

The Impact of Exchange Rate on Remittance Inflow in Nigeria

Ifeoluwa Kosemani and Olamiposi Adeniyi

Department of Economics, Elizade University, Ilaramokin, Nigeria

DOI: <https://doi.org/10.47772/IJRISS.2026.100500462>

Received: 02 May 2026; Accepted: 07 May 2026; Published: 04 June 2026

ABSTRACT

This study investigates the effects of exchange rate fluctuations on remittance inflows in Nigeria from 1990–2023, using annual time-series data obtained from the World Bank Development Indicators (2023). Remittances was specified as the dependent variable, while exchange rate is the main explanatory variable, with GDP per capita, inflation and foreign direct investment as control variables. Fully Modified Ordinary Least Squares technique was applied to obtain long-run coefficients while Dynamic Ordinary Least Squares and Canonical Cointegrating Regression were used as robustness checks. Pairwise Granger causality test was used to assess predictive linkages. FMOLS result reveals that exchange rate depreciation exerts a negative and significant effect on remittances, while GDP per capita has a positive and highly significant effect. Granger causality results show no short-run causal relationship between exchange rate and remittances; however, remittances was found to Granger-cause GDP, while exchange rate shocks Granger-cause GDP. The findings highlight the importance of exchange rate stability for sustaining remittance inflows, and underscore the need for credible and transparent exchange rate management, narrowing of the official–parallel market gap, and the strengthening of low-cost formal remittance channels to enhance development outcomes in Nigeria.

Keywords: Exchange rate, remittances, FMOLS, causal relationship

INTRODUCTION

Remittances have long played a critical role in sustaining households and national economies, particularly in developing countries. With globalization expanding international labour mobility, migrant workers increasingly send financial transfers to their families, making remittances a fundamental driver of economic development, poverty alleviation, and financial stability. Remittances encompass both financial payments and non-financial transfers from migrants abroad to their home countries, while the World Bank defines them to include personal transfers and compensation of employees. (IMF, 2009; World Bank, 2020). For Nigeria, the steady inflows from its diaspora constitute a vital source of foreign exchange, supporting macroeconomic stability and contributing significantly to the growth of sub-Saharan Africa (Benmamoun & Lehnert, 2013).

Remittances can be categorized into three components: personal transfers to households, compensation to temporary workers, and capital transfers associated with permanent migration. These channels underscore the multifaceted nature of remittance flows and their wide-ranging implications for household welfare and national development. At the micro level, remittances improve household consumption, strengthen resilience against shocks, and facilitate investments in education and human capital development (Giuliano & Ruiz-Arranz, 2009). At the macro level, remittances contribute to foreign reserve accumulation, reduce external borrowing, and support economic growth (Ratha & Mohapatra, 2011). Additionally, remittances can spur entrepreneurship as recipients use funds to establish small-scale businesses, thereby generating employment and stimulating local economies.

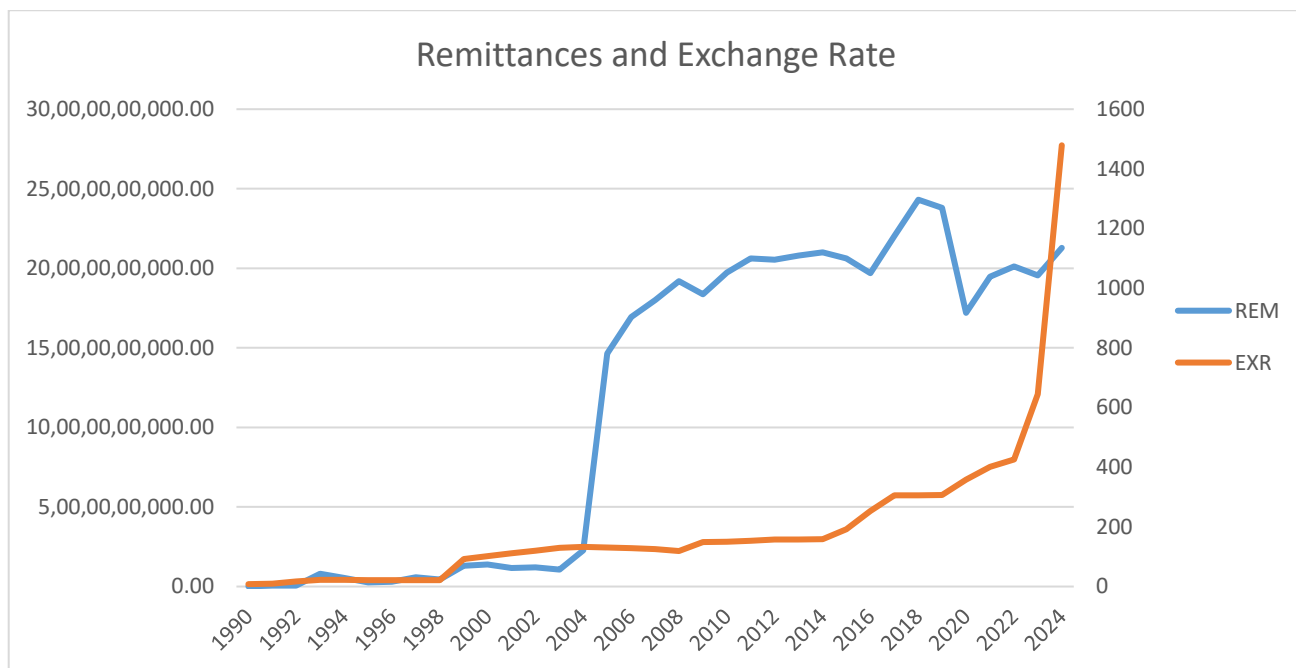
Nevertheless, the benefits of remittances are not without costs. Large inflows may create dependency, discouraging labour market participation and reducing productivity (Chami et al., 2003). They may also fuel inflationary pressures and lead to exchange rate appreciation that undermines the competitiveness of the export sector, a phenomenon known as the “Dutch Disease” (Amuedo-Dorantes & Pozo, 2004; Acosta, Lartey, & Mandelman, 2009; Acosta et al., 2009). These potential downsides highlight the dual nature of remittance flows

and underscore the importance of policy frameworks that enhance their developmental impact while mitigating adverse effects.

Exchange rate movements play a particularly crucial role in shaping remittance behaviour. A depreciation of the local currency increases the value of foreign earnings when converted into domestic currency, thereby encouraging migrants to remit more (IMF, 2009; World Bank, 2020). Conversely, persistent volatility or excessive appreciation may erode the purchasing power of remittances and reduce household welfare (Oloyede, 2016). For Nigeria, where remittances consistently rank as a top source of foreign exchange, understanding how exchange rate fluctuations affect these inflows is both economically and socially significant.

Despite these theoretical expectations, Nigeria's historical experience suggests that the relationship between exchange rate movements and remittance inflows has been far from consistent. An examination of the trend from 1990 to 2023 (see Figure 1) reveals four distinct phases that contradict conventional assumptions. Periods of sharp depreciation have not always been accompanied by increases in remittances, while episodes of relative stability or appreciation have sometimes coincided with surging inflows. These contradictions raise critical questions about the true impact of exchange rate fluctuations on remittance inflows in Nigeria. The persistence of these inconsistencies creates a significant empirical and policy gap, making it essential to investigate whether exchange rate movements genuinely drive remittance inflows or whether other macroeconomic factors—such as GDP per capita, inflation, and foreign direct investment—play a more decisive role in shaping the remittance–exchange rate nexus.

Fig 1



Source: Author's Computation using Eviews 10 (2025)

Between 1990 and 2023, Nigeria's experience with remittances and exchange rate dynamics reveals four distinct phases that highlight the complex nature of their relationship. In the first stage (1990–1998), the naira depreciated gradually, yet remittance inflows remained very low and almost flat, suggesting that exchange rate movements had little or no visible effect on inflows. The second stage (1999–2004) was marked by continued depreciation with irregular fluctuations, during which remittance inflows began to increase slightly but not sharply. The third stage (2004–2021) displayed a stronger divergence: remittances rose sharply and steadily, while the exchange rate continued to depreciate with instability. Notably, inflows maintained an upward trend despite volatility in the exchange rate. In the fourth stage (2021–2023), the naira depreciated steeply to its weakest levels, but remittances did not continue to rise; instead, they fluctuated between increases and declines. Taken together, these four stages underscore the uncertainty and inconsistency of the exchange rate–remittance relationship in Nigeria.

This uncertainty is also reflected in the literature, where studies on causality present mixed evidence. A unidirectional causal relationship in which movements in the real effective exchange rate predict future remittance inflows (Akçay, 2024) while another study reported a bi-directional causality, suggesting that both exchange rate and remittances can predict each other's future values. (Oreko, 2023) Similarly, in Kyrgyzstan, exchange rate movements Granger-cause remittances. (Sultonov, 2020), These contrasting findings indicate the absence of consensus, leaving the causal dynamics between exchange rate and remittances unresolved, particularly in the Nigerian context.

Against this backdrop, two central research questions arise: what is the impact of exchange rate fluctuations on remittances in Nigeria, and what is the causal relationship between exchange rate and remittances? The broad objective of this study is therefore to examine the impact of exchange rate fluctuations on remittances in Nigeria. Specifically, the study seeks to ascertain the long-run impact of exchange rate fluctuations on remittances and to determine the causal relationship between the two variables. The justification for this study lies in the economic importance of remittances to Nigeria and the lack of consensus in existing research. Remittances have become one of the most significant sources of external finance for the country, surpassing both foreign direct investment and foreign aid in recent years (World Bank, 2021). While some scholars argue that depreciation of the naira increases remittance inflows by raising the local currency value of foreign transfers, others contend that persistent depreciation and volatility discourage the use of formal transfer channels (Onuoha & Uzonwanne, 2023; Akanbi & Yusuf, 2024). Moreover, much of the literature has concentrated on the effects of exchange rates on trade, investment, and GDP, with limited attention to remittances despite their critical role in household welfare, poverty reduction, and financial stability (Ratha, 2003; IMF, 2020). By focusing specifically on remittances as the dependent variable and exchange rate as the independent variable, this study fills an important empirical gap in the Nigerian context.

In addition to its academic contribution, this study offers practical value for policy development. By applying the Fully Modified OLS (FMOLS) estimator and Granger causality tests, it provides empirical evidence on whether exchange rate depreciation serves as a driver of remittances or a deterrent. The findings will guide policymakers, regulatory agencies, and financial institutions in formulating exchange rate stabilization measures and remittance-friendly frameworks that safeguard inflows, promote financial inclusion, and sustain economic development.

This research is justified by the central role remittances play in Nigeria's economy and the persistent uncertainty surrounding how exchange rate fluctuations affect their flow. Despite being the largest remittance recipient in Sub-Saharan Africa, Nigeria continues to face sharp naira depreciation and frequent volatility that create mixed incentives for migrants. Theory predicts that depreciation should increase inflows by raising the local value of foreign transfers, yet Nigeria's historical pattern has been inconsistent—sometimes showing growth, at other times stagnation or decline. This contradiction underscores the urgent need for an empirical reassessment focused exclusively on the remittance–exchange rate nexus. Existing studies in Nigeria have produced inconclusive evidence: some suggest that depreciation encourages remittances, while others show that volatility and persistent weakness of the naira deter formal transfers. Moreover, the majority of prior work has concentrated on broader macroeconomic outcomes such as trade or GDP, with limited focus on remittances as a dependent variable. Given that remittances now surpass both foreign direct investment and foreign aid in Nigeria, overlooking this gap leaves policymakers without clear guidance on how exchange rate policy interacts with household welfare and external financing. This study therefore justifies itself on three grounds: first, it addresses an empirical gap by isolating remittances as the primary outcome of interest; second, it applies robust econometric techniques (FMOLS, DOLS, CCR, and Granger causality) that provide stronger long-run evidence than earlier methods; and third, it responds to a pressing policy need by clarifying whether exchange rate depreciation acts as a driver or deterrent of remittance inflows. The results will provide actionable evidence for designing exchange-rate stabilization measures and remittance-friendly frameworks that protect household welfare, ensure financial inclusion, and sustain Nigeria's macroeconomic stability.

LITERATURE REVIEW

The exchange rate is the price of one country's currency in terms of another, expressed either as a nominal rate (the market conversion rate) or a real exchange rate (adjusted for cross-country price levels) to capture

competitiveness (Krugman & Obstfeld, 2009; Obstfeld & Rogoff, 1996). Exchange rate regimes vary from fixed pegs to floating systems, with Nigeria adopting a managed float to reduce volatility (CBN, 2023). Depreciation may improve exports but raises inflationary pressures, while appreciation can lower inflation but harm domestic industry (Mankiw, 2018). Exchange rate movements are shaped by inflation, interest rates, growth, and external balances (Krugman & Obstfeld, 2018; Mishkin, 2019; IMF, 2020; World Bank, 2021). For Nigeria, government interventions and FX reserves also play important roles (CBN, 2023).

Employment and wages abroad, exchange rates, the cost of the transfer, and policy restrictions are factors that affect remittances, which refers to monetary transfers made by migrants to their home countries (Ratha, 2003; IMF, 2020; World Bank, 2021). Positive exchange rates enhance local value and high transfer costs of tight FX controls lower formal inflows. There are several theoretical approaches that may be used to explain the relationship between remittance flows and exchange rate movements.

Purchasing Power Parity (PPP) asserts that exchange rates in the long-run are determined by inflation differentials, hence inflows of remittance could increase when the local currency weakens, since migrants take advantage of the increased purchasing power (Krugman and Obstfeld, 2009). However, any continued volatility may deter stable inflows as a result of uncertainty. Alternatively, both the Behavioral Theory of Remittances (Lucas and Stark, 1985) and altruism and self-interest both contribute to their motive, with exchange rates variations influencing the utility of remittance, in which altruistic transfers can rise because depreciation lowers household welfare, and self-interested transfers can rise in response to better investment opportunities as domestic assets become cheaper in foreign currency. Risk Aversion Model is based on this by observing that transaction risk increases with exchange rate volatility and reduces the certainty-equivalent amounts of remittances and promotes the use of informal channels (El-Sakka and McNabb, 1999). The Portfolio Approach to Remittance Behavior (Elbadawi and Rocha, 1992; Chami, Fullenkamp and Jahjah, 2005) takes it one step further and assumes the remittances are investment-like flows in which the migrants invest their funds according to comparative yields and risks. The process of exchange rate depreciation can increase inflows when migrants feel that local assets are underpriced, but the volatility discourages the types of remittance that involve investment. On the same note, there is the Macroeconomic Absorption Theory (Mundell, 1968), which focuses on the interplay of remittances with external balances, and exchange rates. Big inflows can also appreciate the real exchange rate with a Dutch disease effect that makes non-oil exports less competitive, which in turn contributes to the exchange rate effect.

Empirical Review

Remittances have been shown to significantly influence the economies of recipient countries (Chami et al., 2008), prompting a wide range of empirical studies on their relationship with exchange rates and other macroeconomic variables. In the Nigerian context, Urama et al. (2017) employed the ARDL bounds testing approach to assess whether large remittance inflows between 1978 and 2017 triggered Dutch disease effects. Their results revealed that a 1% increase in remittances led to a 0.44% appreciation of the real exchange rate, thereby encouraging imports and discouraging exports. Similarly, Osigwe and Obi (2016), using cointegration and an error correction model, found a negative long-run relationship between remittances and exchange rate movements, suggesting that remittances significantly influence the real exchange rate in Nigeria. These results align with broader evidence that remittances can appreciate the real exchange rate (the Dutch-disease channel), as documented in multi-country studies by Lopez and colleagues at the World Bank and subsequent updates, which show that sustained remittance inflows are often associated with real appreciation, especially where service-sector prices rise relative to tradable. Investigating the reverse relationship, Zennati (2025) explored the asymmetric effects of remittance shocks on the real effective exchange rate using nonlinear cointegration for Morocco. The results showed that the REER responds differently to positive versus negative remittance innovations. The study highlights the importance of nonlinearity and institutional/financial-sector conditions when interpreting remittance–exchange-rate dynamics in African economies. Narayan (2025) using time-series evidence, the authors link remittances to prices and output, clarifying price-level channels that can interact with exchange-rate dynamics. This provides background for interpreting whether remittance shocks transmit to inflation differentials and, by extension, to the REER in small open economies. Skufi, Meri Papavangjeli & Adam Gersl explored migration, remittances, and wage-inflation spillovers using Albania and Lorena as case studies. They documented that beyond the direct remittance-inflation link, remittances induce inflationary

pressures (about 18 basis points in their study) and exacerbate wage response in tightening labor markets. This is useful in your empirical literature for framing how remittance shocks might translate into inflation differentials, and hence feed into the real exchange rate through the price channel. Olubiyi and Kehinde (2015) applied the generalized method of moments to data from 1980–2013 and found that real exchange rate depreciation had a negative impact on remittance inflows, with altruism identified as the primary driver of transfers. Likewise, Obi et al. (2015), using Johansen cointegration and Granger causality tests, confirmed a long-run relationship among remittances, exchange rate, and money supply, and showed unidirectional causality running from exchange rate to remittances. Atta (2025) re-examining the remittances–REER nexus with updated post-COVID data and modern cointegration tools, Atta revisits whether sustained remittance inflows are associated with real exchange-rate movements and the classic Dutch-disease mechanism. The paper serves as a contemporary benchmark for cross-country evidence on whether remittances co-move with REER and under what conditions the appreciation channel becomes salient. In addition, Mbutor (2010), employing a VAR model, argued that monetary policy indirectly influences remittances through exchange rate, interest rate, and inflation, while also showing that depreciation discourages inflows. More recently, Ayunku and Dickson (2021) found, through Granger causality and regression analysis, that remittances and exchange rate exhibit bidirectional causality with economic growth, while inflation exerts a negative effect.

Studies with similar (supporting) findings. Recent single-country and multi-country analyses continue to report that remittances appreciate the real exchange rate or that depreciation discourages formal inflows. For example, a 2023 study for Vietnam found that a 10% increase in remittances raised the effective real exchange rate by about 3%, weakening price competitiveness—consistent with a Dutch-disease mechanism. In Nigeria, a 2025 ARDL sectoral study reports that while remittances affect sectoral productivity in tradables vs. non-tradables, the long-run effect on the real exchange rate is nuanced; nonetheless, the broader literature it surveys for Nigeria and peers documents frequent real-appreciation effects from remittance surges. Cross-country evidence from the IMF and World Bank likewise associates rising remittances with real appreciation in many emerging economies, though the magnitude depends on openness, factor mobility, and consumption patterns.

Studies finding opposite or discouraging effects. There is also credible evidence for **negative** impacts of depreciation/volatility on formal inflows. Nigerian and SSA studies frequently highlight that exchange-rate uncertainty and dual markets push transfers into informal channels, so measured official inflows fall when the local currency is unstable. A recent GARCH–MIDAS analysis shows that higher remittance inflows can increase exchange-rate volatility, particularly under high economic-policy uncertainty and geopolitical risk, which can, in turn, deter formal remitting (an effect consistent with the risk-aversion and pass-through/transaction-cost theories you cited). Classic evidence from Egypt shows regime dependence: under managed floats, official remittances respond strongly to exchange-rate movements, but under fixed regimes, unofficial channels dominate—underscoring how policy and market structure mediate the sign and visibility of effects.

Mixed or null results. Not all settings find a clean Dutch-disease pattern. A 2025 Nigeria-focused sectoral ARDL paper concludes that contrary to Dutch-disease expectations, remittances do **not** exert a long-term impact on the real exchange rate; instead, trade openness, inflation and terms of trade are stronger real-exchange-rate drivers, while remittances’ main effects show up as shifting productivity between tradable and non-tradable sectors. In West Africa, Ghana’s evidence is mixed across methods and samples: while several studies report that higher remittances appreciate the cedi in the long run (e.g., ECM results), others find insignificant or no robust effect on the real exchange rate once controls are expanded—illustrating how results hinge on identification, controls, and period.

The body of empirical literature therefore confirms that findings remain inconsistent. Many studies show that remittances appreciate the real exchange rate and that depreciation discourages measured inflows, often through Dutch-disease and transaction-cost mechanisms. Others highlight that volatility and policy uncertainty shift transfers into informal channels, thereby reducing official statistics. A growing strand of more recent research, including Nigeria-specific work, suggests no long-run real exchange rate effect, attributing movements instead to openness, inflation, and terms of trade, with remittances primarily influencing sectoral allocation rather than the level of the real exchange rate (World Bank; IMF)

In Nigeria, the policy context of the last decade provides further nuance. Exchange-rate regime changes, the opening and closing of FX windows, and reforms affecting transfer costs and official channels coincided with noticeable shifts in recorded remittances. For example, descriptive aggregates for 2024 show an 8.9% rise in recorded inflows alongside broader external-sector improvements, a trend consistent with a policy channel explanation rather than a pure price (RER) effect (Reuters). Against this backdrop, the present study contributes by examining how exchange rate fluctuations directly shape remittance inflows in Nigeria between 1990 and 2023, employing FMOLS to capture long-run elasticities and Granger causality to test predictive directions. This approach is well aligned with the theoretical perspectives reviewed, particularly the Permanent Income Hypothesis, the Portfolio Approach, and Exchange Rate Pass-through theories, where depreciation may increase local purchasing power and stimulate altruistic or investment-related transfers, but heightened volatility and transaction frictions can divert flows to informal markets. The ambiguity in prior results underscores the need for robust estimation strategies and careful attention to Nigeria's institutional context in interpreting the dynamics of remittances and exchange rates.

METHODOLOGY

Methodology and Data Specifications

Annual times series data was used to examine both the direct effect of exchange rate fluctuations on remittance inflows and the causal dynamics between the two variables, this study provides comprehensive insights into their relationship over three decades. The scope of this study spans the period 1990–2023, a timeframe that captures the rapid growth of remittance inflows as well as major exchange rate reforms under Nigeria's Structural Adjustment Programme. The analysis focuses exclusively on Nigeria, with remittances (LREM) serving as the dependent variable and exchange rate (EXR) as the principal explanatory variable. Additional control variables include GDP per capita (LGDP), inflation (CPI), and foreign direct investment (FDI). Data was gotten from WDI (2023).

Theoretical Framework

To empirically examine the correlation between exchange rate and remittance inflows in Nigeria, this research identifies a specific model that falls in the theoretical framework of the Portfolio Approach to Remittance Behaviour (Lucas and Stark, 1985; ElSakka and McNabb, 1999). The theory presumes that migrants make rational choices by pooling their assets between savings in host and home countries and remittances based on relativity of macroeconomic situations. Indicators that affect the attraction of sending foreign money into Nigeria are therefore the exchange rates, rate of inflation, rate of interest and investment opportunities which interactively yield to promising remittance decisions. Nigerian empirical investigations have underlined the applicability of these macroeconomic factors, in modeling remittance flows. Adejumo and Ikhida (2019) discover that the pressures of the remittances are depreciating on the naira, and Ilu (2018) and Afolabi et al. (2021) confirm the influence of the FDI, oil prices, and inflation clarifying exchange rate volatility. Most recently, the effects of remittance flows are demonstrated to be both stabilizing and destabilizing on exchange rate and inflation dynamics (Anosike and Alfarhel 2024). Based on these results, this research paper describes remittances as a relation with respect to exchange rate, inflation, GDP per capita and foreign direct investment and interest rate.

$$REM_t = f(EXR_t, CPI_t, GDP_t, FDI_t) \quad (3.1)$$

Where, REM_t is remittance inflows into Nigeria at time t , EXR_t is nominal exchange rate

(NGN/USD), CPI_t is Consumer Price Index, GDP_t is gross Domestic Product per capita, FDI_t is foreign Direct Investment inflows.

Model specification for Impact of exchange rate on remittances

To estimate the model, we change it into log-linear form in order to interpret elasticities and to stabilize variance, except CPI, which is kept in level form because it is expressed in a percentage:

$$\ln(REM_t) = \beta_0 + \beta_1 \ln(EXR_t) + \beta_2 CPI_t + \beta_3 \ln(GDP_t) + \beta_4 \ln(FDI_t) + v_t \quad (3.2)$$

Where, $\ln(REM_t)$ is natural logarithm of remittance inflows, sourced from World Bank remittance database, $\ln(EXR_t)$ is log of official exchange rate (CBN statistics), CPI_t is Consumer Price Index (World Development Indicators), $\ln(GDP_t)$ is log of GDP per capita, representing economic development, $\ln(FDI_t)$ is log of foreign direct investment inflows, capturing investment incentives, v_t is white noise error term.

A priori expectation: exchange rate depreciation should boost remittance inflows, and inflation should have a negative impact on the same, GDP per capita is likely to lower remittance flows when the insurance motive is predominant and raise remittances when the investment motive predominates, and FDI is expected to have a favourable influence by signalling general investment confidence (Adejumo & Ikhide, 2019, Ayunku & Dickson, 2021, Obi & Osigwe, 2016 and Aderemi, Omitogun & Osisanwo, 2022).

Model Specification for Causality Analysis

To determine the direction of influence between exchange rate and remittances, the study applies the Granger Causality Test. The model is specified as:

$$\begin{aligned} \ln REMIT_t = & \alpha_0 + \sum_{i=1}^n \alpha_i \ln(REMIT_{t-i}) + \sum_{j=1}^n \beta_j \ln(EXR_{t-j}) + \sum_{k=1}^n \delta_k Z_{t-k} + \mu_t \\ \ln EXR_t = & \gamma_0 + \sum_{i=1}^n \gamma_i \ln(EXR_{t-i}) + \sum_{j=1}^n \theta_j \ln(REMIT_{t-j}) + \sum_{k=1}^n \phi_k Z_{t-k} + v_t \end{aligned} \quad (3.3)$$

Where, $\ln REMIT_t$ is the natural logarithm of remittance inflows, $\ln EXR_t$ is the natural logarithm of the nominal exchange rate (naira/USD), Z_{t-k} is the vector of relevant control variables lagged at k , which includes: Inflation (INF), Foreign Direct Investment (FDI), Interest Rate (INT), GDP per capita (GDP), μ_t and v_t are the white noise error terms, $\alpha, \beta, \delta, \gamma, \theta, \phi$ are the parameters to be estimated. The inclusion of the control vector Z_{t-k} is important to avoid omitted variable bias and to ensure that the observed causality between exchange rate and remittances is not confounded by other macroeconomic indicators that, according to the Portfolio Approach, may also influence remittance behaviour.

Estimation Techniques

Two complementary estimation techniques are applied: Fully Modified Ordinary Least Squares (FMOLS) is employed to estimate the long-run relationship between exchange rate and remittance inflows. FMOLS corrects for serial correlation and endogeneity in cointegrated time series, ensuring consistent estimates. The FMOLS method can be used when the variables are cointegrated and when they are all integrated of the first order. VAR Granger Causality Test is used to determine the causal direction between exchange rate and remittances. This test identifies whether exchange rate fluctuations predict remittance inflows, whether remittances influence exchange rate dynamics, or whether both directions exist.

FINDINGS AND DISCUSSION

Descriptive Statistics of Data

Table 1 presents the descriptive statistics of the variables employed in this study, namely exchange rate (EXR), remittances (LREM), economic growth (LGDP), foreign direct investment (FDI), and inflation (CPI). The mean values for these variables are 109.5049, 22.0016, 26.04890, 1.2951, and 18.2781 respectively, showing the central tendency of the data series. The median values, which are all close to the mean, indicate consistency of the dataset.

The maximum values for EXR, LREM, LGDP, FDI, and CPI were 273.0017, 36.1190, 27.0676, 2.9094, and 72.8355, while their minimum values were 49.7748, 16.1190, 24.6756, -0.0391, and 5.3880 respectively. This shows that the series all fall within a wide range, particularly for exchange rate and inflation, which experienced high volatility within the study period. The standard deviations for EXR, LREM, LGDP, FDI, and CPI were 48.0886, 2.1737, 0.8131, 0.8493, and 15.9021 respectively. This implies that exchange rate and inflation rate recorded the highest levels of dispersion from their means, confirming their unstable nature in Nigeria, while remittances, GDP, and FDI remained relatively less dispersed. The skewness statistics show that EXR, LGDP, FDI, and CPI are positively skewed, indicating distributions with longer right tails, while LREM is negatively skewed, suggesting a distribution with a longer left tail. The kurtosis values reveal that EXR (6.4847), LREM (2.8778), LGDP (1.7027), FDI (1.8873), and CPI (6.8551) have mixed distributions: EXR and CPI have kurtosis greater than 3, implying they are leptokurtic with heavier tails than the normal distribution, while LREM, LGDP, and FDI have values below 3, showing that they are platykurtic with lighter tails. Finally, the Jarque-Bera test shows that EXR and CPI are not normally distributed since their probability values are 0.000000, which are less than the 5% significance level. LREM, LGDP, and FDI, however, are approximately normally distributed as their probability values (0.0855, 0.1657, and 0.3838) are greater than the 5% threshold.

Table 1: Descriptive Table

Statistic	EXR	CPI	LGDP	LREM	FDI
Mean	109.5049	18.2781	26.0490	22.0016	1.2951
Median	100.5657	12.9418	26.2747	23.559	1.2886
Maximum	273.3017	72.8356	27.0762	23.9137	2.9024
Minimum	49.7748	5.3880	24.6756	16.1190	-0.0391
Std. Dev.	48.0886	15.9020	0.8132	2.1737	0.1687
Skewness	1.8327	2.1804	-0.4622	-0.9296	0.1687
Kurtosis	6.4847	6.8551	1.7027	2.8787	1.8873
Jarque-Bera	36.2353	47.9940	3.5949	4.9182	1.9155
Probability	0.0000	0.0000	0.1657	0.0855	0.3838
Sum	3723.167	621.4536	885.6643	748.0547	44.0301
Sum Sq. Dev.	76313.05	8344.851	21.8217	155.9239	23.4487
Observations	34	34	34	34	34

Source: Author's Computation using Eviews 10 (2025)

Unit Root Tests

The unit root test for stationarity was based on the Augmented Dickey Fuller (ADF) test and the Philips-Perron (PP) test. From table 2A, the result showed that all the variables are integrated of order one (1) which implies that they are stationary at first difference.

Table 2A: Unit Root Test

Augmented Dickey-fuller (ADF) Test			Philip Perron (PP) Test		Decision
Variables	Level	First Difference	Level	First Difference	
LREM	-3.1703	-6.6921***	-3.1703	-7.1561***	I(1)
EXR	-2.6553	-5.4410***	-2.8061	-5.4544***	I(1)

LGDP	-1.6126	-4.8936***	-1.6532	-4.8833***	I(1)
CPI	-2.1784	-4.6452***	-2.4613	-4.6322***	I(1)
FDI	-2.3912	-6.9672***	-2.3702	-7.1225***	I(1)

Source: Author's Computation using Eviews 10 (2025)

Structural changes have been argued to prompt changes in unit root. Perron (1989). Therefore, there is a need to test for unit root with structural breaks to confirm the structural changes that occurred in the economy and when. The test was determined using Zivot-Andrews unit root test with structural breaks, it combines both trend and intercept of the ADF model. The test was used to examine the stationarity properties of the variables while allowing for one endogenous structural break in each series. This is important because macroeconomic variables in Nigeria may be affected by structural changes such as exchange rate reforms, inflationary pressure, changes in government policy, economic crises, and external shocks. The result presented in Table 2B confirms that there are different break point years among the variables. The break dates match periods of great significance in the history of Nigeria and the world at large.

The central bank of Nigeria re introduced the Nigeria's Dutch auction system (DAS) in July 2002 to fight the ever increasing demand pressure, make the naira more stable and curb the disparity between the official and parallel market rates causing a structural shift in exchange rate in 2002. There was a structural break due to policy changes and better data capturing that shifted remittances from informal to formal channels in 2004. Also, the reintroduction of DAS in 2002 has begun to be effective on the economy leading to a structural break in 2004. In 1995, inflation reached its peak after the introduction of Structural adjustment programme (SAP) which could be attributed to the expansionary fiscal policy introduced in the mid-90s. In 2005, remittances spiked and contributed significantly to the national income which led to a breakpoint.

Table 2B: Unit Root Test with Structural Breaks.

Variable	Levels	Break Date	First Difference	Status
EXR	-3.9135	2002	-14.9500***	I(1)
REM	-9.9363***	2004	-8.2172***	I(0)
CPI	-7.3019***	1995	-14.2100***	I(0)
RGDP	-3.1505	2005	-5.0191***	I(1)
FDI	-3.2976	2013	-8.6202***	I(1)

Source: Author's Computation using Eviews 10 (2025)

Correlation Test

The correlation result is reported in Table 3. Remittances (LREM) and exchange rate (EXR) show a very weak positive association (0.0056), indicating no meaningful direct link between the two variables. By contrast, LREM and GDP per capita (LGDP) exhibit a very strong positive correlation (0.8454), suggesting that higher remittances are closely associated with improved economic growth. LREM is weakly and positively correlated with FDI (0.0181) and moderately and negatively correlated with inflation (CPI) (-0.3768), implying that remittances may help reduce inflationary pressures. Among the control variables, EXR and LGDP show a weak positive relationship (0.3798), while EXR and FDI display a moderate negative correlation (-0.6225), suggesting that exchange rate instability discourages investment. LGDP is moderately and negatively correlated with both FDI (-0.3594) and CPI (-0.3602), while FDI and CPI exhibit only a very weak positive link (0.0398).

Overall, no evidence of severe multicollinearity is observed since no correlation exceeds the 0.8 threshold apart from the strong LREM–LGDP relationship. This confirms that the variables are appropriate for subsequent econometric analysis.

Table 3: Correlation Test

	LGDP	EXR	CPI	LREM	FDI
LGDP	1.0000	0.3798	-0.3602	0.8455	-0.3594
EXR	0.3798	1.0000	-0.0207	0.0057	-0.6225
CPI	-0.3602	-0.0207	1.0000	-0.3768	0.0398
LREM	0.8455	0.0057	-0.3768	1.0000	0.0181
FDI	-0.3594	-0.6225	0.0398	0.0181	1.0000

Source: Author’s Computation using Eviews 10 (2025)

Cointegration Test

Johansen cointegration test was used to determine the longrun relationship among the variables. It confirmed the existence of three cointegrating equations among remittances (LREM), exchange rate (EXR), GDP per capita (LGDP), FDI, and inflation (CPI). The result is displayed in Table 4, at the 5% level, the null hypothesis of no cointegration was rejected at the “none,” “at most one,” and “at most two” levels, while it could not be rejected beyond three vectors. This confirms that although the variables are individually non-stationary, they share a stable long-run equilibrium relationship. Economically, this implies that remittances, exchange rate, GDP, FDI, and inflation move together in the long run, such that shocks to one variable are eventually offset by adjustments in the others, reinforcing their interdependence.

Table 4: Johansen Cointegration Result

Hypothesized	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob**
None*	0.6775	36.2104	33.8769	0.0258
At most 1*	0.6012	29.4139	27.5843	0.0288
At most 2*	0.5577	26.1034	21.1316	0.0092
At most 3*	0.2010	7.1823	14.2646	0.4678
At most 4*	0.0943	3.1693	3.8415	0.0750

Source: Author’s Computation using eviews 10 (2025)

Lag Length Criteria

Table 5 shows the VAR lag order selection criteria show that the most appropriate lag length in the model is lag 4. The conclusion is made with regard to the outcomes of the five criteria of selection, which include the likelihood ratio (LR), final prediction error (FPE), Akaike information criterion (AIC), Schwarz criterion (SC), and Hannan-quin (HQ). In particular, there was the highest value of the likelihood ratio test at the lag 4 (47.1762), and the last prediction error had the lowest value at lag 4 (0.4798), which once again proves the suitability of the lag worth. In like manner, the information criteria of AIC, SC, and HQ also reached the minimum at lag 4

(11.7820, 16.6862, and 13.3509, respectively), as shown by the asterisks. Taken together these results demonstrate the convergence of the statistical measures consistently in support of lag 4 as the most effective lag order of estimating the VAR.

Table 5: Lag length Criteria Result

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-348.9050	NA	12141.74	23.5937	23.8272	23.6684
1	-238.9493	175.9291	43.2889	17.9300	19.3312	18.3782
2	-231.5553	32.1658	49.0725	17.9037	20.4726	18.7255
3	-150.3490	58.9925	5.9406	15.3566	19.0931	16.5520
4	-71.7296	47.1717*	0.4798*	11.7820*	16.6862*	13.3509*

Source: Author's Computation using evIEWS 10 (2025)

Discussion

Fully Modified Least Squares (FMOLS)

After demonstrating that the variables are I(I) variables and have a long run relationship from tables 2 and 4 respectively, we have satisfied the condition for FMOLS by (Mehmood and Shaid, 2014). The coefficient of the exchange rate (EXR) is -0.0101, and it is statistically significant at the 5% level with a probability value of 0.0144. This negative and significant relationship implies that exchange rate depreciation reduces remittance inflows in Nigeria. In other words, as the naira weakens against foreign currencies, migrants remit less through official channels, possibly due to loss of confidence and diversion to informal markets. This outcome is in line with the findings of Onuoha and Uzonwanne (2023), Akanbi and Yusuf (2024), and Orekoya and Akintunde (2023), who also documented that depreciation of the local currency discourages remittances.

The coefficient of GDP per capita (LGDP) is 2.5077 and statistically significant at the 1% level with a probability value of 0.0000. This positive and highly significant result suggests that higher economic growth encourages remittance inflows. It indicates that migrants are motivated to send more when the economy is performing well, either to invest or to take advantage of improved opportunities at home. This finding aligns with Adeola and Olufemi (2014), Abiodun and Ajibola (2016), and Omotola and Olusoji (2017), who established that economic growth attracts more remittances.

The coefficient of inflation (CPI) is -0.0046 and statistically insignificant with a probability value of 0.6497. This shows that inflation has no meaningful impact on remittance inflows in Nigeria during the study period. Although the sign is negative, suggesting that higher inflation tends to reduce the value of remitted funds and discourage inflows, the insignificance implies that this effect is not strong enough to influence remittance decisions. Similar findings were reported by Ayunku and Dickson (2021), and Anosike and Alfadhel (2024), who noted that while inflation reduces the purchasing power of remittances, the effect is often muted compared to other macroeconomic factors.

The coefficient of foreign direct investment (FDI) is 0.4135 and positive, but statistically insignificant at the 5% level with a probability value of 0.0737. This result indicates that FDI inflows have only a weak and insignificant influence on remittance inflows in Nigeria. While FDI can signal confidence in the economy and create opportunities that might attract remittances, its effect during the study period is not robust. This outcome agrees with the findings of Akanbi and Yusuf (2024), who argued that FDI on its own does not significantly stimulate remittances unless complemented by strong governance and institutional quality. The constant term (C) is -45.1635 and statistically significant at the 1% level, indicating that in the absence of the explanatory variables,

remittances would be negative, reflecting the structural weaknesses in Nigeria's remittance inflow system. The coefficient of determination (R^2) is 0.9487, meaning that about 95% of the variation in remittance inflows (LREM) is explained by the explanatory variables: exchange rate (EXR), GDP per capita (LGDP), inflation (CPI), and foreign direct investment (FDI). The adjusted R^2 of 0.9399 confirms the robustness of the model. This high explanatory power suggests that the chosen variables are strong determinants of remittance inflows in Nigeria during the period 1991–2023.

Table 6: FMOLS result

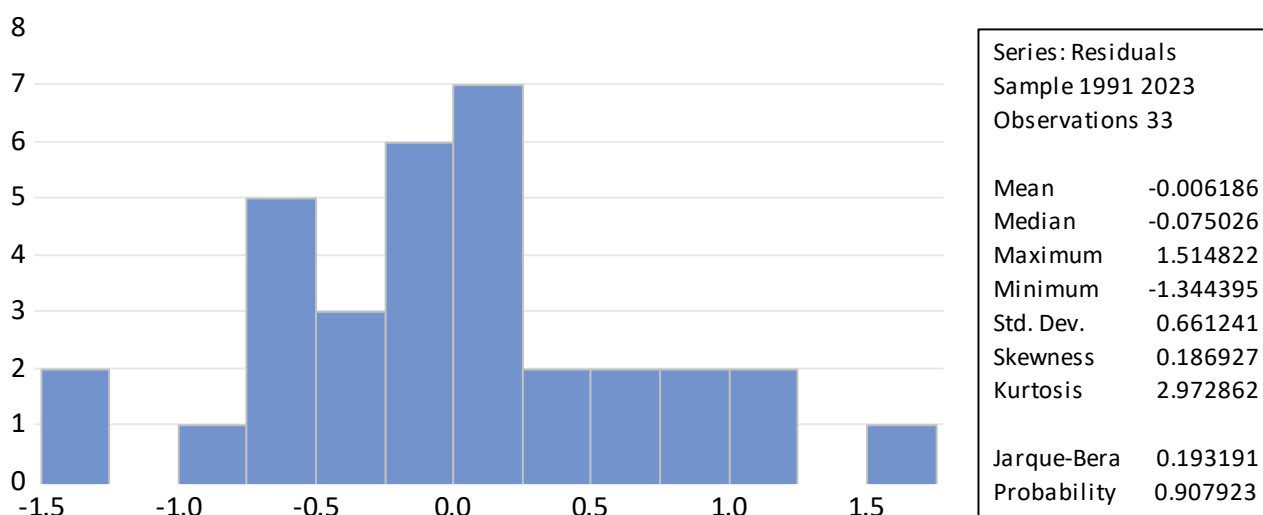
Dependent variable: LREM (Remittances)				
Variable	Coefficient	Std. Error	t-Statistic	Probability
LGDP	2.5077	0.2207	11.3139	0.0000
EXR	-0.0101	0.0039	-2.6088	0.0144
FDI	0.4135	0.2226	1.8582	0.0737
CPI	-0.0046	0.0099	-0.4592	0.6497
C	-45.1664	5.8782	-7.682732	0.0000
	R-Squared	0.9487	Adjusted R-Squared	0.9399

Source: Author's Computation using eviews 10 (2025)

Normality Test

The JarqueBera (JB) test was carried out to check the residual normality of the FMOLS model. Fig.1 presented the residual diagnostic indicating that the residuals have a mean near zero (-0.0062), are almost symmetric (skewness = 0.18), and that their kurtosis (2.97) is near 3.0, the value of a standard distribution. Jarque-Bera is 0.1932 and the probability is 0.9079, which is much higher than the 5% level of significance showing the null hypothesis of normality is not rejected. This is confirmation that the residuals are normally distributed, as one essential econometric assumption, with the implication that the estimates of the model are reliable.

Fig 1: Normality Test



Source: Author's Computation using eviews 10 (2025)

Robustness Check

To verify the reliability of the FMOLS long-run estimates, the study further employed the Dynamic Ordinary Least Squares (DOLS) and Canonical Cointegrating Regression (CCR) techniques as robustness checks. The results are presented in tables 7 and 8. These estimators correct for potential endogeneity and serial correlation problems associated with cointegrated regressions and are widely used to validate FMOLS results.

Table 7: Dynamic Ordinary Least Squares (DOLS) Result

(Dependent Variable: LREM)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXR	-0.0491	0.0079	-6.1782	0.0035
LGDP	3.4865	0.1055	32.8679	0.0000
CPI	0.1910	0.1015	1.8787	0.0704
FDI	0.2557	0.0668	3.8339	0.0185
C	-84.8538	2.8682	-24.2310	0.0000
$R^2 = 0.9995$, Adj. $R^2 = 0.9994$, S.E. = 0.1023				

Source: Author's Computation using eviews 10 (2025)

The results from the DOLS and CCR estimators are consistent with the baseline FMOLS results, confirming the robustness of the long-run relationship between exchange rate and remittance inflows in Nigeria. Across the three estimators, the coefficient of EXCHR (exchange rate) remains negative and statistically significant, indicating that naira depreciation discourages remittance inflows in the long run. This consistent direction and significance across methods reinforce the reliability of the conclusion that currency instability undermines the flow of remittances through formal channels.

Table 8: Canonical Cointegrating Regression (CCR) Result

(Dependent Variable: LREM)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXR	-0.0101	0.0044	-2.2934	0.0295
LGDP	2.6476	0.1960	13.5096	0.0000
CPI	-0.0030	0.0095	-0.3106	0.7584
FDI	0.1369	0.2429	0.5639	0.1231
C	-46.2372	5.1607	-8.9595	0.0000
$R^2 = 0.8779$, Adj. $R^2 = 0.8605$, S.E. = 0.7239				

Source: Author's Computation using eviews 10 (2025)

Similarly, the coefficient of LGDP is positive and highly significant in all models, showing that improvements in domestic income and economic activity attract greater remittance inflows, possibly due to investment or saving motives among the diaspora. The coefficient of FDI also remains positive in both DOLS and FMOLS, implying that foreign investment inflows coexist with remittances as complementary sources of external finance. The CPI variable, although insignificant, retains a consistent sign across estimators, suggesting that short-term price movements exert minimal influence on remittances.

The close similarity in the sign, magnitude, and level of statistical significance across FMOLS, DOLS, and CCR provides strong evidence of robustness. The DOLS estimator, with its inclusion of leads and lags of first differences, controls for serial correlation, while CCR adjusts for endogeneity through transformation of the data. The convergence of results across these estimators therefore validates the stability and reliability of the estimated long-run coefficients.

In summary, the robustness checks confirm that the negative effect of exchange rate depreciation on remittance inflows is not model-specific but structurally consistent across alternative estimators. This strengthens the study's conclusion that excessive volatility and sustained depreciation of the naira discourage formal remittance inflows into Nigeria.

Causal Relationship Between Exchange Rate and Remittance in Nigeria.

The results of the Pairwise Granger causality test presented in Table 9, indicates the causal relationships between remittances (LREM), economic growth (LGDP), and exchange rate (EXR) in Nigeria for the period 1990–2023. From table 5, the optimal lag length used in the causality test is lag 4.

The test shows that LGDP does not Granger-cause LREM, as the probability value (0.7240) is greater than the 5% significance level. This implies that changes in economic growth do not predict the inflows of remittances in Nigeria. However, the reverse relationship is significant, as LREM Granger-causes LGDP with a probability value of 0.0233, which is below the 5% threshold. This suggests that remittance inflows have predictive power over economic growth in Nigeria. The implication is that remittances play an important role in stimulating GDP growth, either through household consumption or investments. This finding is consistent with the works of Anosike and Alfadhel (2024) and Akhimien and Osifo (2019), who established that remittance inflows contribute positively to economic growth.

The causality test between exchange rate (EXR) and remittances (LREM) indicates no significant relationship in either direction, as both probability values (0.8261 and 0.7012) are greater than 0.05. This result implies that exchange rate movements do not predict remittance inflows, and conversely, remittance inflows do not significantly influence the exchange rate in the short run. This absence of causality suggests that the relationship between remittances and exchange rate is more long-term in nature, as observed by Orekoya and Akintunde (2023) and Sanusi and Oderinde (2020), who emphasized that remittances tend to serve as a stabilizing force rather than a direct short-run determinant of exchange rate dynamics.

The relationship between exchange rate (EXR) and economic growth (LGDP) reveals a unidirectional causality running from EXR to LGDP, with a probability value of 0.0014, which is highly significant at the 1% level. This indicates that exchange rate fluctuations strongly influence economic growth in Nigeria, suggesting that depreciation or appreciation of the naira directly affects the pace of GDP growth. However, the reverse is not true, as LGDP does not Granger-cause EXR ($p = 0.9464$). This implies that economic growth does not drive changes in the exchange rate during the study period. This finding aligns with the works of Onuoha and Uzonwanne (2023) and Akanbi and Yusuf (2024), who stressed that exchange rate instability is a key determinant of Nigeria's macroeconomic performance.

In summary, the Granger causality results establish three main conclusions: (i) remittances Granger-cause economic growth, but GDP does not Granger-cause remittances; (ii) there is no causality between exchange rate and remittances in either direction; and (iii) exchange rate Granger-causes economic growth, but GDP does not Granger-cause exchange rate. These results highlight the critical importance of remittances in supporting Nigeria's economic growth and confirm the dominant role of exchange rate fluctuations in shaping macroeconomic performance.

Table 9: Granger Causality Test

Null hypothesis	obs	F-Statistic	Prob
LGDP does not Granger cause LREM	31	0.44367	0.7240

LREM does not Granger cause LGDP		3.79590	0.0233
EXR does not Granger cause LREM	31	0.29854	0.8261
LREM does not Granger causes EXR		0.47704	0.07012
EXR does not Granger cause LGDP	31	7.09479	0.0014
LGDP does not Granger cause EXR		0.12178	0.9464

Source: Author's Computation using eviews 10 (2025)

CONCLUSION

This study investigated the impact of exchange rate fluctuations on remittance inflows in Nigeria using annual data from 1990–2023. Remittances (LREM) were modeled as the dependent variable, with exchange rate (EXR) as the key explanatory variable and GDP per capita (LGDP), inflation (CPI), and foreign direct investment (FDI) as controls. ADF and PP methods confirmed that all variables were integrated of order one, $I(1)$. Johansen cointegration results established the existence of long-run equilibrium relationships among the variables. Based on this, the Fully Modified OLS (FMOLS) estimator was employed to derive consistent long-run coefficients, while Pairwise Granger causality tests were conducted to examine the causal relationship. The FMOLS results show that the exchange rate exerts a negative and statistically significant long-run effect on remittances (-0.0101 , $p < 0.05$), indicating that naira depreciation discourages official remittance inflows, possibly due to a shift toward informal transfer channels. GDP per capita exerts a positive and highly significant effect (2.5077 , $p < 0.01$), suggesting that stronger domestic economic performance attracts diaspora transfers through both consumption and investment motives. Inflation is negative but insignificant (-0.0046 , $p > 0.10$), while FDI is positive yet weak and insignificant (0.4135 , $p \approx 0.074$). The model demonstrates high explanatory power ($R^2 \approx 0.95$; Adjusted $R^2 \approx 0.94$), and diagnostic checks confirm its reliability.

Granger causality results further reveal three key dynamics: (i) no short-run causality exists between exchange rate and remittances in either direction; (ii) remittances Granger-cause GDP ($p < 0.05$), underscoring their role in stimulating economic growth; and (iii) exchange rate Granger-causes GDP ($p < 0.01$), confirming the dominant role of exchange rate movements in shaping macroeconomic performance. Together, these findings demonstrate that while remittances and exchange rate are cointegrated in the long run, their short-run interaction is weak, with remittances primarily influencing growth and exchange rate fluctuations acting as a key macroeconomic driver.

In conclusion, the study establishes that exchange rate depreciation has a negative impact on official remittance inflows in Nigeria, while GDP per capita is a strong positive determinant. Inflation and FDI exert weak influences, and causality results confirm unidirectional linkages from remittances to GDP and from exchange rate to GDP, but no causal relationship between remittances and exchange rate. These findings highlight the importance of maintaining exchange rate stability and strengthening macroeconomic fundamentals to safeguard remittance inflows.

The following recommendations proceed from the findings of the study;

Appropriate exchange rate management policies should be introduced as this will help to minimize depreciation of the Naira, this will in turn lead to the sustainability of remittance inflows. Moreover, Gross domestic product, foreign direct investment, and exchange rate movements should be closely monitored as they encourage continuous remittance inflow. Additionally, Residents should be sensitized that using remittances to fund only consumption would result in potential destabilizing effects of uncontrolled inflows, however, they should understand that remittance inflows should be directed into productive sectors of the economy such as manufacturing, especially SMEs and infrastructures, in order to enhance national development. Finally, policymakers should implement coordinated macroeconomic policies, this will strengthen stability, attract

investors and migrant community confidence, thereby safeguarding remittances as a vital source of foreign capital.

Future studies could focus on using panel data by incorporating data from other regions of the world, especially regions that receive high remittances. The use of monthly data (which is not available at the moment) can also to provide broader insights into the exchange rate–remittance relationship and financial stability of a country/region. Lastly, remittance inflows can also be disaggregated into formal and informal channels to provide a nuanced understanding of how exchange rate movements affect different remittance pathways.

REFERENCES

1. Acosta, P. A., Calderón, C., Fajnzylber, P., & Lopez, H. (2009). What is the impact of international remittances on poverty and inequality in Latin America? *World Development*, 36(1), 89–114. <https://doi.org/10.1016/j.worlddev.2007.02.016>
2. Acosta, P. A., Lartey, E. K. K., & Mandelman, F. S. (2009). Remittances and the Dutch disease. *Journal of International Economics*, 79(1), 102–116. <https://doi.org/10.1016/j.jinteco.2009.06.007>
3. Agarwal, R., & Horowitz, A. W. (2002). Are international remittances altruism or insurance? Evidence from Guyana using multiple-migrant households. *World Development*, 30(11), 2033–2044. [https://doi.org/10.1016/S0305-750X\(02\)00118-3](https://doi.org/10.1016/S0305-750X(02)00118-3)
4. Amuedo-Dorantes, C., & Pozo, S. (2004). Workers' remittances and the real exchange rate: A paradox of gifts. *World Development*, 32(8), 1407–1417. <https://doi.org/10.1016/j.worlddev.2004.02.004>
5. Ayunku, D., & Dickson, T. (2021). Exchange rate variation, remittance inflows, and economic growth in Nigeria. *Journal of Economics and Policy Studies*, 16(2), 33–47.
6. Benmamoun, M., & Lehnert, K. (2013). Financing growth: Comparing the effects of FDI, ODA, and international remittances. *Journal of Economic Development*, 38(2), 43–65.
7. Central Bank of Nigeria. (2023). *Statistical bulletin (Exchange rate and external sector indicators)*. Abuja: CBN. <https://www.cbn.gov.ng>
8. Chami, R., Fullenkamp, C., & Jahjah, S. (2003). Are immigrant remittance flows a source of capital for development? *IMF Working Paper No. 03/189*. International Monetary Fund. <https://doi.org/10.5089/9781451859312.001>
9. Chami, R., Fullenkamp, C., & Jahjah, S. (2005). Are immigrant remittance flows a source of capital for development? *IMF Staff Papers*, 52(1), 55–81. <https://doi.org/10.5089/9781451847319.001>
10. Chami, R., Hakura, D., & Montiel, P. (2008). *Remittances: An automatic stabilizer?* IMF Working Paper No. 08/91. International Monetary Fund. <https://doi.org/10.5089/9781451869528.001>
11. Elbadawi, I. A., & Rocha, R. R. (1992). Determinants of expatriate workers' remittances in North Africa and Europe. *World Bank Policy Research Working Paper No. 1038*. World Bank. <https://documents.worldbank.org/en/publication/documents/reports/documentdetail/>
12. El-Sakka, M. I. T., & McNabb, R. (1999). The macroeconomic determinants of emigrant remittances. *World Development*, 27(8), 1493–1502. [https://doi.org/10.1016/S0305-750X\(99\)00067-4](https://doi.org/10.1016/S0305-750X(99)00067-4)
13. Giuliano, P., & Ruiz-Arranz, M. (2009). Remittances, financial development, and growth. *Journal of Development Economics*, 90(1), 144–152. <https://doi.org/10.1016/j.jdeveco.2008.10.005>
14. International Monetary Fund. (2009). *International transactions in remittances: Guide for compilers and users*. International Monetary Fund. <https://www.imf.org/en/Publications/ManualsGuides/Issues/2016/12/31/InternationalTransactions-in-Remittances-Guide-for-Compilers-and-Users-21840>
15. International Monetary Fund. (2020). *World economic outlook: Global manufacturing downturn, rising trade barriers*. International Monetary Fund. <https://www.imf.org/en/Publications/WEO>
16. Krugman, P. R., & Obstfeld, M. (2009). *International economics: Theory and policy* (8th ed.). Pearson Addison-Wesley.
17. Krugman, P. R., & Obstfeld, M. (2018). *International economics: Theory and policy* (10th ed.). Pearson.
18. Lopez, H., Molina, L., & Bussolo, M. (2007). Remittances and the real exchange rate. *World Bank Policy Research Working Paper No. 4213*. World Bank. <https://doi.org/10.1596/1813-9450-4213>

19. Lucas, R. E. B., & Stark, O. (1985). Motivations to remit: Evidence from Botswana. *Journal of Political Economy*, 93(5), 901–918. <https://doi.org/10.1086/261341>
20. Mankiw, N. G. (2018). *Principles of economics* (9th ed.). Cengage Learning.
21. Mawutor, K., Aveh, F. K., & Nketiah-Amponsah, E. (2023). Remittances and economic growth in Ghana: Evidence from ARDL approach. *Journal of African Business*, 24(1), 45–63. <https://doi.org/10.1080/15228916.2021.2002192>
22. Mbutor, M. O. (2010). Remittances and monetary policy in Nigeria. *Journal of Economic and Financial Studies*, 2(1), 61–73.
23. Mishkin, F. S. (2019). *Macroeconomics: Policy and practice* (2nd ed.). Pearson.
24. Mumuni, Z., & Quaidoo, C. (2015). Remittances and inflation in Ghana: An empirical investigation. *African Journal of Economic Policy*, 22(2), 88–107.
25. Mundell, R. A. (1968). *International economics*. New York: Macmillan.
26. Nketiah, E., Opoku, R. T., & Arthur, E. (2019). The effect of remittances on Ghana's real exchange rate. *African Development Review*, 31(3), 285–297. <https://doi.org/10.1111/1467-8268.12400>
27. Obi, C. P., Osigwe, A. C., & Madichie, C. (2015). Remittances, exchange rate and monetary policy in Nigeria: Evidence from cointegration and causality analysis. *Journal of Applied Finance & Banking*, 5(5), 125–138.
28. Obstfeld, M., & Rogoff, K. (1996). *Foundations of international macroeconomics*. MIT Press.
29. Oloyede, J. A. (2016). Impact of remittances on economic growth in Nigeria. *Journal of Economics and Sustainable Development*, 7(14), 20–28.
30. Olubiye, E. A., & Kehinde, O. (2015). Exchange rate volatility and remittance inflows in Nigeria: A GMM approach. *International Journal of Economics and Finance*, 7(2), 134–142. <https://doi.org/10.5539/ijef.v7n2p134>
31. Osigwe, A. C., & Obi, C. P. (2016). Remittances and exchange rate dynamics in Nigeria: An error correction approach. *Journal of Economics and Development*, 18(1), 77–92.
32. Perron, P. (1989). The great crash, the oil price shock and the unit root hypothesis. *Econometrica*, 57, 1361–1401.
33. Ratha, D. (2003). Workers' remittances: An important and stable source of external development finance. In World Bank (Ed.), *Global development finance 2003* (pp. 157–175). World Bank.
34. Ratha, D., & Mohapatra, S. (2011). Preliminary estimates of diaspora savings. *Migration and Development Brief*, 14. World Bank. <https://www.knomad.org/publication/migrationand-development-brief-14>
35. Reuters. (2024). Nigeria remittance inflows rise 8.9% in 2024 as FX reforms bite. *Reuters Africa*. <https://www.reuters.com>
36. Tuuli, I. (2015). The effect of remittances on Ghana's exchange rate: Evidence from an error correction model. *Journal of African Development*, 17(2), 55–74.
37. Urama, N. E., Nwosu, E. O., & Nwaogwugwu, U. C. (2017). Remittances and Dutch disease in Nigeria: Evidence from ARDL approach. *African Review of Economics and Finance*, 9(1), 93–118.
38. Vietnam Study. (2023). Remittances and the real exchange rate: Evidence from Vietnam. *Asian Economic and Financial Review*, 13(5), 450–468.
39. World Bank. (2020). *World development indicators 2020*. World Bank. <https://databank.worldbank.org/source/world-development-indicators>