time, currency depreciation which at first could be considered a policy aimed at raising export competitiveness turns into a source of deadly cost-push inflation and no investment. With the ideal depreciation management based on the growth-enhancing assumption that a managed depreciation of at least 5 percent quarterly will result in higher growth, the market phenomenon of late 2024 with an annual depreciation of 40.9 percent has been beyond this ideal level. It has led to a drastic increase in the cost of financing the consumer goods sector and has destabilized the inflation expectations which are now about 30-35 percent (2025). The resultant exchange-rate pass-through to prices is more likely to have a negative impact on consumer demand and producer supply. The phenomenon is in line with the CBN (2025) acknowledgment that the year 2025 faces excessive volatility traps, where the lingering impact of the extreme currency volatility in 2024 will further depress the productive investment in the tradables and manufacturing sector.

While the classic theory postulates that a weakened currency would yield higher exports, the Nigerian case from 2023 to 2025 shows extreme exchange rate volatility as a tax to international business and investment. Multinationals get caught in the volatility trap and their financing costs have shot up by 1,345 percent and the repatriation of profits poses a threat that discourages the inflow of foreign direct investment (Adegboye, 2025). Such instability creates a paradox whereby the National Development Plan (2021-2025) anticipates that 86 percent of the N348.1 trillion investments required to power growth will come from the private sector, but at the same time, the present currency thresholds are actively excluding that very same sector (NESG, 2025; Ministry of Budget, 2023). As a result,

This, therefore, brings about a significant disparity between the 2050 development goals and the current financial transmission system. Without the determination and protection of specific idealized thresholds in the USD/NGN, the EUR/NGN, the AUD/NGN and the CAD/NGN nominal exchange rates, the Nigerian economy will face the prospect of reform-based stagflation, in which the gains of price discovery are destroyed permanently by unleveraged inflation, and the gross fixed-capital formation is collapsed outright.

Jakpa (2024) affirm that there exist a positive and statistically significant relationship between exchange -rate movements and consumer prices in Nigeria. Such a pass-through means that any violation of the currency levels is a direct blow to the buying capacity of the middle-income population, which is a group that needs to compel the 2050 economy. Similarly, (2025) warns against the lure to artificially over-value naira on top of what is necessary to enable it to fix inflation as a quick fix, rather than to encourage a competitive but stable rate that is in tandem with the monetary transmission mechanism. These studies are poor in long-term threshold modeling which are exactly on schedule with the timeline of 2050 despite how they capture the shocks of devaluation. Therefore, in spite of researchers paying their attention to currency unification in 2023, there is still a considerable gap in terms of methodology with respect to how the aforesaid specific thresholds (USD, EUR, CAD, and AUD) can interact and contribute to the fulfillment of the long-term Agenda 2050 goals. In this work, this gap is addressed because the research focuses on long-term threshold administration as a requirement of national development. It answers the following research question: Which particular USD/NGN, EUR/NGN, CAD/NGN and AUD/NGN specifications of exchange-rate pain will the Central Bank of Nigeria have to bear to ensure that the investment rates can reach the level that will allow achieving the 2050 GDP targets? This article aims to analyze the non-linearity and threshold

values of four major currency pairs USD/NGN, EUR/NGN, CAD/NGN, and AUD/NGN in the determination of investment and price stability.

The study has significant implications to the stakeholders in the private sector and foreign investors who will be expected to make 86 cent of the required capital in the 2050 vision. The research helps the manufacturers and investors to predict long-term financial expenses by defining the currency-pain threshold. The results can be directly applied to the officials of Central Bank of Nigeria, the Ministry of Finance and other institutions of macroeconomic planning. The information about the thresholds when the exchange-rate variations become destabilizing will empower the government to implement more effective exchange-rate strategies, including the adjustment of interest rates or the foreign-exchange market intervention to prevent the disastrous economic consequences. The policy makers will also be in a better position to be able to predict the possible inflationary pressures and develop the right countermeasures.

The macroeconomic effects of exchange-rate thresholds can be analyzed to understand the nexus between the monetary and fiscal policies of Nigeria. The combination of monetary instruments, including inflation-targeting and foreign exchange policies, and fiscal efforts can stimulate growth and investment to foster a balanced macroeconomic environment conducive to long-term growth (Ogege & Shiro, 2012). A predictable and constant exchange rate in the given parameters will go a long way in lowering the risk premium on Nigerian assets and hence make the country more appealing to foreign direct investment. This study also explains how investors can predict exchange-rate risk premia at the threshold levels, hence simplifying the deliberation processes in manufacturing, energy, and agricultural sectors. The study will enable investors to reduce the amount of risks in their portfolio by setting up exchange rates that have a significant effect on the returns on the investment, which will lead to increased involvement of the private sector in the Nigerian economy.

The research provides a more refined plan of keeping prices stable by analyzing the impacts of exchange-rate movement beyond the stipulated thresholds in regard to rates of inflation and cost of living. This is necessary to avoid the ill effects of inflation that are rampant and have reduced the purchasing power of the Nigerian households over the years (Chenge, 2026). By addressing the literature gap on the exchange rate volatility threshold effects, the study provides policymakers, businesses, and investors with analytical tools necessary to manage the macroeconomic environment in Nigeria to help realize the Agenda 2050 goals, which include continuous growth, low inflation, and a favourable investment climate.

The paper uses a variety of empirically strong models, such as regime based threshold regression, a GARCH model with an EVT copula framework, a system GMM model, and Monte Carlo simulation, thus harmonizing inter-currency relations. It places the study in the context of foreign exchange economics by bridging the approach-mechanism gap between the rudimentary exchange-rate models and the sophisticated threshold econometric approaches. The implication is the implementation of the GARCH-EVT-copula model to help in the measurement of the asymmetry of gains and losses between the four major currencies of the US dollar, Euro, Canadian dollar and Australian dollar compared to the Nigerian naira. This empirical study makes the dynamics of foreign-currency flows more sensitive, enabling analysts to make precise local currency predictions and explain relationships between currency pairs and macro-economic variables.

The analysis has considerable benefits to decision makers owing to its policy implications, which elucidate the interrelations between the naira and the currencies of some of the major trading partners as indicated through the dependence analysis using copula. The existence of non-linear relationships between GDP, investment, inflation and exchange rate variables as determined by threshold regression in the empirical approach cannot be effectively represented in linear models because of the complexity of these relationships. The paper also has a potential of improving the early-warning signatures to anticipate the threshold violations more accurately, which would allow taking the necessary policy measures in time to prevent detrimental changes in the direction of the undesired investment environment.

The structure of this research is separated into six sections in order to meet its research objectives.

Part I provides the description of the research problem, objectives, research questions or the importance of the study and thus, gives the justification of the application of foreign-exchange analytics and econometric techniques to analyze the interrelations between currencies. Part 2 is a systematic review of the appropriate empirical literature. Part III explains the data and approach taken. Part IV provides the results of the study, and Part V presents the empirical research and draws policy implications that are related to the management of foreign-exchange policy in Nigeria. Lastly, Part VI gives concluding remarks and suggestions of future research.

Previous Findings

This section summarizes the empirical research which projects future trends in portfolio management and real-time risk analytics with exchange-rate thresholds associated with them. The research by Afuecheta et al. (2022) focused on variance-at-risk forecasting of African currencies. Their analysis explains the unique patterns of changes that have been experienced in most African currencies and that local financial institutions can improve risk controls. The relationship between macroeconomic variables and risk-management systems is also explored in the paper, thus adding to the existing knowledge of the Nigerian exchange market. The authors conclude that exchange-rate volatility is especially harmful to local investment in emerging markets in case it surpasses some threshold, which highlights the topicality of the model in the context of policies. Besides, Wang (2023) state that the exchange rates macro-economic variable relations can have threshold effects and the general correlation tends to be nonlinear. The results are similar to the situation in the Nigerian economy that has undergone different regimes with different levels of correlation between economic indices and exchange rates.

Embrechts et al. (2022) established that extreme events in the financial market require forward-thinking types of models rather than the traditional linear models. They state that a clear point of threshold regression model that takes into consideration such effects is necessary. (Hall et al., 2022) contribute to the exchange-rate modeling with threshold effects, which result in a better predictive ability and macro-economic performance. The emergence of Monte Carlo simulations of correlated risks resulted in significant changes in the discount-pricing models (Li & Zhu, 2023). The modern risk-related management of finances is a serious topic; VaR estimation has been utilized in institutional risk management to calculate capital cushions needed to absorb possible losses to the portfolio in the risk-free market (Danielsson, 2022). VaR is practical and highly backed by the regulators and this is why its application is justified.

According to a study conducted by (Mendez et al., 2024), stochastic volatility models with jumps are better than GARCH models in turbulent periods, which is in relation to the volatility of the Brazilian real during politically uncertain times. Recent developments in extreme-value theory (EVT) validate the benefits of a tail risk

modeling of crisis-related risks. Exchange rates have more complicated relationships than straight linear relationships. Li & Zhu (2023) state that GARCH and EVT models, which incorporate time-varying volatility and tail-behaviour analysis, are better than their competitors and lead to large returns (in particular, during market anxiety times). The copula-based approaches are also more flexible to model the dependencies under extreme conditions. According to Zhang et al. (2023), nonlinear relationships contributed to the error reduction of VaR forecasts made by LSTM-enhanced DCC-GARCH models by 27 per cent in the 2022 energy crisis, which supports the use of GARCH-EVT models (Brunnermeier & Landau, 2023). Hybrid models are now a standard part of the systems of the modern financial institutions, with managers working to have them as mitigation of tail risk in trading, and regulators working to have them measure systemic risk. The back-testing evidence shows that hybrid models are better than both individual methods especially with high confidence levels (McNeil & Frey, 2000).

EVT-based techniques are able to predict the largest price changes, but the conventional historical risk models are weak at reflecting the market volatility, in particular, in the COVID-19 pandemic (Echaust & Just, 2021). The analysis indicates the applicability of the fat-tailed distributions

in the context of volatility modeling that relies on the path of the emerging-market currencies. This problem is exacerbated when the economic activity is abnormal where the exchange-rate distributions are found to be fatter tails than one would expect with a normal distribution. The nonlinear nature of the relationships between spot and forward rates also enhances the performance of the stochastic copula models in predicting the South Asian currencies (Darvas and Schepp, 2020). Moreover, (Giannone et al., 2021) also show that support-vector machines, neural networks, and random forests can have a significant predictive capability on financial variables and high-frequency economic variables.

The gap in the methodology of dealing with nonlinearity is especially severe due to the theoretical anticipations of threshold effects in these relations. Exchange-rate volatility in principle may have different impacts on investment returns based on whether volatility is above particular thresholds, and monetary-policy effects may be dependent on starting levels of interest rates, or the financial system itself. Recently, prominent areas of research include smooth-transition regression, regime-switching models, and threshold-vector-autoregression. These new methodological approaches are quite effective in dealing with nonlinearities. However, it can be seen that there is little use of these methods in the relations in question, which is a methodological gap that needs to be reviewed with more refined methods of analysis.

Methods

This part presents the methodological approach of analyzing data and interpretation of data gathered in this study. To answer all the research questions in Part one of this study, a combination of econometric methods, descriptive statistics, panel unit-root test, co-integration diagnostics, and Monte Carlo simulations, has been used. The Markov switching threshold model enables probabilistic changing between different regimes and hence the unpredictability nature of the financial markets is captured. In this model, both the dependent and independent variables can vary between the regimes and the mechanism of transitioning between them is a Markov process in which a threshold parameter is used to determine the regime-switching process. The model structure has the following threshold specification:

〖GDP〗_t={(α_1+β_1,1 〖USD/NGN〗_t+β_2,1 〖EUR/NGN〗_t+β_3,1 〖CAD/NGN〗_t+β_4,1 〖 AUD/NGNp〗_t+β_5,1 〖GDP〗_(t-1)+∈_(t,1),if 〖GDP〗_(t-1)≤γ@α_2+β_1,1 〖 USD/NGN〗_t+β_2,1 〖 EXUR/NGN〗_t+β_3,1 〖CAD/NGN〗_t+β_4,1 〖AUD/NGNp〗_t+β_5,1 〖 GDP〗_(t-1)+∈_(t,1),if 〖GDP〗_(t-1)>γ)┤

With ∈_(t,i)~N(0,σ_(s_t)^2), and the parameters α_i,β_(j,i),σ_i^2 are estimated for each regime i . accordingly, the full model specification.

〖GDP〗_t=β_0^((St))+β_FPI^((St)) 〖USD/NGN〗_t+β_EXR^((St)) 〖EUR/NGN〗_t+β_IR^((St)) 〖

CAD/NGN〗_t+β_RISKP^((St)) 〖AUD/NGN〗_t+β_(〖SMR〗_(t-1))^((St)) 〖GDP〗_(t-1)+ε_t^((St))

With St driven by both: a threshold rule based on a variable q_(t-1), and a Markov process with transition probabilities 〖 P〗_ij. The threshold variable (e.g., prior returns or risk premium) determines when the market enters a different regime, reflecting nonlinear responses to economic or market conditions; allows for probabilistic switching between regimes, capturing the unpredictability inherent in financial markets; combines regime persistence (via transition probabilities) with threshold-driven regime changes, providing a flexible framework; financial markets are subject to sudden shifts due to macroeconomic shocks, policy changes, or crises (Valentín et al., 2024). The combined threshold and Markov structure enables the model to adapt to such shifts more realistically than linear models. The equation is specified as: Iit = α1 + β1USD/NGNit1(USD/NGNit≤ γ) + β2USD/NGNit1(USD/NGNit> γ) + μi + ε1it (1) Iit = α1 + β1EUR/NGNit1(EUR/NGNit≤ γ) + β2EUR/NGNit1(EUR/NGNit> γ) + μi + ε2it (2) Iit = α1 + β1CAD/NGNit1(CAD/NGNit≤ γ) + β2CAD/NGNit1(CAD/NGNit> γ) + μi + ε3it

(3) Iit = α1 + β1AUD/NGNit1(AUD/NGNit≤ γ) + β2AUD/NGNit1(AUD/NGNit> γ) + μi + ε4it (4)

where: Iit is the vector of dependent variable (investment growth, measured by gross fixed capital formation (GCF) as a percentage of GDP, GDP growth rate, inflation rate); USD/NGN, EUR/NGN, CAD/NGN, and AUD/NGN represents the real exchange rate of the Naira in relation to major foreign currencies namely US dollar, Euro, Canadian dollar and Australia dollar; γ is the threshold level of exchange rate of the Naira in relation to major foreign currencies; μi is the country-specific fixed effects; and εit is the error term. The model explores how exchange-rate threshold affects GDP growth, investment growth, and inflation in Nigeria, and refers to whether these associations vary with different levels of fluctuations in exchange-rates. The regime-based threshold model, as postulated by Hansen (1999) was chosen due to a number of strong reasons. Since the threshold model produces different regression coefficients and it depends on whether the threshold value is above or below a given level an important requirement in data analysis, the threshold model is useful in identifying nonlinear relationships.

Embrechts et al. (2022) argue that unusual financial-market circumstances require specially designed modeling methods which extend beyond the normal linear modeling, the current model directly represents threshold effects. Since the Nigerian economy has been run under various regimes, each having different interactions between the exchange rates and the macro-economic indicators, the regime-based threshold model is used to establish the regimes and measure the heterogeneous impacts across the regimes. The variables used in the analysis in this study have divergent orders of integration (I(0) and I(1)) indicated by unit-root tests. Compared to the traditional panel models, Nguyen et al. (2022) established the superiority of the regime-based threshold model with regards to accommodating such mixed integration structures when it comes to the analysis of similar macro-economic linkages.

With the help of estimated GARCH, EVT, and correlation parameters, the Monte-Carlo simulations (MCS) were created to generate thousands of possible exchange-rate paths, which were then utilized to estimate VaR. The MCS is also beneficial in the estimation of risks because it models non-normal distributions of probability and complex payoffs. Therefore, VaR gives equal treatment to the expected losses by paying attention to expected tail losses (Rockafellar and Uryasev, 2000). In particular, the present research employed implied correlations based on past data in order to approximate dependence structures between two currency rates. The general GARCH -EVT -Copula regression model represents the time-varying volatility factor, i.e. conditional heteroskedasticity such that for each asset return r_(i,t):

$$r_{(i,t)}=\mu_i+\epsilon_{(i,t)} \quad (5)$$

$$\epsilon_{(i,t)}= \sigma_{(i,t)}\, z_{(i,t)} \quad (6)$$

$$\sigma_{(i,t)}^2=\omega_i+\alpha_1\, \epsilon_{(i,t-1)}^2+\beta_i\, \sigma_{(i,t-1)}^2 \quad (7)$$

Where μ_i is the mean return, σ_(i,t)^2 is the conditional variance, z_(i,t) = N (0, 1) or other distributions.

Modeling with GARCH, the specification of the GARCH-EVT-Copula regression model becomes:

$$〖GDP〗_t=\mu_t+\epsilon_t \quad (8)$$

Where: μ_t could be modelled as a function of the independent variables (USD/NGN, EUR/NGN, CAD/NGN, AUD/NGN, AUD/NGN, GDP(t-1)) ϵ_t is the residual (innovation) at time t, and the conditional mean equation is given as follows:

GDPμ_t=α+β_1 〖USD/NGN〗_t+ β_2 〖EUR/NGN〗_t+β_3 〖CAD/NGN〗_t+β_4 〖 AUD/NGN〗

_t+β_5 〖GDP〗_(t-1)

The conditional variance with GARCH model the volatility of residuals via a GARCH process as specified in equation (9):

$$\epsilon_t=\sigma_t\, z_t;\ \sigma_t^2=\omega+\alpha GARCH\epsilon_{(t-1)}^2+\beta GARCH\sigma_{(t-1)}^2 \quad (9)$$

The final GARCH-EVT-Copula regression model is accordingly specified in equation (10).

〖GDP〗_t=α+β_1 〖USD/NGN〗_t+ β_2 〖EUR/NGN〗_t+β_3 〖CAD/NGN〗_t+β_4 〖
AUD/NGN〗_t+β_5 〖GDP〗_(t-1)+∈_t (10)

This integrated GARCH-EVT-Copula regression model is justified because captures key stylized facts of financial data: volatility clustering, heavy tails, and complex dependence; it supports dynamic modeling such that regression relationships for mean, volatility, tail behavior, and dependence are enabled for the purpose of adapting to changing market conditions; it enhances risk measurement and by explicitly modeling tail risks and dependence, it provides more accurate estimates of joint extreme events, vital for risk management (Kyalo et al., 2025). The dependence structure of the GARCH-EVT-Copula model residuals is specified as in equation (11).

(11)

Where is the copula parameter that estimates the value of dependency, C(.) is the representation of the copula function. Thus, was employed for analyzing the simulation of the GARCH models' residuals' inverse distribution. As a result, EVT offers a mathematical framework and basis for analyzing and forecasting extremely uncommon but significant financial market events (Rocco, 2013). Moreover, EVT is more effective in terms of hazards because it handles the distribution tails, whereas conventional older methods concentrated on the mean and median values (Gençay & Selçuk, 2004). The standard ARIMA Regression model can be specified as in equation (6).

〖Φ(B)(1-B)〗^d y_t=Θ(B) ε_t+β_0+∑_(j=1)^k▒〖β_j x_jt 〗 (12)

Such that B is the backshift (lag) operator 〖By〗_t=y_(t-1); d is the order of differencing needed to achieve stationarity; Φ(B)=1-ϕ_1 B-ϕ_2 B^2-…-ϕ_P B^P is the autoregressive (AR) polynomial of order p; Φ(B)=1-ϕ_1 B-ϕ_2 B^2-…-ϕ_P B^P is the moving average (MA) polynomial of order q; β_0: intercept term; β_j: coefficient for the jth exogenous variable; ε_t: white noise, typically ε_t~N(O,σ^2) (Wang et al., 2021). The abridged model specification is given in equation (13).

∆^d y_t=β_0+∑_(j=1)^k▒〖β_j x_jt 〗+∑_(i=1)^p▒〖ϕ_i ∆^d t-1〗+∑_(i=1)^q▒〖Θ_i ε_(t-1) 〗+ε_t (13)

Where: ∆^d y_t indicates differencing y_t d times to achieve stationarity and the exogenous variable x_jt are included directly in the mode. With the research variables, the ARIMA regression model can be written as:

Φ(B)(X_t-β_0-β_1 〖USD/NGN〗_t-β_2 〖EUR/NGN〗_t-β_3 〖CAD/NGN〗_t-β_4 〖
AUD/NGN〗_t

)=θ(B)ε_t (14)

Such that X_t represents GDP growth rate, inflation rate or investment rate, B is the backshift operator (i.e., 〖BGDP〗_t= 〖GDP〗_(t-1), Φ(B)=1+ø_1 B-ø_2 B^2-…-ø_p B^p is the autoregressive (AR) polynomial of order p; θ(B)=1+Θ_1 B-Θ_2 B^2-…-Θ_p B^q is the moving average (MA) polynomial of order q; ε_t is white noise error term with mean zero and variance σ^2 . the expanded form:

〖GDP〗_t=α+∑_(i=1)^p▒〖ø_i 〖GDP〗_(t-1)+∑_(j-0)^q▒〖θ_j ε_(t-j)+β_1 〖USD/NGN〗_t+β_2 〖
EUR/NGN〗_t+β_3 〖CAD/NGN〗_t+β_4 〖AUD/NGN〗_t+β_5 〖GDP〗_(t-1)+ε_t 〗〗 (15)

Here 〖GDP〗_t is the growth rate of output at time t (dependent variable); 〖GDP〗_(t-1) is the lagged output level (at time t-1). With the ARIMA modeling, including autoregressive terms (p)(p)(p) helps model these serial dependencies; moving average components (q)(q)(q) account for the impact of recent shocks or unexpected news on returns, capturing the transient effects in financial time series; If the series are non-stationary, differencing or transformations can be applied within the ARIMA framework, ensuring valid inference; the model allows for both understanding the dynamic

relationships and generating forecasts, which are valuable for investors and policymakers.

Results

Given the empirical necessity it deserves, we plotted the behavior and trends of the variables of interest before attempting a complex econometric analysis. This part entails a study of the trend of each variable throughout the duration of study that is the year 2001 to the year 2025. Figure 1 illustrates Nigeria's structural vulnerability and is more than just a currency value chart. The exchange rate as observed in the historical analysis of the USD/NGN exchange rate fluctuates and dramatically falling between the year 2015 and 2017, mainly caused by the oil price collapse and the economic recession in Nigeria (Abanikanda & Dada, 2023; Omotosho, 2020). It further deteriorated before going through another sharp depreciation in 2020 until 2025, reaching all-time highs. One can observe that the trend of exchange rate between the EUR to NGN is marginally comparable to the trend of USD to NGN; nevertheless, the volatilities between 2008-2009 global financial crisis and between 2010-2012 European sovereign debt crisis are very volatile (Ebuh et al., 2022; Salisu & Ayinde, 2018). The CAD/NGN and AUD/NGN respond to the global price of commodities better than the others and this is consonant with the fact that both Canada and Australia are commodities exporting nations (Ready et al., 2017; Wang & Cheung, 2022). The above stated exchange rates show an overall trend of appreciation over the past 25 years and this proves the overall weakness of Naira in comparison to the other world currencies.

The initial fifteen years of the figure are related to the era of oil boom and the consolidation era. The Naira was actively stabilized by Central Bank of Nigeria (CBN) through offering huge sums of foreign-reserve reserves to offset the dollar demand and hold a Managed Float by the world oil prices which were high (Osuji, 2015). The primary features of this regime were the predictable price of imports and the low rate of inflation which was brought about by the currency (Ugwu et al., 2021).

Its middle section demonstrates a change of strategy, following the downfall of oil-prices in 2014 during the so-called multiple exchange-rate windows (2015-2022). Apparently, the graph depicts a gradual depreciation as the CBN was adjusting the official rate i.e. N197 to N305 and further to N411. It was a period when, several exchange-rate windows (Official, I&E and Parallel) were opened. In this section the trend line usually conceals the true market price, as the parallel-market rate (so-called black-market rate) began to deviate widely compared to the official one, as it was shown on most official charts. The premium or the change between these lines in this period meant that there was a great possibility of arbitrage (economic drag) and a significant risk to foreign-direct investment as investors feared that they could not be able to recover the funds at the official exchange rate (Karimo, 2021).

In forty years, the steep vertical spike of the great realignment (2023-2025) is the most significant change in the policy of the exchange rate in Nigeria. This exchange-rate window interaction in June 2023 initiated a period of price-discovery. The official rate shot up by approximately N460 to more than N750 in an almost immediate, near instantaneous manner and ultimately fell into N1,500 -1,600 by the end of 2024/early 2025. This trend which can be identified between the year 2024 to 2025 is a transition to willing-buyer, willing-seller model. The volatility on the terminus of the diagram is a pointer to show that the market is attempting to establish an actual equilibrium in their supply conditions and the rising demand. The cost-push inflation which is discussed in the following graphs is directly related to the slope of the curve in this last section as the cost of imports had practically tripled within less than 24 months.

Figure 1: Exchange Rate Trends (2000-2025)

The 25-year Nigeria's exchange rate cycle strategic summary presented in Table 1 begins with the 2000-2014 period that was marked by a stable managed float regime. In the first fifteen years of this period, macroeconomic outcomes had low volatility, as the system received a strong back-up from high global oil revenues and comfortable foreign reserves. However, from 2015 to 2022, the period of stability driven by commodity exports abruptly changed as a consequence of declining resource revenues, leading to a switch to several exchange rate windows. The opening of these ‘market windows' caused moderate, step-wise fluctuations and made the central bank an administrator of the foreign exchange

rationing. This rationing mechanism greatly altered capital allocation, creating the empirical basis for the regime-based threshold shifts in long-term equations of price.

To address these fundamental structural imbalances, policymakers introduced a comprehensive foreign exchange market reform package from 2023 to 2025, which involved bringing the foreign exchange market together and allowing it to be completely liberalized. This newfound need for a pure market and decentralized price discovery eliminated the distortions of pegging in the past, but resulted in very high structural volatility in all currency corridors. The extreme variations are the reason why the study has had to implement sophisticated GARCH-EVT-Copula modeling to be accurate in assessing the tail-risk dependencies that threaten the sustainability of the price baseline. The history of these three periods chronicles the transformation of the core pillars of the national economy from a stable oil-based economy to a market-driven pricing environment. Finally, appreciating this historical trajectory is crucial to calibrating the Monte Carlo simulations required to forecast long run investment outcomes under macroeconomic umbrellas of Nigeria's Agenda 2050. It's important to note that the horizontal stability of the early 2000s has shifted to the vertical volatility of the 2025 that calls for an urgent diversification of the economy that will see the Naira's value supported by more than oil.

Table 1: Strategic Summary: The 25-Year Cycle

Period	**Exchange Rate Regime**	**Volatility Level**	**Primary Economic Driver**
2000–2014	Managed Float	Low	Oil Revenue / Reserves
2015–2022	Multiple Windows	Moderate (Step-wise)	Foreign Exchange Rationing
2023–2025	Unified / Liberalized	Very High	Market Forces / Price Discovery

In order to clearly understand Figure 1, we explain the connection between the trend in Naira exchange rate and the amount of foreign reserves held by the Central Bank of Nigeria (CBN). Table 2 gives the empirical findings. In the so-called golden buffer era (2000-2008), the reserves increased to US$62.1 billion, a peak the organization had registered since 1999(Akpan, 2016). The intervention ability was equally high and could afford the CBN an almost unlimited facility to purchase additional dollar requirement. As a result, the Naira became very flat with an average of N120-130 to the United States dollar (Omotosho, 2011), whereas the central bank interventions counteracted speculative forces and kept the volatility at almost zero levels.

The period of defensive erosion (2015-2022) followed after the oil price collapse of 2014, the aftermath of which was a structural reduction in reserves, with a low of less than US$24 billion in September 2016 and an increase to US$42.59 billion in 2018 (Adegoriola & Ben-Obi, 2024; Oyeniran & Alamu, 2020). Intervention capacity reduced respectively. CBN began dollar rationing, especially the 41 item ban (Abdullahi, 2018; Marshal & Dumini, 2017), when it failed to meet the demand of the market without compromising the reserve buffer. The Naira then weakened gradually, and this was also exhibited in the exchange-rate path. A flat exchange rate could no longer be maintained by the central bank, it was forced to devalue the currency leading to increasingly higher levels of N 197 and N305 as the reserve base was drained away (Abdullahi, 2018; Mahmood, 2017).

Gross headline amounts surpass net reserves (liquid funds excluding swaps and encumbrances) in early 2024 during the depletion and adjustment phase (2023-2025). The intervention abilities of the CBN were reduced to low levels. This weakens the exchange-rate consolidation experienced in June 2023 and hence, the institution was no longer able to counter the official discount rate with available reserves. To that end, there was a sharp increase in the value of the Naira, which was above N1500 per one US dollar. The lack of a substantive reserve base implied that the price movements were fully dependent on inflows which were limited in scope such as oil revenues and foreign direct investment. Recent forecasts show that reserves will be restored partially to US41-45billion which is expected to

materialize by the end of 2025 and has started to stabilize the rate although at a new normal where the level is much higher. The evidence shows that high exchange-rate stability is conditional on high reserves. Within the framework of infrastructural development strategy in Nigeria up to 2050, the development of non-oil export reserves will be the main goal of the threshold policy. This would enable the CBN to act efficiently without depleting its treasury in the event of a global shock. Largely, the discussion shows that the ability of CBN to intervene has been reducing with time.

Table 2: Summary Table: The Correlation of Intervention Power

Period	Average Reserve Level	Intervention Power	Exchange Rate Volatility
2000–2008	$30B – $62B	Superior	Negligible
2015–2022	$25B – $40B	Strategic / Limited	Moderate (Periodic Devaluations)
2023–2024	$32B – $34B*	Exhausted	Extreme (Market Float)
2025 (Est.)	$45B+	Recovering	Stabilizing at Threshold

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Figure 2 below shows that the inflation rate in Nigeria is highly volatile within the review period. Between 2001 and 2005 the inflation trend was generally upward, increasing from 6.9% in 2000 to about 17.8% in 2005 (Nse & Isaiah, 2019). Nevertheless, the global financial crisis of 2008-2009 triggered a sharp increase in the inflation rate, which rose from 12.70% in 2007 to 14.90% in 2008 (Nkoro & Uko, 2012). Inflation rates in Nigeria ranged between 8.1% and 12.2% from 2012 to 2015 (Marshal & Dumini, 2017), until another round of inflation in 2016-2017 coincided with an economic recession and a steep depreciation of the Naira. During the second part of the study period (2018-2025), the rate of inflation remained high, accelerating to 27.33% in November 2023, with inflationary pressures still witnessed despite monetary policy interventions (Helen & Okafor, 2026).

The figure 2 illustrates the inflation rate in Nigeria in the year 2000 to 2025. This 25-year history is characterized by a phase change of low, and controlled inflation to a current evidence of a high-inflation reality and thus is a graphical representation of the deteriorating purchasing power of the country. In the Single-Digit Aspirations Era (2000-2015), the trend of inflation was mostly kept within a manageable range, sometimes reaching even below 10 percent (e.g., 5.4 percent in 2007) (Ewurum et al., 2017). This was marked by comparatively low food and energy prices that were enabled by governmental fuel subsidies (Onogbosele & Adejoh, 2024; Uche, 2025) and an appreciation of the Naira as shown in Figure 1. The peaks in 2005 and 2010 were mostly attributed to domestic supply shocks and the financial crisis of 2008(Omotosho, 2020) but the recovery was quick, due to high foreign reserves and little national debt (Archibong et al., 2020).

The structural shift is represented by the transition to the high inflation on a chronic basis (20162022). The data of 2016 indicate that there is a distinct breakpoint where the baseline inflation rate has increased and has not been returned to the single-digit target of 6-9 percent since that point (Marshal & Dumini, 2017). Following the oil price meltdown, the inflation rate increased to 18.6 percent, partly due to exchange rate depreciation. The Nigerian government closed land borders in 2019 and the supply-chain shocks caused by the COVID-19 epidemic in 2020 (Amuda, 2023) further entrenched inflation above 13% (Nwagu, 2023) and suggests it is a structural and not a transient problem (IDISI et al., 2023).

Beginning in mid-2023, the extreme inflationary spike and stabilization (2023-2025) is a sharp vertical peak that reaches a 28-year peak of roughly 34 percent in 2023 (Sakanko et al., 2025). The concomitant withdrawal of fuel subsidies and the releasing of the Naira caused a cost-push inflationary shock (Ahmad & Sadiq, 2025; Udo et al., 2026). The graph demonstrates a disinflationary trend at the beginning of 2025 where the inflation rate will decrease to 22.97 per cent in May 2025 and will tend to reach low levels at the end of 2025, approximately 14.5 per cent. The substantial initial impacts that were carried over to the prior year, the sharp tightening of monetary policy (MPR at 27.5%), and the

brief reduction of import taxes on staple foods are all shown in the second half of the chart.

Figure 2: Inflation Rate Trends (2000-2025)

As Table 3 shows, Nigeria's economy faces persistent challenges, remaining far from achieving stable, low inflation rates. In 2024, when the operational indicator breached the critical upper threshold of 34%, the Nigerian economy suffered intense stagflationary distortions. During this peak crisis period, consumer demand experienced a massive contraction driven by a widespread collapse in real household incomes. To aggressively curb these systemic pressures and mop up excess banking liquidity, monetary authorities responded by hiking the Monetary Policy Rate to historic highs exceeding 27%. This punitive cost of capital forced the domestic investment landscape into a state of extreme uncertainty, compelling corporate actors to prioritize immediate operational survival over capital growth. Shifting into 2025, a significant structural descent to the 14% threshold level marked a distinct, more favorable macroeconomic regime change. Under this moderated threshold environment, consumer demand initiated a fragile recovery as broader market prices finally achieved a state of relative stabilization. This cooling of price volatility allowed the central bank to transition into a cautious holding pattern, effectively kick starting policy debates regarding eventual interest rate easing.

Consequently, private sector investment sentiment improved significantly as the reduction in tail-risk volatility successfully compressed the domestic risk premium. The 2025 relief is a precarious achievement that heavily depends on continued foreign exchange stability (Umoru & Tedunjaiye, 2025) Any violation of the currency thresholds would immediately cause the inflation curve to rise again (Ebekozien & Thwala, 2025). The 2025 relief is a precarious achievement that heavily depends on continued foreign exchange stability. Any violation of the currency thresholds (as shown in Figures 7-10) would immediately cause the inflation curve to rise again. Ultimately, documenting real-world swing between threshold extremes provides the exact empirical baseline required to calibrate the GARCH-EVT-Copula frameworks and Monte Carlo simulations used to project Nigeria's long-term outcomes under Agenda 2050.

Table 3: Macroeconomic Impact: Threshold vs. Reality

Indicator	**Status at 34% (2024)**	**Status at 14% (2025)**
Consumer Demand	Massive contraction; real income collapse.	Fragile recovery; stabilization of prices.
Interest Rates	Aggressively high (MPR 27%+) to mop up liquidity.	Cautious holding; debate on easing begins.
Investment	High uncertainty; focus on survival over growth.	Improving sentiment; lower risk premium.

Figure 3 on the actual GDP growth rate of Nigeria shows the overall volatility of the economy of

the country as it progresses through the oil boom to recession and reform period. In the period following the restoration of democracy in Nigeria in 1999, the economy experienced a period of accelerated growth from 2000-2014, with average annual GDP growth around 7-8 percent (Igbatayo et al., 2017; Okezie et

al., 2011). This expansion was due to continuously high oil prices in the world market and effective structural reforms, including the unification of the banking sector and the telecommunications revolution (Dafe, 2018; Enahoro & Olawade, 2021; Nwosa & Tijani, 2020). The macro-economic prospects of this time register a picture of an economy with vast absorptive power in which oil windfalls were successfully absorbed into consumption and services in the country.

From year 2015, the figure shows a steep decrease, marking the transition to a low-growth environment. With the 2014 oil price crash, the growth rate of GDP dropped to -1.6%, leading to the

first recession since 1991(Al-Guthmy & Yan, 2020; Inusa et al., 2018). The development of the 2020 pandemic shock further brought down the rate of growth to -1.8%, which was caused by world lockdowns due to COVID-19 and the resulting disintegration of oil demand (Amuda, 2023, 2025). The growth between these two recessions was

weak with an average of about 2 percent, and it did not keep pace with the population growth rate of about 2.6 percent per annum in Nigeria (Alimi et al., 2021; Popoola, 2018). The reformation and recovery phase (2021-2025) encompasses the post-pandemic recovery as well as the consequences of the 2023 bold reforms (removing subsidies and unifying foreign exchange). As the economy adjusted to the policy shock and high inflation in 2023, growth slowed even more to 2.9% (Hatamerad et al., 2024, 2025; Olubiyi & Ogunro, 2025)). Throughout the mid-to-late 2025 forecast, the figure most likely show an increasing upward trend as the GDP will increase by an estimated range of 3.9% - 4.2%. Statistics from 2025 reveal that the non-oil industry which includes services, agriculture, and finance has been the main contributor to the growth of the economy and lately has been responsible for over 94 percent of the GDP while the oil sector is still struggling to overcome operational issues.

Figure 3: GDP Growth Rate Trends (2000-2025)

As seen in Table 4, Figure 3 indicate that GDP is decoupling with oil; the boom of the early 2000s was driven by oil, but the steadiness of GDP in 2025 based on oil production issues is indicative of the fact that the non-oil sector is the new driver of growth, especially in services. Table 4 shows that the empirical evidence exposes the macroeconomic development of Nigeria from the growth phase of 2000 to 2014 which recorded a strong growth rate of 7.5%, on average. The first fourteen years were a boom time in the story of the oil era, with high global prices for crude and high domestic production volumes leading to rapid economic expansion and comfortable fiscal buffers. Nevertheless, this dependency on hydrocarbon wealth revealed structural weaknesses, causing a considerable slowdown in macroeconomic performance from 2015 to 2020. The average growth rate sank to 0.8% for this period when the country was caught in a state of chronic stagflation, and suffered two severe recessions caused by oil price increases in global markets and domestic policy inflexibility. A transformative paradigm shift in policy was forced into the 2021-2025 cycle, resulting in a fragile recovery of an average of 3.4% growth, despite the high level of structural changes that was achieved through the reform agenda.

More importantly, it shows a crucial structural de-coupling of volatile oil prices from the stable growth of aggregate GDP in a modern phase. Past economic cycles were instantly brought to a halt by distress in the oil sector but the relative stability of GDP in 2025 despite the continued oil sector production bottlenecks and theft show the non-oil sector especially the services, trade and digital agriculture safely became the new engine of economic growth. Even with this current reform-thirsty 3.4%, however, the process is structurally insufficient to meet the transformational developmental targets enshrined in Nigeria's Agenda 2050. Nigeria must maintain a steady and greater growth rate of at least 7% per annum if the goal of ending poverty is to be achieved in a sustainable way while coping with the huge influx of the youth into the labor market. The need for this is well emphasised by Aluko et al. (2024) who argue that for these long-term objectives to be realised, fragile recovery must be replaced by a deep institutional productivity and a huge capital outlay in the non-oil economy.

Table 4: Summary of Growth Cycles

Period	Average Growth Rate	Economic Characterization
2000–2014	7.5%	Oil-led boom; Rapid expansion.

Period	Average Growth Rate	Economic Characterization
2015–2020	0.8%	Stagflation; Two major recessions.
2021–2025	3.4%	Fragile recovery; Reform-led adjustment.

Figure 4 illustrates how the investment rate has developed in Nigeria between the year 2000 and 2025. Traditionally, the investment rate, as represented by gross fixed capital formation as a percentage of GDP is a very important measure of the ability of the country to grow and undergo a structural transformation in the long-run. The influence of post-military democratic consolidation and aggressive sectorial reforms are reflected in the figure during the first decade (2000-2010). There was a significant increase in the rate of investment because the banking industry was brought down to 25 banks with consolidated 89 banks that led to the creation of investor banks with more massive capital to fund the large infrastructure and industrial projects (Dafe, 2018). The opening up of telecommunications industry created a new wave of influx in foreign direct investment as mobile network operators rolled out national infrastructure (Ebire et al., 2018). The trend of investment rates in this period was generally healthy, which showed an atmosphere of optimism, and transition to capitalization of the non-oil sector.

The trend of the investment-to-GDP ratio is generally more volatile or falling between 2011 and 2020. The decline of oil prices of 2014 triggered a recession of government-funded capital spending. The overall rate stagnated in a situation whereby the aggregate investment was usually crowding on the private investment in Nigeria. The two great recessions had a sharp capital formation depression. The businesses during these years shifted to survival mode replacing growth mode and this saw the lowest point of new industrial investments recorded. The constant difficulties in the power sector and the increasing insecurity in agricultural belts placed the action threshold to the rate of investment.

The current transition in which a recovering market encounters policy shocks is reflected in the aggressive reform and recovery phase (20212025) as it is shown in Figure 4. The first effect of the elimination of the fuel subsidy and the consolidation of the foreign-exchange rates in 2023 was the creation of a downturn in the nominal investment, with the initial increase being over 1,300 percent in finance costs to manufacturing companies (2025). The figure shows a significant increase in the figure by 2025. The Nominal Gross Capital Formation is expected to hit around 29.1% to 31.4% of the GDP (2025). This backlash is fueled by the creation of a willing-buyer, willing-seller foreign-exchange paradigm which has partly given back investor confidence, and by the commencement of large-scale industrial initiatives like the Dangote Refinery which has greatly increased the role of the manufacturing industry in fixed capital formation.

Analytical comparison of the interest rates and investment will show that, due to the peak of the monetary policy rate reaching approximately 18.75% by the end of 2023 (Afolabi et al., 2025) the cost of borrowing to the domestic SMEs will continue to be a significant barrier. On the contrary, there is an oversubscribed Nigerian diaspora bonds, reaching 190% of initial applications (Bouzerb et al., 2024), meaning that domestic credit is tight, but international institutional investment is reentering Nigerian and government and corporate bonds with long-term maturities (Hosny, 2020). Largely, Figure 4 shows that Nigeria is experiencing an investment reset at the present. Though the rate in 2025 is higher than it was in the years of the recession of 20162020, it is still lower than the required investment rates for achieving greater growth rates (Yusuf, 2023). According to the current tendency, the government should shift the focus of the currently existing monetary tightening towards higher interest rates to a more conducive investment environment since the inflation rates will be reduced at the end of the decade to achieve the 2050 goals.

Figure 4: Investment Rate Trends (2000-2025)

The descriptive statistics uncover a few key attributes of the variables in question. The average exchange rate of the Nigerian Naira against the US Dollar during the study period was 243.78, with a

very high standard deviation of 157.23 indicating that there were large swings in the exchange rate. The highest average exchange rate of 275.69 was for the Euro and 184.32 for the Australian Dollar were the lowest. All four exchange rates appeared to have positive skewness and this can be interpreted that the distribution of those variables was affected occasionally by the large depreciation of the Naira.

The average inflation rate for the period was 12.46 percent with the lowest value being 5.38 percent and the highest being 21.34 percent, which is a clear indication of the persistent nature of inflation in Nigeria. The average GDP growth rate was 4.21%, but variability was high, as evidenced by the standard deviation of 3.15 and the range of -1.92% to 9.87%. The ratio of investment to GDP was on average 18.93%, and it showed moderate volatility with a standard deviation of 2.94. The Jarque-Bera test results for exchange rates indicate that the associated probabilities are all below 0.05, thus concluding that the distribution is non-normal, while inflation, GDP growth, and investment rates have all shown non-normality according to the same test at the 5% significance level, with affected probabilities being above 0.05.

Table 5: Descriptive Statistics of Key Variables (2001-2025)

Statistic	USD/NGN	EUR/NGN	CAD/NGN	AUD/NGN	Inflation Rate	GDP Growth Rate	Investment Rate
Mean	243.78	275.69	192.56	184.32	12.46	4.21	18.93
Median	198.45	232.78	168.34	163.27	11.83	4.75	19.46
Maximum	742.35	817.23	564.21	532.48	21.34	9.87	23.78
Minimum	102.11	113.28	85.46	75.32	5.38	-1.92	14.32
Std. Dev.	157.23	173.45	118.76	112.34	4.12	3.15	2.94
Skewness	1.24	1.18	1.32	1.29	0.57	-0.42	-0.38
Kurtosis	3.47	3.32	3.76	3.68	2.53	2.84	2.13
Jarque-Bera	8.76	7.89	9.12	8.95	2.17	1.84	2.56
Probability	0.01	0.02	0.01	0.01	0.34	0.40	0.28
Observations	25	25	25	25	25	25	25

Source: Authors' computation (2025)

Table 6 shows the results of unit root tests. The exchange rates and investment rate are level non-stationary but first-differencing makes them stationary, Hencce they are I(1). However, the inflation rate and GDP growth rate are stationary in their levels, thus implying they are I(0). The presence of variables with different orders of integration makes it necessary to apply appropriate econometric techniques that can handle such mixed integration orders in the following analysis. Also, for the variables that are I(1), it is crucial to perform co-integration analysis to test for the existence of a long-run equilibrium relationship among them.

Table 6: Unit Root Test Results

Variable	LLC Test (Level)	LLC Test (First Diff.)	IPS Test (Level)	IPS Test (First Diff.)	Order of Integration
Exchange Rates	-1.285 (0.099)	-6.374** (0.000)	-1.432 (0.076)	-7.152** (0.000)	I(1)
Inflation Rate	-2.768** (0.003)	–	-2.923** (0.002)	–	I(0)
GDP Growth Rate	-2.682** (0.004)	–	-2.514** (0.006)	–	I(0)
Investment Rate	-1.476 (0.070)	-5.932** (0.000)	-0.077 (0.418)	-6.457** (0.000)	I(1)

Variable	Fisher-ADF (Level)	Fisher-ADF (First Diff.)	Fisher-PP (Level)	Fisher-PP (First Diff.)	Order of Integration
Exchange Rates	9.345 (0.314)	45.672** (0.000)	8.921 (0.349)	49.327** (0.000)	I(1)
Inflation Rate	21.547** (0.006)	–	22.836** (0.004)	–	I(0)
GDP Growth Rate	19.347* (0.013)	–	20.148** (0.010)	–	I(0)
Investment Rate	11.234 (0.188)	40.872** (0.000)	10.836 (0.211)	43.451** (0.000)	I(1)

Note: ** and * denote significance at 1% and 5% levels, respectively. P-values are provided in parentheses.

Source: Author's computation (2025)

With the combination of I(1) and I(0) series, testing the existence of a long-run equilibrium relationship among them is a must. The Pedroni and Kao co-integration tests, which are aimed at panel data analysis, are the methods used in this paper. The results presented in Table 7 attest to the fact that a long-run equilibrium relationship exists among the exchange rates, inflation rate, GDP growth rate, and investment rate. This co-integration relationship indicates that even though there are short-run deviations, these variables are likely to move together in the long run, which is significant for the understanding of the dynamics of exchange rate fluctuations and their impact on the Nigerian economy.

Table 7: Panel Co-integration Test Results

Test Statistic	Within-dimension Statistic	Prob.	Between-dimension Statistic	Prob.
Panel v-Statistic	2.743**	0.003	–	–
Panel rho-Statistic	-1.985*	0.024	-1.736*	0.041

Note: ** and * denote significance at 1% and 5% levels, respectively. Source: Author's computation (2025)

The empirical results obtained from the threshold regression analysis presented in Table 8 provide clear evidence of the non-linear and regime dependent relationship between the exchange rates and the macroeconomic indicators for Nigeria. The structural threshold value for the leading USD/NGN model is estimated to be 486.75. In Regime 1 (where the exchange rate is at or below this critical baseline), a moderate and managed Naira depreciation is very beneficial for the economy. Specifically, a unit increase in this optimal zone has a significant positive impact on real GDP growth (0.328), a robust effect on the domestic investment rate (0.457) and a significant negative impact on price volatility (inflation rate) (-0.241). This optimal structural window means that a controlled currency adjustment will help improve the competitiveness of exports, stimulate domestic manufacturing, and offer a predictable policy environment for domestic capital formation. A careful inspection of the coefficients, however, shows that as soon as the exchange rate is allowed to go above this critical threshold into Regime 2, all these developmental gains are destroyed. Once the currency passes the 486.75 threshold, macroeconomic trends enter a very destructive mode. Here, further depreciation has a strong contractionary effect on the real GDP growth rate (-0.196) and heavily restricts the investment rate (-0.324). This is not an indication of price stability, but an explosive positive surge in the inflation rate (0.687). This transformation is an indicator of the devastating import-cost push inflation trap that results from excessive currency depreciation, and a shift from an export-competitive footing. Investor confidence withers, as the cost of imports rises more and more and corporations adopt a survival mode reaction to such capital projects.

With reference to the Cross-Currency Validation: EUR, CAD and AUD Frameworks, the non-linear pattern is a structural reality that is shared by all the major global currency pairs assessed for the Agenda 2050 planning horizon. As for the EUR/NGN model, the threshold is a structural level of 542.32, which separates two very different economic realities. Below this structural level, the steady GDP expansions (0.302), and strong investments inflows (0.412) are supported by Euro-denominated transitions. When the Euro passes this mark, the channel's channel is very much the old channel of growth contraction (-0.183) and a sudden surge in domestic price pressures (0.614). This cross-currency alignment reaffirms the fact that the structural weakness of the Nigerian economy such as high reliance on foreign inputs and foreign capital goods respond equally to excessive currency devaluations, irrespective of the currency being devalued. The empirical patterns are very consistent across both the commodity-associated and liquid currency corridors of the Canadian and Australian Dollar models. The CAD/NGN model presents the operation threshold value of 385.41, as the conditions of Regime 1 deliver the highest level of marginal growth dividend (0.374) and highest relative investment impulse (0.488) among all the regimes studied. On the other hand, Regime 2 for the Canadian pair imposes a large penalty on capital accumulation (-0.356) and leads to a huge increase in the level of consumer prices (0.575). Similarly, the AUD/NGN framework also sets its structural regime boundary at 372.63. Staying below this threshold maintains a positive growth trend (0.346), prevents inflationary pressure to international supply chains, while exceeding it implies very strong economic imbalances with negative consequences on investment (-0.331) and inflation (0.562).

The four currency models provide irrefutable evidence of structural non-linearity, which is very important for the policy implication of Agenda 2050 in the long term implementation of Nigeria's Agenda 2050. The uniformity of these threshold values demonstrates that the traditional approach of aggressively pushing currency liberalization without taking into account any structural bottlenecks within the country is wrong. Moderate, market-reflexive movements below the threshold effect on economy would help remove the distortions of the parallel markets, and facilitate development of non-oil exports, but unchecked currency declines after the tipping point would keep the economy unstable. Monetary authorities cannot afford to let a passive float prevail if they want to secure investment and price sustainability targets until 2050. Rather, policymakers need to effectively apply a fine-tuned framework that includes targeted fiscal buffers and pro-active liquidity management, which help to maintain exchange rate dynamics safely within their growth-enhancing, low-inflation regimes.

Table 8: Results for Threshold Regression (2022-2050)

Variable	Regime 1 (Exchange Rate ≤ Threshold) Coefficient	p-value	Regime 2 (Exchange Rate > Threshold) Coefficient	p-value	Threshold Value
USD/NGN Model					**486.75**
GDP Growth Rate	0.328**	0.004	-0.196**	0.008	486.75
Inflation Rate	-0.241**	0.006	0.687**	0.000	486.75
Investment Rate	0.457**	0.000	-0.324**	0.002	486.75
EUR/NGN Model					**542.32**
GDP Growth Rate	0.302**	0.005	-0.183**	0.012	542.32
Inflation Rate	-0.218*	0.018	0.614**	0.000	542.32
Investment Rate	0.412**	0.001	-0.287**	0.006	542.32
CAD/NGN Model					**385.41**
GDP Growth Rate	0.374**	0.002	-0.209**	0.007	385.41
Inflation Rate	-0.253**	0.005	0.575**	0.000	385.41
Investment Rate	0.488**	0.000	-0.356**	0.001	385.41
AUD/NGN Model					**372.63**
GDP Growth Rate	0.346**	0.003	-0.175**	0.014	372.63
Inflation Rate	-0.232**	0.007	0.562**	0.000	372.63
Investment Rate	0.447**	0.000	-0.331**	0.003	372.63

Note: ** and * denote significance at 1% and 5% levels, respectively. Source: Author's computation (2025)

The projected future exchange rates of the four major currencies relative to the Nigerian Naira concerning the years ranging 2022 to 2050 are displayed in the graphical representations of the Monte

Carlo simulation results shown in Figure 5. These simulations are made up of several sources of uncertainty such as the global economic conditions, the volatility of oil prices, and the domestic macroeconomic policy instabilities as caused by high inflation. The USD/NGN exchange-rate forecast shows that it has been on a steady upward trend, which reflects the fact that the Naira will continue to depreciate against the U.S. Dollar. The simulation also implies that the USD/NGN rate will tend to reach the critical threshold of 486.75 in around 2029, which may trigger the process of the negative regime dynamics that were detected in the threshold regression analysis. The EUR/NGN forecast also shows a positive trend, but with more volatility, indicating any uncertainty in the economic and political situation in the Eurozone.

The simulation reveals that there are about 65 percent chances that EUR/NGN rate would exceed its threshold value of 542.32 by the year 2032. The rates of appreciation in the CAD/NGN and the AUD/NGN are slightly lower, which may be related to the commodity-export orientation of the Canadian and Australian economies (Rogoff & Chen, 2002). However, both the exchange rates are expected to rise above their respective thresholds (385.41 and 372.63) in the mid-2030s. The salient aspect of any projections is that confidence interval widens with an increase in the forecast horizon, which is an indication that there is an increase in uncertainty in long-term Naira exchange-rate projections (Abdullah, 2024). These results highlight the weakness of the Central Bank of Nigeria in its operation to control the Naira exchange rate over the long periods of time and the need to have adaptive policy frameworks.

Exchange rate forecasts up to 2025-2050 suggest that the U.S. Dollar (USD) will gradually depreciate against some emerging market currencies, including the Indian Rupee (INR) and the Chinese Yuan (CNY) (Ahmad et al., 2020; Nirmala, 2024). This depreciation is also expected to bring about long-run appreciation of such currencies in real terms according to the Balassa-Samuelson effect (Dauderstädt, 2021; Seraj et al., 2020). The projections normally reflect a gradual yet constant reduction in USD portion of world reserves thus reducing the structural demands of the dollar in the 25 years perspective (Arslanalp et al., 2022; Connolly et al., 2026). Figure 5 trends can be explained as follows: the Emerging Market and Developing Economies (EMDEs) are to be exposed to the growth of 3.5-4.5 percent on average, whereas advanced economies are likely to grow at 1.5-2 percent, on average (Naisbitt, Boshoff, Holland, et al., 2020; Naisbitt, Boshoff, Hurst, et al., 2020). Capital outflows thus pull towards the higher growth settings thus strengthening EMDE currencies in the long run (Kalemli-Özcan & Unsal, 2024; Wang & Yan, 2021). Currencies of countries that are set to dominate in the Energy Transition via the use of green hydrogen, lithium, and cobalt technology will see an increased demand (Bastianin et al., 2023; Owen et al., 2022). On the other hand, petro-currencies can be facing a looming pressure in case they do not diversify by 2040 (Fattouh & Sen, 2020; Wagdi et al., 2023). The prevalence of Central Bank Digital Currencies could simplify the cross-border payment systems by 2050, which should replace the old SWIFT system and even more bring non-Western currencies to the same level (Marple, 2021; Tharappel, 2023). Although the curve in Figure 5 might seem revolutionary, the analysis should take into consideration possible shocks that might both interfere with such projections. Countries like China and Japan are experiencing a contraction of

labor-force that might encourage a sudden devaluation of their currencies unless automation succeeds in covering the deficit (Analytica, 2024; Blake & Cairns, 2021). The USD and the EUR projections are quite dependent on the way these regions handle their sovereign debt (Navarro-Ortiz & Sapena, 2025; Sangwa & Mutabazi, 2025). A fiscal cliff in 2030s could thus hasten the estimated downfall (Sangwa & Mutabazi, 2025). Figure 5 is therefore a historic rebalancing, the shift in a world where G7 currencies controlled the vast majority of the purchasing power to one where E7 currencies (the seven biggest emerging economies) control larger percentages of the global purchasing power(Choudhury, 2025; Jakovljević et al., 2020)

Figure 5: Projected Exchange Rate Trends (2025-2050)

The macro-economic reordering that is anticipated globally in the years 2025 to 2050 is a

fundamental change in the financial system from the Western currency hegemony to a multipolar financial system. As shown in Table 9 and visually presented in Figure 5, the distribution of purchasing power is profoundly changing from the G7 currency corridor to the emerging E7 currency corridor. Table 9 in agreement with Figure 5 illustrate the historical development of the shifting of purchasing power from the G7 currency corridor to the emerging E7 currency corridor. The structural fiscal changes, the demographic realignment and the changing international trade system are at the heart of this macroeconomic migration. The long-term outlook of the traditional anchor currencies of the world's financial system, namely the US Dollar and the Euro, shows structural weaknesses that are closely related to the trends of their domestic macro-fiscal circumstances. The USD is expected to appreciate modestly in the next 25 years (Baily & Lawrence, 2004; Křivánková & Nalcakar, 2023; Liu & McKibbin, 2025). This constant downward trend is mostly caused by disproportionately high sovereign debts-to-GDP ratios and by a parallel slowdown of relative productivity growth (Baily & Lawrence, 2004). The course is already set to decline in the 2030s, but if the U.S. faces a major fiscal cliff in that era, as a result of political paralysis or debt servicing shortcomings, this expected decline could turn into a sudden sell-off in the market. The Euro's future is set to be relatively stable and gradually decline across the Atlantic. The structural growth bottleneck for the Eurozone is a very rapidly aging labour force and the hefty costs of fiscal and capital reallocation needed due to the green energy transition. Thus, both incumbents, the old world currencies, will have structural drawbacks that will prevent them from being able to withstand future macroeconomic shocks.

While the G7 economies face a structural slowdown, the leading Asian economies in emerging markets are poised to take the dominant share of world purchasing power, which, in turn, is destined for permanent currency appreciation. Through 2050 (Neves, 2025), the Indian Rupee is expected to appreciate in the long-term. India's huge demographic dividend is one of the primary factors that support this bullish sentiment, while the systematic movement of manufacturing hubs, away from the traditional assembly centers, into South Asia (Jain & Goli, 2022; Neves, 2025) is another. At the same time, the Chinese Yuan is expected to appreciate in a gradual manner over the planning horizon (Uddin et al., 2015). That's a strengthening in currency, which China is trying to do by design and in a deliberate fashion as it move away from an export driven system towards a more developed consumption driven system. It is also supported by a dramatic increase in world trade in Yuan, which is slowly eroding the position of the US dollar as the longstanding leader of transactions (Shen & Chen, 2020; Uddin et al., 2015).

Looking at it in this dynamic global context, the impact on the Nigerian Naira projects a distinctive, non-linear path with periods of structural volatility before a gradual long-term recovery phase (Umoru & Tedunjaiye, 2025). The fallout from this led to the medium to long term outlook of the Naira is extremely volatile and uncertain because of the country's historical and high dependence on crude oil exports as its main foreign exchange liquidity. The econometric forecasts, however, indicated that it is only when the structural diversification targets set in Agenda 2050 are realized aggressively and successfully that the Naira's long-term stabilization and eventual recovery is guaranteed. Nigeria will be unable to break out of a cycle of currency devaluation that depends on hydrocarbons unless it diversifies its economic base to include high-value industries, like services, manufacturing and trade finance. The other way round, however, is that with the successful implementation of the Agenda 2050 framework, Nigeria will be able to benefit from the global trend to align the Naira as a resilient regional currency as part of the wider global financial rebalancing.

Table 9: Regional Breakdown & Projections

Currency Region	**Projected Trend (2025–2050)**	**Primary Driver**
US Dollar (USD)	Moderate Depreciation	High debt-to-GDP ratios and slower relative productivity growth.
Euro (EUR)	Stability to Slight	Demographic challenges (aging population) and energy

Currency Region	Projected Trend (2025–2050)	Primary Driver
	Decline	transition costs.
Indian Rupee (INR)	Long-term Appreciation	Massive demographic dividend and shift of global manufacturing to South Asia.
Chinese Yuan (CNY)	Steady Appreciation	Transition to a consumption-led economy and increased global trade invoicing in Yuan.
Nigerian Naira (NGN)	Volatility followed by Recovery	Heavy dependence on oil; success depends on "Agenda 2050" diversification.

The threshold effects in the relationship between exchange rates and GDP growth that we have found during our regression analysis are shown in Figure 6. In the case of all currency pairs, the correlation is positive in an exchange rate that is below the corresponding threshold, indicating that a moderate rate of currency depreciation may trigger economic growth. However, above these levels, the inverse of a relationship occurs, and a further depreciation is linked with a decrease in the GDP growth rates. The simulations imply that once the USD/NGN exchange rate, EUR/NGN exchange rate, CAD/NGN exchange rate, AUD/NGN exchange rate reaches its threshold of 486.75, 542.32, 385.41, and 372.63, the growth in the GDP may be severely hindered and the process of the Naira depreciation may shift once more to growth-enhancing instead of growth-inhibiting. Such findings are highly meaningful in terms of policy implications where the objective of the Nigerian monetary authorities should focus on keeping their exchange rates at or below these threshold levels. The simulation also demonstrates the possibility of policies to reduce the adverse impact of high rates of currency depreciation, especially in later years of the projection period where the exchange rates are likely to cross their limits. The figure is a long-term forecast model (2022 -2050) that relates exchange-rate stability to GDP path. The dominant belief of such a simulation is that the growth of GDP is not the result of the strong or weak currency, but predictability and threshold management (Habib et al., 2017). The Growth Ceiling is the stage of currency over valuation at which household goods become too costly in the international market and hence the industrial production is slackened (Setterfield & Ozcelik, 2017).

The inflationary floor is the stage when the devaluation of the currency becomes counter productory and the prices of imported technology and raw materials increase, thereby eliminating the gains in the GDP (Omarova et al., 2020). In most 2050 simulations the bands of the threshold become narrower which can be seen as moving towards the mid-2030s (Orłowski & Rybiński, 2006). This implies that with the maturity of the economies the exchange rate volatility becomes unbearable. In the case of emerging economies, to achieve the emerging market status, there has to be maintenance of the exchange rate in an incrementally narrow margin with a view to lure FDI.

The positive inclination of the line of GDP simulation (under the condition of positive growth prospect) shows that the increase in the real exchange rate will be preceded by productivity improvements. The higher a country is moving away as a major resource exporter towards more of a service or technology-based economy the higher the threshold of a healthy exchange rate becomes. The figure shows two different ways, The Manufacturing Path that needs a currency which is slightly undervalued to ensure that this nation has a competitive advantage in world exports and the Service/Consumer Path that relies on a stronger currency to ensure that the purchasing power of middle classes is maintained to drive domestic GDP.

According to the simulation, Figure 6 above, the following conclusions can be made in a befitting way. In order to remain within the growth threshold, the Central Bank has to ensure good foreign reserves to counter any external shock. The simulation indicates that the GDP growth would become most sustainable when the exchange rate is employed as a price stability tool, but not a mere

representation of trade balance. The simulation end state indicates that the desired 2050 state of the target economy will be a Mature Market, which is defined by low volatility in the exchange rate, and a large proportion of higher value-added GDP. It is a linear time assumption in the simulation; nevertheless, the exchange rate might hit the bottom limit due to extreme events like the global energy balance changes or the restructure of the geopolitical balance. When the rate drops to a lower level than that which is simulated, the economy will be at the risk of the middle-income trap where the economy will fail to grow because debt servicing will be expensive and there will be inflation of imported goods and services

Figure 6: Exchange Rate Thresholds for GDP Growth (2022-2050)- GDP Simulation

As per Table 10, the 2050 horizon combines high-impact capital liberalisation transition, moderate transition in trade towards intra-regional independence from USD and critical fiscal environment characterized by deficit spending increasingly limiting stability of exchange rate corridors. The macroeconomic framework of the 2050 horizon as illustrated in Table 10 shows a significant structural change in the underlying drivers of Nigeria's long-term economic stability. For the goal of price sustainability and investment growth in Agenda 2050 to be achieved the interplay of the dynamics of capital accounts, regional trade integration and fiscal discipline is extremely complex and it is vital to understand its links and interactions in order to establish the limits of economic resilience. In Nigeria, the inevitable road to full capital account liberalisation will change the nature of how external shocks will impact the domestic economy as the country moves towards 2050. Opening up financial markets is essential to capital inflows of the large foreign direct investment (FDI) required for infrastructure, but also makes the country vulnerable to portfolio flows. This greater openness will continuously challenge and test adaptation thresholds of earlier empirical models for the exchange rate. Without deep regulatory measures in the domestic financial sector, abrupt capital flight could rapidly shift the currency beyond its optimal tipping points, and launch the contractionary and high-inflation dynamics associated with the upper regime cycles.

The long view showcases the importance of a structural shift away from the classic Western money supply anchors. This will help Nigeria to gradually move away from its longstanding practice of using the US Dollar for international trade because it will shift trade preferences towards its intra-regional partners, which will have access to local currency. The benefits on the immediate GDP are moderate; the strategic benefits in the long run are tremendous. It helps the domestic economy cope with large fluctuations in the USD by settling cross-border transactions in regional payment systems or local currencies. Settling cross-border transactions with regional payment systems or local currencies helps the domestic economy to cushion itself against sudden increases in the USD. This diversification of trade reduces the impact of imported inflation and can help insulate domestic supply chains from unpredictable fluctuations in global currency.

Fiscal policy becomes the final binding restraint and the most fragile catalyst for macroeconomic instability up to 2050. Continued un-backed deficit spending is a structural trigger for the monetary imbalances to escalate as it keeps pumping excess liquidity into the banking system, which always finds its way into the foreign exchange market as an increased demand for foreign currency. This constant monetary pressure puts the safe exchange rate range, which is the zone in which the currency can float without causing severe inflation or suffocating private investment, under extreme pressure. As the safe corridor narrows, a trivial shock or even a transitory decrease in commodity revenues can indiscriminately knock the exchange rate out of the productive zone and into a very destabilizing and high-cost economic environment. Eventually, Table 10 suggests that the structural drivers do not exist in isolation. Uncontrolled capital liberalization will quickly break a tight, fragile exchange rate corridor, and a loose fiscal policy will quickly bring an early end to the gains of diversification of trade. To realize the development aspirations in Nigeria by the year 2040, the country needs to impose a zero-tolerance macro-prudential policy framework that actively enhances the safe exchange rate corridor and enables Nigeria to reap the benefits of global capital integration and regional trade independence safely.

Table 10: Structural Drivers of the 2050 Horizon

Variable	Impact on GDP Threshold	Long-term Outlook (2050)
Capital Flows	High	Increased liberalization will test the thresholds.
Trade Balance	Moderate	Shift toward intra-regional trade reduces USD dependency.
Fiscal Policy	Critical	Deficit spending narrows the safe exchange rate corridor.

The threshold in Figure 7 can be understood as a stabilization level or a fair-value level. As long as the exchange rate is below this equilibrium, that is, it is undergoing appreciation or is largely stable, it means that the rate is nearly or approaching this equilibrium. The effect of this is a good price discovery and narrowing of the arbitrage, which eventually results in convergence between the official market rate and the parallel market rate and hence the amalgamation of both. On the other hand, a figure that is above the level, indicating sustained depreciation, is usually seen through an increasing exchange rate into greater heights like N2,000 and above, which is an indication that it is not able to attract foreign direct investment (FDI) or in cases where it is still over-dependent on oil exports.

Figure 7 conventionally illustrates three different stages in the development of the Naira. The 20222025 shock commonly known as the Volatility Shock shows steep upsurge in the graph, which reflects the currency unification in 2023(Gold & Yusuf, 2025) and the following floating regime, which caused major devaluation (Analytica, 2023). The overall trend of the graph is projected to level off by 2026, due to measures taken by tightening monetary policy (Ozili, 2024). During the period 20262035, which is the Consolidation Phase, the exchange rate line behavior is influenced by the chosen threshold policy; either stabilization of the exchange rate line horizontally, which reflects a successful move to a market-based rate, or further gradual increase, which reflects structural inflationary pressures. Lastly, the 20352050 block, also referred to as the strategic horizon showed that, in a rising Nigeria scenario, the exchange rate will be stabilized in parallel with the economic diversification. Conversely, stagnation scenarios imply a strong increasing trend in the line which represents long-term weakening of purchasing power.

Figure 7: Projected USD/NGN Exchange Rate with Threshold

The exchange rate projection given in Figure 7 acts as a leading indicator for the rest of the figures in this report; thus this series will argue against the idea of strong Naira in buyer's favor unless it proves that this is possible. A mean within the threshold allows 20 years of infrastructural planning for the 2050 objectives. For the rate to remain near the projected threshold through 2050, Nigeria's foreign reserves must remain robust (projected for ~$41 billion by one feasible estimate 2025/2026). The implications derived from Figure 7 portray a situation whereby almost by necessity, the exchange rate in 2050 will beckon the breach of the lowest even of thresholds, without transitioning towards a decent production-driven economy from consumption precedents.

Table 7: Impact on Macroeconomic Indicators

Scenario	Impact on Inflation	Impact on Investment
Below Threshold	Single-digit inflation (long-term)	High FDI and capital importation.
At Threshold	Stable, predictable inflation (12–15%)	Moderate business confidence.
Above Threshold	High cost-push inflation	Capital flight and manufacturing decline.

In Figure 8, the threshold sets a very significant level of currency valuation (around ₦1,400 to

₦1,700 per €1 in today's economic setting of 2026) for macroeconomic stability. Fall south of the level suggests a healthy current account and successful intervention on the market. This imports European technology for Nigerian industrialization, hence for cost implications. When the Thresholds (e.g., ₦2,200+) are broken, the indication is an inflation caused by cost push of the goods imported from Europe and specialized machinery upon which the country would need to decide which pathway to follow.

The chart indicates the immediate effect from the FX Unification Policy 2023; the data in the chart during Q2 2026 signals managed volatility as the CBN seeks to hold market expectations at the outcome threshold. The 2026-2035 industrialization axis cuts out for failure in project. If Nigeria were to unlock benefits of the African Continental Free Trade Area (AfCFTA), the EUR/NGN rate should find it in a stable sideways movement with buoyancy from non-oil exports through a steady inflow of foreign exchange. In the second scenario of The Nigeria Agenda 2050's achievement, we see in the chart that the trend overlaps, signaling that Naira has settled at its real effective exchange rate, thereby factoring in an accurate comparison of a 30-year infrastructure Euro-priced bond.

When considering cross-currency comparisons, such as USD vs. the Euro, the Euro projection (Figure 8) must be interpreted together with the USD projection (Figure 7). While the USD is the world's leading reserve currency (Bertaut et al., 2025), the Euro is vital for trade diversion so as to reduce Dollar dependency by engaging in long-term trade contracts with the Euro (Zahmani et al., 2021) and for debt servicing; hence, staying above the threshold is a matter of fiscal sustainability. The threshold does not essentially equate to a "strong" Naira. It does mean to decrease the volatility index. The high volatility would prevent European investors from committing to long-term Greenfield projects in Nigeria (Njoku et al., 2025). Looking at the figure, if the rate stays above the threshold for too long, Nigeria must now go into an accelerated Euro-substitution mode to find local alternatives to goods currently being imported from the EU to prevent a permanent form of inflation.

Figure 8: Projected EUR/NGN Exchange Rate with Threshold

At Figure 9, the threshold level marks a stabilizing value generated in 2026 scenarios to lie in the corridor

₦ 1,000 to ₦ 1,150. This threshold acquires significant socio-economic importance due to Canada being the most preferred destination for Nigerian students and skilled workers (Ogbonye et al., 2025). A significantly higher rate beyond the threshold creates added costs for migration and tuition for families in Nigeria and may prevent continuity in diaspora remittance inflows over the long term. Moreover, Canada remains an important supplier of wheat and potash (the key ingredient for fertilizers) to Nigeria (Zdráhal et al., 2019). The crossing of the estimate raises the price of bread and agricultural inputs for the average Nigerian. The 28-year period essentially captures the transition from a commodity-led relationship to a more integrated economic partnership. As with other currency pairs, the graph exhibits a severe uptrend following the naira devaluation in 2023 and by early 2026 the projection seems to indicate a corrective process as the NGN tries to stabilize against the CAD subsequent to Nigerian monetary policy tightening. Therefore, the CAD/NGN thus becomes a proxy for the assessment of Nigeria implementing its National Agricultural Technology and Innovation Policy. Less dependency on Canada for wheat reduces pressure on the exchange rate itself and pulls the line to near the threshold.

Up to 2050, it is possibly predicted that a more mature relationship will be felt. In case the Naira stays around the threshold, it means remittance inflows will henceforth be a structural stabilizer of the Naira at the time when they help to balance demand for the Canadian currency. Figure 9 presents the need for a broader basket of currency for the CBN, and the need for the inclusion of CAD in order to control the inflation pressures brought out from the structural burden of agricultural imports. The CAD/NGN rate can be seen as a social indicator since there has been a strong educational tie between the countries. Staying near this benchmark is equally important as preserving the valued destination of global mobility for the middle class without otherwise deserting a bankrupt domestic economy.

Figure 9: Projected CAD/NGN Exchange Rate with Threshold

The threshold shown in Figure 10 approximates the stabilization threshold expected by 2026 in

the current models technically ranging between ₦950 and ₦1,100 per AUD. There are at least two important reasons why this threshold acts as a vital economic signal: Australia possesses global leadership in solid minerals and mining technology (Kumar, 2021). From Nigeria's standpoint, in order for it to finally diversify away from oil in 2050, the AUD/NGN exchange rate should remain within the definite limits to allow for Nigerian import of Australian mining equipment and technical know-how affordably. Australia has become an important destination for the Nigerian diaspora for development (Olagbegi et al., 2019). A break in this threshold (when Australians become too costly) means withholding Nigerian professionals from acquiring Australian high-grade training-a critical component of Nigeria's long-term human-capital strategy. Any trajectory related to currency fluctuation illustrates the attempt to track reality from long-term strive on market maturity. For the specific case here, the graph tends strongly upward to draw a line in the course for the devaluation of the Naira before all currencies on the market, including the AUD, from 2023.

Solid minerals drive dominates the period 2026-2035 (pivoted on diversification). Stable thresholds of exchange accommodate an inflow of FDI from Australia to the Nigerian mining sector. The projected alignment with Nigeria's target of an upper-middle-income economy makes it evident toward 2050. The AUD/NGN stabilization mirrors Nigeria's successful attempt at balancing trade in non-oil commodities. Using Figure 10, we distinguish between the stable growth and high volatility scenarios with regard to the threshold. Figure 10 might be stating that policymakers in Nigeria are not looking ahead to the regular USD/EUR axes. It remains crucial to remain with either the currency threshold-since that will bring real contact with the Australian mining sector, would chart a good course for the reforms within Nigeria's extractive sector implementations. This objective of a diversified economy anchored for 2050 deeply on this figure. If the Naira continues to be weak against AUD, the cost of industrialization would considerably increase as many of the tools required for a post-oil Nigeria are priced in AUD.

Figure 10: Projected AUD/NGN Exchange Rate with Threshold

The analysis of Table 11 reveals that the real exchange rate within the fixed band is favourable for the economic viability of mining activities, meaning that if the real exchange rate moves outside the fixed band, it creates a risk premium, causing capital flight, project unviability and excessive dependence on costly imports. In this optimal time, the local currency has a stable and controlled purchasing power, and this directly correlates with the reduction of costs to import heavy machinery, specialized yellow fleets, and advanced processing equipment at a lower cost in the region. The solid minerals sector is capital-intensive with long gestation periods, thus it is important to have a predictable cap-ex so that the net present value (NPV) of the Greenfield mining projects remain positive and bankable. Once the exchange rate reaches a certain critical level, the local currency price of certain special industrial machines goes up sharply. This is instant CAPEX inflation, and immediately renders previously lucrative mineral deposits commercially unviable. Any international mining firm that gets to a point where assets are in deadlock and costs are uncertain inevitably ceases to explore further, leading to a fast exodus of investment to more predictable regulatory environments. The safe threshold zone opens up a potent structural transmission channel resulting in significant export of processed and value added Nigerian minerals. The stable cost environment offers the advantage of safety for local companies to invest in domestic ore beneficiation plants, rather than shipping raw, low margin ores. This has a positive impact on the net trade of the country, high skilled job creation in the industrial sector and foreign exchange receipts.

On the other hand, if that threshold is exceeded, the domestic processing value chain takes a big structural hit. When the currency collapses beyond their ability to manage and the domestic supply chain collapses, people become dependent on costly imported raw materials, catalysts and inputs to a great extent. This cost-push squeeze entirely undermines the competitiveness of the processing centres in Nigeria, and thus makes mineral boom in the country an expensive import-dependent bottleneck instead of export-dependent processing. The exchange rate remains within the specified limits, which indicates a strong macro-prudential policy framework, and increases investor confidence on the key mining markets of the Indo Pacific. This stability allows tier-one international miners and sovereign wealth funds to agree to long-term off-take contracts and to make patient, FDI into the host country

economy seeing it as a reliable node in the global CDM supply chain. As soon as the exchange rate crosses the level, policy credibility is lost, and there is a heavy price to pay on international markets. A significant risk premium is quickly included in every trading agreement between countries, including strategic deals between Australia and Nigeria in the mining and engineering sector. This risk premium significantly increases the cost of sovereign and corporate borrowing, makes international trade insurance difficult, and makes foreign investors pay a structural currency risk premium in the form of very low asset pricing. It is interesting to see from Table 11 that Nigeria's solid minerals industry cannot serve as a key driver in the process of economic diversification under the Agenda 2050 without a hands-off approach towards the exchange rate. The structural transition from a value-adding, high-confidence mining hub to a high-risk, unviable investment environment happens automatically the moment the threshold is breached. Protecting the mining CAPEX environment and maintaining global trade credibility requires a tightly coordinated policy framework that actively prevents the currency from slipping into its destructive, upper-regime territory.

Table 11: Economic Impact of the Threshold

Factor	Below/At Threshold	Above Threshold (Breach)
Mining CAPEX	Lower costs for heavy machinery; viable projects.	Projects become unviable; capital expenditure declines.
Trade Balance	Increased export of Nigerian processed minerals.	Heavy reliance on expensive imported raw materials.
Policy Credibility	High investor confidence from the Indo-Pacific.	Risk premium added to all Australian–Nigerian trade deals.

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Figure 11 shows Nigeria's Agenda 2050 test and the route to be achieved to the required investment to GDP ratio of 40.11%. The threshold logic with respect to Investment multiplier implies that the main idea behind Figure 11 is how Investment ceases to be a linear factor. The threshold (probably the exchange rate stability point referred to in Figures 7-10) acts as a switch for capital formation. Above/within the threshold (stability), that is, when the dollar stays within the target thresholds (e.g., ₦1,200-₦1,450/$), the figure has a steepening exponential growth curve. This is so due to predictability lowering the risk premium, making 20-year infrastructure projects attractive in the eyes of banks. Below/outside the threshold (volatility), that is, if the threshold is broken, loss is seen in the growth of the investment rate indexes. High volatility very much discourages businesses from keeping surplus capital in liquid with safe assets, as against borrowing gross fixed capital from them before the increase/deposit of it.

Accordingly, 2022-2026 are the policy shock phase years. The initial years of the forecast show a slow down or standstill. This reflects the 2024 finance cost inflation that temporarily hurt new capital inflow. 2030-2040 is the convergence zone; this contains the most important segment of the figure. For Nigeria to reach its targets, the investment rate must continue rising from the current to 35% by 2030 (seen in Figure 4). This necessitates a switch from portfolio inflows (hot money) to Greenfield FDI (factories and rails). As such, it is estimated that 7 to 10% by 2050 sustainability targets will require 40.11% IPP (investment to GDP growth) would take 100 million out of poverty. To investigate the closeness to these targets, we look at the investment-savings gap. The government of Nigeria has to continue its large-scale infrastructure investments for Figure 11 to trend toward the 40% target with lively public policy; that many of private projects should be crowded in over time.

As depicted from Figure 11, the simulation strongly suggests that once exchange rates cross its respective threshold, the relationship between currency devaluation and investment shifts from a growth-positive reinforcement to a highly negative drawback. In regime 1 (below threshold), modest devaluation would further enhance export-led investment as represented by CAD/NGN with a coefficient of 0.488, USD/NGN (0.457), AUD/NGN (0.447), and EUR/NGN (0.412). Such a relationship

overwhelmingly sustains the prevailing conception that some depreciation in a currency stimulates economic activity, mainly through increased trade competitiveness (Kandil et al., 2007). A transition to regime 2 (above threshold), however, reflects a profound and total inversion in which further depreciation would harm investment due to increased uncertainty, inflation risks, and waning confidence by the markets and foreign direct investors. The negative coefficients in this regime for EUR/NGN at -0.287 and CAD/NGN at -0.356 point to negative capital inflows and serious capital flight, once exchange rates exceed critical thresholds. This process of transition fits well with other emerging market benchmark comparisons showing that excessive currency volatility does unproductively discourage long-term investment commensurate with border-crossing risk levels (Adegbe & Kummer, 2025).

Giving Nigeria's investment climate vulnerability a further leap uphill, the project on investment rates becomes nauseating. This is seen as miserably as the investment-like climate is already explained as a non-attractive one. Come 2034 and probably around 2035, the crossing of the CAD/NGN arbitrary limit, and another limit laid out at AUD/NGN levels should turn the investment climate to engulf it. The expected split of currency pairs according to their effects upon investment is of paramount importance. Even as all the currencies tend towards the negative impact, the following order of negative crossovers is elicited: the earliest USD/NGN (2029), then came EUR/NGN (2032), CAD/NGN (to debt) (2034), AUD/NGN (2035) (lastly). These undulating events allow adaptable policy makers to be able to control the detrimental impact on investment in some cases by carrying out prudent interventions.

Figure 11: Investment Rate Projections based on Exchange Rate Thresholds (2022-2050)

From Table 12, it can be seen from the currency link analysis that investment depends on the exchange rate. Graphically, if Figures 7 and 8 (USD and EUR rates) remained as volatile as they have been, the above line in Figure 11 would never reach the 40% sustainability level, because the cost of machinery imports is quite dear. Of this moment, Nigeria was recovering rather than transforming. Having said that, investment has shown some recovery from the 2016 lows, but the country is still about 9 to 10 percentage points from the investment density required by the government and private sector to sustain the goals set for 2050. For this gap to be closed, it will depend on maintaining the exchange rate within the agreed-upon thresholds to reduce the cost of capital.

Table 12: Measuring the Sustainability Distance

Metric	**Current Status (2025/2026)**	**2050 Target**	**Analysis**
Investment Rate	~31%	40.11%	9% gap: Nigeria is currently under-investing by nearly a tenth of its GDP.
FDI Contribution	Low / Volatile	High / Stable	Most current investment is domestic; foreign capital is still wary of threshold breaches.
Capital Productivity	Moderate	High	Much of current investment goes to debt servicing rather than asset creation.

In Figure 12, inflation rates based on exchange rate thresholds (2022-2050) were depicted. The Monte Carlo inflation simulations reflect a significant degree of disconnect (inflation-exchange rate) and even

sometimes a sharp divergence for all four major currency pairs during the period of 2022-2050.

The thing that strikes one foremost is the complete reversal in the exchange rate-inflation nexus once the exchange rates hit their threshold values. Within regime 1 (below threshold), all currency pairs portray negative coefficients for the impact of inflation, with CAD/NGN showing the most deflationary impact of -0.253 too followed by USD/NGN at -0.241, AUD/NGN at -0.232, and EUR/NGN at -0.218. Such odd behavior implies depreciation of the currency within the range may paradoxically lessen the inflationary pressure, likely through better export performance and trade balance improvement. Nonetheless, the transition to regime 2 beyond the threshold indicates a shift in the economic structure, where exuberant devaluation is now highly inflationary. The USD/NGN pair has the most inflationary impact, presented by a coefficient of 0.687; hence, indicating that upon crossing the threshold of 486.75, which is likely to fall during the year 2029, an excess depreciation will trigger stronger inflation. EUR/NGN comes next in the ranking with a coefficient of 0.614, whereas CAD/NGN and AUD/NGN follow with moderately lower yet pronouncedly significant coefficients of 0.575 and 0.562 respectively. The change reflects transition from better export-led effects to adverse import cost pass-through effects.

Nigeria's forecasted inflation trends present significant macroeconomic risks. Approaching near-critical threshold levels in USD/NGN rates will be highly likely to fuel leverage at a significantly elevated level of an inflation rate of 12.5% (Omofa, 2016), thereby lessening macroeconomic stability substantially. The breach by the USD/NGN in 2029 is worthy of concern as it is the most likely to set off a long-term inflationary spiral early. The only instance when two currency pairs were known to serve together in regime 2, and the simulation area increases the inflation rate well above the 6% target set by the Central Bank of Nigeria, to 20-25% in mid-2030s. Double breach within set thresholds increasing inflation is why an ever-disintegrating concatenation of events ensues from the USD/NGN breakage of 2029 to EUR/NGN in 2032, and then to CAD/NGN in 2034 and brokered by AUD/NGN by 2035. Nigeria has a limited window of possibility between 2025 and 2029 to aggressively implement exchange rate stabilization policy before falling into a prolonged state of excessive inflation risk, according to this deteriorating sequence.

Given that combined inflation forecasts, pointing to enormous degree of cumulative cross-border spillovers only further intensified beyond the total effect that accrues to related currency pairs; essentially, the mean rate of inflation on the four currency pairs sees outrageous turbulence since about the year 2030 as several currencies of their own go into Regime 2 territories. The standard of practice here therefore revolved around Nigeria's higher import dependence, with exchange rates securing control over consumer goods and capital goods price formation for nearly all sectors (Hamzat et al., 2024). However, the most interesting thing to point out is the divergent volatility in different currency pairs. EUR/NGN has the most longest held volatility effect on inflation; although moderated; this is also a disclosure that underscores the uncertainty in the Euro bloc and Nigeria's vulnerable exposure to European economic conditions. The AUD/NGN pair has a relatively lower volatility; a situation which suggests that the inflationary effect provided by commodity price fluctuations to some extent dampened inflation fluctuations. This phenomenon cold is the result of a self-regulating situation being formed with particular reference to Nigeria's own commodity exports.

Figure 12: Inflation Rate Projections based on Exchange Rate Thresholds (2022-2050)

We estimated ARIMA models for each currency pair based on the unit root test results showing that exchange rates are I(1). The model was chosen by minimizing the information criteria (AIC and BIC) while making sure that residual diagnostics showed a sufficient model fit. Table 13's findings indicate that ARIMA(1,1,1) is the best model for USD/NGN and AUD/NGN exchange rates, while ARIMA(1,1,2) is best for EUR/NGN and ARIMA(2,1,1) is best for CAD/NGN. The residuals from all models approximate white noise, indicating sufficient model specification given the non-significant Ljung-Box Q statistics (p-values > 0.05). For all currency pairs, the out-of-sample MAPE ranges from 4.85% to 6.18%, indicating a respectable level of forecast accuracy.

Table 13: Optimal ARIMA Model Specifications and Diagnostics

Exchange Rate Model	Specification	AIC	BIC	Ljung-Box Q (p-value)	RMSE (In-sample)	MAPE (Out-of-sample)
USD/NGN	ARIMA(1,1,1)	782.34	793.58	11.23 (0.42)	8.74	5.32%
EUR/NGN	ARIMA(1,1,2)	824.67	839.53	10.45 (0.49)	10.21	6.18%
CAD/NGN	ARIMA(2,1,1)	718.92	733.78	9.87 (0.54)	7.36	4.85%
AUD/NGN	ARIMA(1,1,1)	705.36	716.60	10.72 (0.47)	7.12	5.09%

The GARCH results presented in Table 13 clearly show a high level of volatility aggregation with respect to all four currency pairs. Our GARCH findings disclosed the prevalence of high volatility clustering among the four currencies. Values closer to unity (0.99) were consistent across all respective currencies. This implies that exchange rate shocks are persistent and do not regress in Nigeria (ID et al., 2025). Along these lines, the effects of a shock appearing today (e.g., an oil price fall or sudden policy adjustment) will result in the exchange rate being volatile for long periods (ID et al., 2025). High β ranging from 0.897 for USD to 0.932 for AUD indicate that the market is getting used to getting hurt all the time. The current volatility is driven more by the past volatility and less by new information (α)(Sen et al., 2021). This means, for Agenda 2050, the CBN has a monumental task upon it every time the market starts shaking.

According to the EVT results, all the omega values are positive and significant, i.e., 0.278 for the USD/NGN pair. This implies heavy-tailed distributions (Katz et al., 2002; Marimoutou et al., 2009). Ergo, the occurrence of severe depreciation in this case is much more likely than what a normal distribution would predict (Davison et al., 2013). The USD/NGN pair has the highest omega value of 0.278, which serves yet as further evidence that the Nigerian economy is highly vulnerable to extreme shocks emanating from the US Dollar (Boz et al., 2022; Ogunjimi, 2020). These statistics provide a clear reference given for the price of exchange rate risk for investors and policymakers. The USD/NGN maintains the highest ends of VaR and ES throughout. These suggest that foreign investors who hedge in USD require a higher risk premium with respect to investment in Nigerian assets, hence thwarting the investment pillar of Agenda 2050.

The entirety of volatility, marked as high persistence, has been argued to spill into imported inflation fuelled by relative exchange rate fluctuations (Bala et al., 2025). In order to win the price stability targets set for the Agenda 2050 macroeconomic framework, GARCH findings affirm that CBN alone cannot afford to lean on short-term interventions as the means for wiping more of the structural stickiness of volatility with further Forex

liquidity. EVT findings (mainly heavy tails) neither attract nor inspire further confidence from FDI. Investors are less concerned with short-term daily price changes while more concerned about the said 4.67% tail risk (VaR 99%). Tranquility would be within the long-term infrastructure projects by severely lowering such extreme risk with the key mechanism being a transparent fix to the exchange rate threshold. Smaller VaR and ES for CAD/NGN(3.45% at 99%) and AUD/NGN (3.58% at 99%) could suggest that diversification of Nigeria's trade and reserve portfolio from a pure USD-centric one could, in addition to providing a buffer against volatility, enhance the nation's resilience. The model confirms existence in the Nigerian exchange rate of high persistence and big tail risks. For the successful implementation of Agenda 2050, it is essential for macroeconomic strategies to shift from handling daily noise onto the controlling of extreme shocks picked out in EVT.

Table 13: GARCH-EVT Model Results for Exchange Rate Series

Parameter	USD/NGN	EUR/NGN	CAD/NGN	AUD/NGN
GARCH Component				
ω (constant)	0.00002**	0.00003**	0.00002**	0.00002**
α (ARCH term)	0.089**	0.073**	0.064**	0.057**
β (GARCH term)	0.897**	0.913**	0.926**	0.932**
Persistence ($\alpha + \beta$)	0.986	0.986	0.990	0.989
EVT Component				
Threshold (u)	1.48	1.56	1.42	1.38
Shape (ξ)	0.278**	0.251**	0.186**	0.193**
Scale (β)	–	–	–	0.654**
Value-at-Risk Estimates				
VaR (95%)	2.34%	2.21%	1.87%	1.92%
VaR (99%)	4.67%	4.32%	3.45%	3.58%
Expected Shortfall (95%)	3.82%	3.56%	2.94%	3.12%

Table 9 depicts the dependence structure that was derived from t-copula parameter estimates. The GARCH parameter estimates indicate a very high persistence ($\alpha+\beta$) of almost equal to 1 for every single exchange rate series, meaning that the volatility shocks will last for a long time before disappearing. The ARCH parameter (α) was found to be significant for all the series, thus corroborating the existence of ARCH effects in the data. The EVT outcome has reported positive and significant shape parameters (ξ) for all the series, which fall between

0.186 (for CAD/NGN) and 0.278 (for USD/NGN). These positive shape numbers suggest that the distributions are heavy-tailed, with the heaviest tail being associated with USD/NGN. The VaR estimates resulting from this study reveal that USD/NGN is the most risky currency pair (95% VaR of 2.34%), followed by EUR/NGN (2.21%), AUD/NGN (1.92%), and CAD/NGN (1.87%). The t-copula parameter estimates point out a substantial dependence level among all currency pairs. The most intense dependency is seen between USD/NGN and EUR/NGN (0.783), while the dependency between CAD/NGN and AUD/NGN is the next strongest at (0.678). The degrees of freedom parameters lie at a comparatively low level (between 6.34 and 9.76), which hints at the presence of tail dependence. The probability of extreme co-movements, which is what the tail dependence coefficients measure, is the highest for USD/NGN-EUR/NGN (0.286) and the lowest for EUR/NGN-AUD/NGN (0.148).

Table 9: Dependence Structure based on t-Copula Parameter Estimates

Currency Pair	Correlation Parameter	Degrees of Freedom	Tail Dependence Coefficient
USD/NGN – EUR/NGN	0.783**	6.34**	0.286**
USD/NGN – CAD/NGN	0.625**	7.82**	0.214**
USD/NGN – AUD/NGN	0.589**	8.15**	0.195**
EUR/NGN – CAD/NGN	0.547**	9.23**	0.162**
EUR/NGN – AUD/NGN	0.512**	9.76**	0.148**
CAD/NGN – AUD/NGN	0.678**	7.34**	0.243**

Note: ** denotes significance at the 1% level.

Source: Authors' computation (2025)

Discussion

From the year 2022 to 2050, the simulative trend-established according to careful scrutiny-shows that the Nigerian Naira has been comparatively vunerable against the leading world currencies. These findings parallel those of Eichengreen (2023) that the currency of the emerging markets was on that track of structural decline in a global environment of more integrated capital markets. Most definitely, our forecasts show that USD/NGN will come to stand at a high 486.75 several years down the line-it was a necessary occurrence under the age-old negative regime dynamics of last period. Following the threshold regression analysis from the current study, EUR/NGN exhibits a similar uptrend with high volatility, pretty much amid what (Forbes &

Warnock, 2022) uncovered-the notion has been drawn that exchange rate responses to policy changes of the central bank are more complex than cast in the theories. About 65% chances were identified for the EUR/NGN rate to see beyond the current threshold of 542.32 by 2032 grounded on the policy divergence between Nigeria and Eurozone.

Expected values of CAD/NGN and AUD/NGN show slight increases, which further maintains support for the observation made by (Hall et al., 2022) that volatility for currencies, linked to commodities contrasts with major reserve currencies. All these aspects have great pertinence to the management of the Nigerian exchange rate owing to the implication of this study that diversification of trade invoicing currencies could bring stability advantage. This echoes what has been said by Rossi & Sekhposyan (2022) that macroeconomic planning is very dependent on these exchange rate forecasts in terms of accurate information. In regard to this, the point of threshold value established by this study showed an added value, and that seemingly offers an application for a concept beyond a mere linear relationship, as used by other authors. Rahman & Song (2025) underscore the role of effective exchange rate management in sustaining economic growth, while Li & Zhu (2023) elaborated on the ruinous impacts exchange rate mismanagement could have on growth. Threshold values at different critical levels present guidance on what exchange rates are currently managed poorly in Nigeria.

The empirical analysis of the exchange rate determination for investment in Nigeria via Monte Carlo simulations shows the two are a non-linear relationship characterized by threshold effects. Under Regime 1 (exchange rate less than or equal to the threshold), exchange rate depreciation enhances investment with positive coefficients across all currency pairs (USD/NGN= 0.457, EUR/NGN= 0.412, CAD/NGN= 0.488, AUD/NGN= 0.447). This is in agreement with the finding of Chen & Hardle (2023) that moderate currency depreciation stimulates export competitiveness and attracts investment in the tradable sectors. However, under Regime 2, a further drop in investment results from a further drop in exchange rates. This is consistent with the findings of Afuecheta et al. (2022) that there are gaps of

investment in developing countries, not due to savings, but because of risk-induced misallocations in both sectors and between firms. Indeed, the changing regime is consistent with the critical theory presented. The level of participation rose or fell as it hit the thresholds chosen, underlining the value of the theoretical concepts. Moreover, given their evidence in a deeper examination of financial market development, contended that extended financial markets were in a position to mitigate the negative impact of a possible macroeconomic shock on investment. Hence, excess depreciation of the Nigerian exchange rate could, in essence, cause a negative investment environment, and the situation, if at all, could be exacerbated owing to the already lesser-developed financial markets in comparison with developed countries. Reflecting the outer extremes of sectoral investment heterogeneity is our finding, viewing that large manufacturing firms have been usually found to display 3-5 times higher investment-to-GDP ratios than the SMEs, while services sector lets down macroeconomic stability. Therefore, the currency exchange threshold thus filters into industrial sectors in a differentiated manner, becoming more resilient to depreciation in the case of export-oriented industries.

The VaR results show that for the inflation phase the aggressiveness of the four pairs has varied. The 95% VaR in terms of USD/NGN and EUR/NGN stands at 2.34 percent and 2.21 percent, respectively, while the same for CAD/NGN and AUD/NGN stands at 1.87 percent and 1.92 percent, thus signaling bigger downside risks during times of inflation equally for the latter pairs compared to the former ones. Those findings are in line with Danielsson (2022) conclusion, according to which risk management practices are tailored to the specific environment of the macroeconomic scenario, and inflation particularly requires dedicated attention to managing currency exposures. Therefore, our results can be viewed as being in the support of the call for a differentiated-method-based risk measure for different currency pairs and not one-size-fits-all methodologies.

Applying a GARCH-EVT model for our study reflects the observation of Echaust & Just (2021), wherein it has been elaborated that traditional risk models underestimated market volatility to a great extent during the COVID-19 pandemic. With EVT analysis, underestimation was substantially corrected and market forecasts were found to be much more reliable. The non-zero shape parameters of our EVT outcomes (USD/NGN: 0.278, EUR/NGN: 0.251, CAD/NGN: 0.186, AUD/NGN: 0.193) show the most substantial components of tails in exchange distributions, leading to the question of what happens if those tails play a larger role than such. The use of t-copulas in measuring the dependence of currency pairs with special emphasis on the tail dependence presents evidence of the same between USD/NGN and EUR/NGN (0.286). Given this result, and in support with Zhang et al. (2023) conclusion that the cross-currency dependence increases in times of stress in the market, perhaps those implications bring us to the subject of portfolio diversification during inflation.

The results presented in this study suggest the existence of significant relationships between exchange rate VaR and major macroeconomic variables like gross domestic product growth, inflation incremental and investment rate contraction. That rise in exchange rate VaR due to overrunning estimated thresholds can also be seen as a direct impact of poor GDP growth, higher inflation rates, and lower investment rates, as seen from the interpretation of regime-dependent coefficients. These support Varian (2023) conclusion that multivariate GARCH-models are capturing cross-currency volatility spillovers between West African currencies and showed strong linkages mainly during periods of monetary policy differentiation. The negative relationship between exchange rate risk and GDP growth in the results is aligned with Okafor & Ibrahim (2023) observation of exchange rate volatility spillovers severely affecting economic growth during debt crisis periods in West Africa. Threshold effects on VaR-macroeconomic relationships are shared by Mendez et al. (2024) as they found that Latin American currencies and macroeconomic indicators exhibit regime-dependent relationships post-pandemic. As a side note, threshold regression models, similar to their Markov-switching ARIMA models, can be just as good in terms of identifying non-linearity. As for sector impacts, it is in line with the observation of Chen et al. (2021) highlighting how exchange rates considerably affect commodity prices and sector-specific outcomes through various channels of transmission. The identified channels above possibly explain the diversity of sectoral effects found from this study. Our policy lessons relate to the (2023) call for managed flexibility in exchange rate regimes in face of challenging external setting for developing countries. They outline a view of managed flexibility that may well be positioned in the context of Nigeria based on the threshold estimates.

Given the observations in the current paper, it is clear that fiscal policy and monetary policy should be intertwined with one another in Nigeria. The findings make an argument for Regime 2, where the positive correlation between the variable in question, exchange rate depreciation and inflation rate (0.687 with USD/NGN), is seen to have increased. Consequently, an exchange rate policy must be interconnected with other policies to control inflation. This goes well with the identification of three main channels by Coulombe et al. (2022) from government spending to economic outcomes, showing exchange rate dynamics as the prime avenue of transmission in this case. They suggest fiscal multipliers would bring more benefits around 30% and 50% higher, provided private investment is also high, reinforcing the significance of a stable exchange rate for investments. The World Bank (2023) has evidence that countries with stronger governance and lower corruption see significantly higher growth generation from public spending. Thus, any exchange-rate policy endeavor should embark on institutional changes to ensure it maximizes the return in terms of connected benefits.

The shape parameter of one of the exchange rate's distributions encompassed a range of 0.186-0.278, a clear concession that fat tails so imposed due to the variability are such that the pitfalls perceived through normal distribution-based risk models could denote an unfortunate underestimation of the real risk. Powered by the findings of this research, one recognizes the conclusions from the study by Li & Zhu (2023) that contemporary modeling can perfect risk analysis in the upcoming markets. With regard to hedging exchange rate risk, the establishment of domestic derivatives markets would reach a crucial turning point, proposing the statement of Brunnermeier & Landau (2023) that GARCH-EVT models boast the highest capacity in the estimation of equity and foreign exchange markets' value at risk. Regulation of some form will necessarily be relevant to the proper creation of these markets.

The exchange rate management would hence have to seek possible structural changes in the Nigerian economy to adapt to a high variable exchange rate. If the economy is not subject to uniform sector-specific effects, then our observation is that the Nigerian economy could be immune to exchange rate fluctuations by switching over to a variety of products to export. Similarly, this is consistent with the recognition from the OECD (2023) that public investment in renewable energy infrastructure will have substantially higher multipliers (1.8-2.2) while reducing the crowding-in of green private investments. This will diversify the economy from the international volatile price commodities that our empirical findings relate systematically to diminishing exchange rates' impacts. The World Bank (2023) also noted digital infrastructure as another area of structural change that promises high returns, with broadband network investments delivering between 30% and 40% in annual social returns) on the basis of enabling the market to where innovation usually takes place. The impact of e-business on transactions costs will also be instrumental in ensuring that some sectors are efficient and able to withstand any negative results of the exchange rate instabilities.

Implications and Policy Considerations

According to the findings, Nigeria should implement some form of managed floating exchange rate system, with intervention thresholds set just at the likely thresholds. Forex traders need to maintain the exchange rate below or near 486.75 for USD to NGN, 542.32 for EUR to NGN, 385.41 for CAD to NGN, and 372.63 for AUD to NGN, as the rate has adverse economic implications beyond these figures. This rationale complies with the endorsement from Bekaert & Hodrick (2021) regarding exchange rate management frameworks that consider regime-dependent dynamics. Hence, based on the Monte Carlo simulations, if USD/NGN crosses the threshold by the year 2029, Nigeria must build up the needed intervention capacity until that year. Varied values of the thresholds across the different currency pairs explicitly call for boosting the foreign reserve and invoicing of trade with multiple currencies. Such an act, as provided by Ghosh & Yamada (2023) in terms of Markov-switching GARCH models for exchange rate volatility analysis will tend to reduce the effect of shock on any one currency on the markets.

The results of the study further imply the necessity of enhanced risk management by the Nigerian financial institutions analyzed by VaR. The financial markets have been analyzed through VaR methodology to access imperatives of hedging in FX markets in the context of high inflation

situations. The findings, with the help of the established models, indicate for higher VaQ for USD/NGN and EUR/NGN markets during a high inflation period; therefore, higher losses are prone to be expected on these market streams compared to the market streams of CAD/NGN and AUD/NGN. This describes how Nigeria's exposure to currency-risk axis is largely dominated by USD and EUR (Olufemi, 2011; Umoru & Tedunjaiye, 2025) and by extension causing a financial crisis and consequent investor sentiment particularly when inflation rates are high. The analysis of the inflation trends through the periodical data observed in this study has also supported the depreciation of the exchange rate. Inflation is also pressing the Naira to depreciate against the other major world currencies (Umoru & Tedunjaiye, 2025). This trend of depreciation is specifically significant in the periods of 2008-2009 (Moses et al., 2020; Penzin & Salisu, 2025), 2016-2017 (Abdullahi, 2018; Omoregie, 2019; Omotosho, 2020), and 2020 (Bélaïd et al., 2020; Farayibi & Asongu, 2020; Saka, 2021) due to the global financial crisis, recession, and pandemic, respectively. These additional layers have worsened the inflationary trends that have directly ruined the exchange rates, resulting in a vicious circle of depreciation in the Nigerian economy.

Amid high inflation and exchange rate depreciation, curbing inflation should be considered the main target for all policymakers. The simulation results prove to be a giant challenge in designing and putting forth the structure of a practical monetary policy. The Central Bank of Nigeria has become extremely limited in trying to effect inflation control with general monetary policies in a situation whereby exchange rates trigger certain bands ((Bianchi & Melosi, 2018; Marcet & Nicolini, 2003; Чугунов et al., 2021; Ikechukwu et al., 2016; Isibor et al., 2023). The huge value of the inflation coefficient in Regime 2 shows that the conventional interest rate is not competent enough to stop inflation. Triggers will likely be needed beyond exchange rates and into other tools to affect the exchange rate-foreign exchange intervention. The findings further support the discharge of multiple controls from the exchange rate as the precondition for controlling inflation. This effort may involve enforcing strict adherence to fiscal measures, cutting down on nonviable expenses by decree, and heightening the productive activities of civil servants. In the meantime, the measures that will fully keep inflationary pressures in check (including interest rates and liquidity) concerning the CBN should be considered to be funded and implemented. Negative coefficients of Regime 1 point to mild currency depreciation that supports disinflation, making the maintenance of a strong currency an improbable desire for Nigeria due to its loss of export competitiveness. One should be mindful that a mere drop in the currency value invariably does happen to support the disinflationary process. Henceforth, it is not the interest of Nigeria to try hard to sustain an undervalued currency as it would discourage exports. Yet the steep shift to positive coefficients after certain thresholds means that an endeavor too tightly to prevent exchange rates would be devastating and be difficult to get right.

Analyzing the Nigerian economy shows an intense sensitivity towards inflation, which highlights the deeply rooted and structural economic flaws of the country. Specifically, from 2015 onwards, Nigeria's economy has suffered a reduced rate of investment, especially as Naira started exchanging unfavorably experiencing devaluation with other global currencies and increasingly worsened in value (Munir & Iftikhar, 2023; Yabu & Kimolo, 2020; Abdullahi, 2018; Al-Guthmy & Yan, 2020; Igweh & Chukwuka, 2024; Tondapu, 2024; C.C. et al., 2022; Ikechukwu et al., 2016). The study established that Nigeria needs to prescribe its policies that will ensure that the country does not fall into the grip of exchange rate volatility, which is being exacerbated by global uncertainty and volatile oil prices. The evidence from this study was able to elaborate other important tenets with regards to macroeconomic exchange rate management. A crucial nod with respect to this study is that constituting the exchange rate as catalyst of growth and, at the same time, as a factor which brings instability. As perceived, exchange rates are the backbone of real-time performances in trade and portfolio investment (Ajao et al., 2023; Solodzhuk & Myhovych, 2022; Thigah, 2025). On the other hand, exchange rates are viewed as endogenous factors that bring about instability through inflation and create disincentives for investment (Jamil et al., 2023; Sadeghi et al., 2022). One of the features or drawbacks of the consumption of import goods that the Nigerian population emphasizes is a pronounced de facto loss for the economy (Owan et al., 2020, 2025). With this, the imports create a quicker and wider way to pass exchange rate depreciation directly through to local prices and, accordingly, crosses up with the commonly known monetary policy transmission mechanism (Aliyu et al., 2009; Oyadeyi et al., 2024). The increasing

uncertainty in inflation forecasts underscores challenges gripping the long-term projection dynamics (Yakubu et al., 2025; Agustiar, 2020; Ganbarov et al., 2020; Sukadi, 2023). This is not to say that such exchange rate variations have been caused by prolonged periods of currency volatility (Ampitan & Akintunde, 2024; Umoru & Tedunjaiye, 2025). Indeed, deep transformational structural adjustments are imperative to ultimately curb such dependency threats, facilitating import substitution and at the same time reckoning with the exchange rate inflation channel (Osunkwo et al., 2025; Sa'ad et al., 2023).

When the government and CBN of Nigeria improve their access provision to the market, it minimizes risk for its stakeholders. The effect acts as a massive premium for foreign investors (via the special avenue of investment, FD Hydroelectric Power Projects) into Nigeria, as long as they are guaranteed the necessary returns on investments. Automatic management of the exchange rate is imperative, as increasing confidence intervals from previous periods (2040-2050) have increased uncertainty for the future long-term forecasts. All moves toward coordinated fiscal and monetary policy are to avoid total mishaps, as the analysis is overtaking exchange rates remaining below lower thresholds as the only post least-subsidized follower important policy focus. There is a huge and permanent fall-off in investment, starting from as little as one day of exchange rates being above threshold levels. This indicates the direct necessity of an orchestrated effort for preemptive policies and referee early warning systems to take these situations head-on. Proper behaviors must be ingrained and systemized well before the manifestation of mismanagement and ought to be executed at the immediate notice of violations. Nigeria has historically banked on crude oil exports for so much of her revenue generation-a trend that owes to the relatively undervalued socio-political attitudes. However, the rising exchange rate response may impact this trade. The current prediction that there could be sustained dips in investment and overreliance on unstable export does reflect the need for economic diversification should still happen. Diversification provides the resources needed to wean off external support. The various tiered thresholds dictate different outcomes given the fact of diversifying currency reserves and trading currencies, reigniting positive signs of reduced concentration risks towards the USD-NGN.

Thus, with external shocks, such as crumbling oil prices in the global market place, geopolitical risks, and global financial glitches, the Nigerian government would a priori have to come up with a strategic defensive policy against such risks. It strongly recommends that they should prearrange the strategies that could be invoked when there is a change in circumstance. For foreign exchange rate, stabilizing the domestic economy through diversification of sources of foreign income is seen as an ice for cushioning the country far from such shocks. The development of local industrial activity also takes argument that redirecting investments from traditional sectors to more complex manufacturing processes will increase long-run growth. This sort of industrial evolution would permit diversified exports and further trade in value augmentation, all of which will considerably reduce the volatility against the Nigerian naira.

Conclusion

In the research the author has explored econometric techniques to distill the nexus between exchange rates and performance of the economy, with a special focus on thresholds to ascertain when exchange rate significantly causes detrimental effects on macroeconomic variables in Nigeria. The research reveals that one of the major outcomes of this research was the identification of a minimum threshold value regarding the exchange rate. The mechanism of exchange rate depreciation immediately leads to these adverse effects over a set minimum level. Their subsequent effect includes high inflation rates and decreased investments, thus slow growth of the GDP of a country. This study had placed more importance on looking at how the exchange rate fluctuations result in affecting the overall investment and developing the State's side, that is, neoclassical investment theory. It is found out that, from these underspecified threshold levels of exchange rates, both the FDI and the local investments go up mainly due to comparatively high export competitiveness. However, there has been a counter to investment as they bid their movements greater than that threshold. Increase in uncertainty,

higher inflation, and declining confidence by investors are hence due to large depreciation in the value of the currency. The CBN should deliberately ensure that the value of its foreign currencies is managed to stay beneath set critical levels. Such measures could include a more active approach by reworking the methods employed to minimize Naira's value swings by way of operations run on the forex market, adjustments in the inter-tertiary credit rates, and beefing up the foreign exchange reserve to withstand adverse conditions from outside the borders. That would adversely affect the inflation and investments. And this is why CBN should make sure that the Naira does not surpass set foreign exchange thresholds. So, the recommendation of this study is since the rate of exchange in relation to oil prices and other external environmental indicators is known to consider diversifying the export base in Nigeria. Branching out the economy into other fields, such as agriculture, manufacturing, and technology, would help mitigate economic shocks caused by Naira's fluctuation bearing in oil pricing. Having the exchange rate stabilized and for inflation to be eradicated, joint input by fiscal and monetary authorities is required. The government should review the fiscal policies, towards placing a cap on huge budget deficits. In line with the rest of Africa, the government will have to work closely, instead of in silos, with CBN, formulating policies that are meant to secure price stability, low inflation and an environment conducive to investment. Future studies should look at how global capital flows and economic integration affect the Nigerian exchange rate. Such work may contribute in understanding how international factors impact upon domestic forces in accordance with currency stability. Considering at the constantly fluctuating exchange rates, it is useful in further studies to use more sophisticated approaches with error machines. The future research should focus on changes, including structural changes, policy reforms, sectoral distribution in Nigeria, in relation to exchange rate stability..

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