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# EVALUATING THE IMPACT OF REMITTANCES ON REAL EXCHANGE RATE IN NIGERIA

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## Abstract

*This study examines the impact of remittances on real exchange rates in Nigeria from 1986 to 2023. Utilizing the autoregressive distributed lag (ARDL) model, the analysis captures both short-run fluctuations and long-run equilibrium effects. Empirical results indicate that remittances have a statistically significant and positive impact on 'Nigeria's real exchange rate, leading to a depreciation in the short run and a potential appreciation in the long run but not statistically significant. This suggests that remittances exert immediate upward pressure on the domestic currency, which could influence trade performance and inflationary trends. However, the long-term effect implies partial adjustment over time as the economy stabilizes. These findings provide important insights into the remittance-exchange rate relationship and offer practical guidance for the formulation of exchange rate and monetary policies. The study therefore recommends that policymakers prioritize redirecting remittance inflows towards the productive sector and strengthen formal remittance channels via digital platforms, reducing transaction costs and informal market distortions.*

**Keywords:** remittances, real exchange rates, ARDL, monetary policy, Nigeria

**JEL Classification:** F24, F31, C32

## 1. Introduction

Remittances play a significant role in the global economy, serving as a vital source of external financing for many low and middle-income countries. In recent times, remittance inflows have become highly pronounced as a key source of foreign income, overtaking other sources of foreign capital, such as foreign direct investment and official development assistance, in many countries in terms of size and growth rate (Hien 2020). Remittances make up a substantial portion of GDP. In countries such as Nepal and Haiti, remittances make a significant contribution to both household welfare and national economic resilience (Azizi, 2021; Qutb, 2021). In Nepal, for instance, remittances account for over 20% of the country's GDP, while in Haiti, the figure exceeds 15% (World Bank, 2022). These transfers help smoothen consumption, reduce poverty, and enhance financial inclusion.

However, the impact of remittances is not uniform across countries and depends heavily on the structure and diversification of the national economies. In more economically diversified economies, such as South Africa, Kenya, and Brazil, the reliance on remittance inflows tends to be lower. The extent to which

remittances influence macroeconomic stability and development is shaped by factors such as the strength of financial systems, labour markets, governance quality, and policy frameworks (Anetor, 2019; Nyasha & Odhiambo, 2022). Furthermore, remittances have been found to promote positive outcomes, such as increased investment in education and health, improved housing, and enhanced access to credit, particularly in underserved rural areas (Fajnzylber & López, 2008; Chami, Fullenkamp, & Jahjah, 2003). However, overdependence on remittances can expose economies to vulnerabilities such as Dutch disease effects and real exchange rate appreciation, which potentially harm export competitiveness and lead to trade imbalances (Azizi, 2021; Essayyad et al., 2018).

Nigeria exemplifies both the opportunities and challenges presented by remittance flows. With remittance inflows rising from a modest level of US$10.01 million in 1990 to an estimated US$20.5 billion in 2023, Nigeria is now the largest remittance recipient in sub-Saharan Africa (World Bank, 2022). However, the macroeconomic implications of this growth, particularly on the real exchange rate, remain a pressing concern. Significant and sustained remittance inflow can exert upward pressure on the value of the Naira, potentially undermining export competitiveness and deepening structural trade imbalances. Therefore, understanding the relationship between remittances and real exchange rate dynamics is crucial for 'Nigeria's macroeconomic planning, especially as the country continues to navigate external shocks, foreign exchange volatility, and developmental challenges.

The relationship between remittances and real exchange rates in Nigeria highlights the importance of both variables in the country's economic dynamics. The real exchange rate (RER)', which reflects the relative prices of domestic and foreign goods and services, is a key determinant of Nigeria's trade competitiveness (Adeseye, 2021; Osigwe & Obi, 2016). Understanding how remittances influence these rates is critical for formulating effective economic policies. Evidence from recent studies suggests that in the short run, remittance inflows may depreciate the domestic currency, possibly due to increased foreign exchange availability and its use for consumption-related imports (Ilu, 2019; Okon, 2022; Azizi, 2021; Essayad et al., 2018). However, in the long run, the effect is either statistically insignificant or tends toward real exchange rate appreciation, aligning with the Dutch disease hypothesis, where large inflows of foreign currency reduce export competitiveness by strengthening the domestic currency (Azizi, 2021; Anetor, 2019; Olu et al., 2020).

Although studies have examined the macroeconomics implications of remittances, many existing literatures have inadequately addressed Nigeria's distinct policy shift and the dynamics of its financial sector, both of which can influence the remittances and exchange rate nexus. Moreover, within the Nigeria context, there is still remain ambiguity on the specific relationship between remittances and exchange rate, particular, in the utilization contemporary long-term data. Therefore, this study contributes to existing body of literature by offering a novel empirical insight into the direct impact of remittances on real exchange rate in Nigeria, spanning the period from 1986 to 2023. This timeframe is justified by the significant structural and policy changes that occurred during this period—including trade liberalization, exchange rate deregulation, oil price shocks, and shifts in remittance inflow patterns. Capturing nearly four decades of economic fluctuations enables a deeper understanding of both short-run dynamics and long-run equilibrium relationships.

## 2. Literature Review

### Conceptual Review

Remittances are funds or resources sent by individuals working abroad to their home

countries, supporting household income, healthcare, education, and overall economic stability (Faheem et al., 2022; Kajtazi & Fetai, 2022; European Bank for Reconstruction and Development, 2019). These transfers, often facilitated through official channels such as banks or money transfer companies, play a crucial role in alleviating poverty and promoting economic growth (World Bank, 2020; IMF, 2018; UN Department of Economic and Social Affairs, 2020; Asian Development Bank, 2018). Remittances facilitate financial inclusion, investment, and household consumption, acting as a significant source of economic activity (World Economic Forum, 2017; Qutb, 2022; Azizi, 2021). They are essential for maintaining families, making investments, or saving money, contributing substantially to both the economies of sending and receiving countries (Khodeir, 2015).

The exchange rate, which varies based on context and usage, can be categorized as the official exchange rate set by a government or central bank, or the market exchange rate determined by supply and demand in the foreign exchange market (Azizi, 2021; Yaro et. al., 2023; Adeseye, 2021; Osigwe & Obi, 2016). The real exchange rate (RER) indicates the purchasing power of a currency relative to another, adjusted for inflation (IMF, 2020), while the nominal exchange rate represents the direct exchange value without considering inflation (OECD, 2022). Exchange rate systems can be fixed, where the currency value is pegged to another currency or basket of currencies, or floating, where the value fluctuates based on market conditions (Azizi, 2021; Mawutor et al., 2023). Additional types include cross exchange rates, forward exchange rates for future transactions, and spot exchange rates for immediate transactions (Adjei et al., 2020; OECD, 2022). The purchasing power parity (PPP) exchange rate theoretically equalizes the purchasing power between two currencies (IMF, 2022). Exchange rate is classified into nominal and real exchange rate (Haruna & Bashir,2025). The RER is crucial for understanding a country's global competitiveness, as it adjusts the nominal exchange rate by the ratio of foreign to domestic prices, taking into account inflation differentials (Lopez, Bussolo, & Molina, 2007; Lane & Milesi-Ferretti, 2007).

**Theoretical Review**

This study is anchored on the Altruism Theory of Remittances. It provides valuable insights into the relationship between remittances and real exchange rates in Nigeria. According to this theory, migrants send money back to their home countries to support their families and communities out of altruistic motives. In Nigeria, where remittances significantly contribute to foreign exchange inflows, understanding the altruistic motivations behind remittance sending is essential. These remittances often meet basic needs such as food, housing, education, and healthcare, improving living standards and alleviating poverty (Stark, 1991). The theory emphasizes the significance of familial support networks and social obligations, demonstrating how cultural and emotional factors influence remittance flows, and provides a comprehensive understanding of why migrants prioritize sending money home.

From a macroeconomic perspective, the Altruism Theory suggests that remittances can impact real exchange rates by influencing consumption patterns and economic activity. As remittances increase household income and consumption, they can stimulate demand for goods and services, potentially leading to inflationary pressures and currency appreciation. This can spur economic growth by boosting local businesses but may also make exports less competitive globally. Remittances can impact investment decisions and capital flows, influencing the supply and demand dynamics of foreign exchange markets. Understanding these altruistic motivations can help policymakers manage exchange rate

volatility and promote economic stability by channelling remittances into productive investments, reducing transfer costs, and improving financial inclusion (Adams & Page, 2005). This approach can help Nigeria harness remittances to drive economic growth, reduce poverty, and enhance overall well-being.

**Empirical Review**

A substantial body of literature exists on the impact of remittances on the real exchange rate in both single-country (Adibi, 2023; Akighir & Atswam, 2023) and multiple-country (Olanipekun, 2022; Kim, 2019) cases. The study conducted by Adibi (2023) employed a Dynamic Ordinary Least Squares (DOLS) model to examine the impact of remittances and remittance volatility on the real exchange rate in Nigeria. The study found that increase in remittances leads to a depreciation of the real exchange rate in Nigeria. In another study conducted by Akighir and Atswam (2023) on the nexus between remittances, the exchange rate, and total exports in Nigeria, using annual data spanning the period 1986 to 2020. A structural vector autoregression (SVAR) model was employed to estimate the collected data, and the empirical results reveal that foreign remittances lead to an appreciation of the exchange rate. The result was affirmed by Oleksiv and Mirzoieva (2022) in a study on the impact of remittances on exchange rates and consumption, which employed Granger causality tests and ARDL modelling techniques. The empirical results reveal that, remittance inflows lead to appreciation of the real exchange rate both short-run and long-run.

Turning to the Caribbean, Prophète (2022) studied 'Haiti's remittance-exchange rate nexus using an ARDL model. This finding has several implications for policy and practice. Policymakers may need to explore alternative channels or mechanisms through which remittances can be effectively utilized for development purposes. Enhancing financial literacy and investment opportunities for remittance recipients could potentially increase the positive impact of these funds. Additionally, suppose remittances are not significantly influencing the dependent variable. In that case, it might be necessary to investigate other factors or refine the model to capture the true effect of remittances on the economy. Although remittances are insignificant in the short run, the long-run results reveal that remittances increase the value of the real exchange rate. In a panel study conducted by Olanipekun (2022) on the short-run and long-run impact of foreign remittances on the exchange rate in Sub-Saharan Africa, using data sets spanning the period from 1981 to 2018. Evidence from the research indicated that remittances inflow led to real exchange rate appreciation among the French-speaking countries. However, the effect of remittances on the real exchange rate in the English-speaking countries is insignificant. In another multiple-country study, Azizi (2021), investigates the impacts of 'workers' remittances on real exchange rates and net exports of 101 developing countries using panel data spanning for the period 1990 to 2015 using Instrumental variable (IV) estimation method. The study confirmed that remittances leads to appreciation of the exchange rate.

Joof and Touray (2021) employed a fully modified ordinary least squares and dynamic ordinary least squares regression techniques to study the **i**mpact of remittances on real exchange rate in Gambia using monthly data sets that spans from January 2009 to December 2019. Findings from the research show that remittance has a positive and significant impact on the real exchange rate. In Indonesia, Kuncoro (2020) employed an ARDL approach to investigate the impact of foreign remittances on exchange rates in Nigeria. The empirical results show that, remittances are pro-cyclical in both the short and long run. Adejumo and Ikhide (2019) applied the Dynamic Ordinary Least Squares (DOLS) technique to examine the impact of foreign remittances on real

exchange rate in Nigeria over the period 1981 to 2014. The study found that remittance inflows leads to appreciation of the real exchange rate. In contrast to the latter result, Ilu (2019) applied an ARDL model to investigate the impact of foreign remittances on exchange rate using annual data sets spanning the period 1980 to 2018. The estimated results indicates that, remittances inflow leads to depreciation of the exchange rate in Nigeria. in another study by Kim (2019), a perfect-foresight general equilibrium model, Generalized Methods of Moments (GMM) and Instrumental Variable (IV) estimation technique where employed to examine the influence of remittances on real exchange rate across 114 developing countries. The results showed that under fixed exchange regimes, remittance inflows cause appreciation of the exchange rate. Essayad et al. (2018) employed an ARDL model to investigate the impact of foreign remittances on the real exchange rate in Nepal, spanning the period from 1993 to 2016. The empirical results show that that remittance inflows leads to depreciation of the exchange rate in the short-run but in the long-run the impact is insignificant.

The reviewed works indicate that the impact of foreign remittances on the real exchange rate is inconclusive, as different results were obtained from numerous countries across the globe. However, similar research conducted in Nigeria is scant, and the contributions of foreign remittances to the real exchange rate in Nigeria are inadequate. This research seeks to bridge the gap and update the existing body of knowledge.

## 3.. METHODOLOGY

### Model Specification

The model specification used in this study is based on the description of the relationship between the dependent and independent variables of this research work. Following the primary model presented in Kim (2019), which specifies the relationship between remittances and the exchange rate.

$$RER_t = \beta_0 + \beta_1 REM_t + \beta_2 GDP_t + \beta_3 MS_t + \beta_3 FDI_t + \mu_t \quad (1)$$

$RER_t$ stand for real exchange rate at time t.

$REM_t$ represents remittances at time t

$GDP_t$ stand for the gross domestic product for country at time t.

$MS_t$ is the money supply for a country at time t

$FDI_{it}$ stand for inflow foreign direct investment for the country at time t.

$\mu_t$ represents the error term, assumed to be normally distributed.

$\beta_0$ is the constant.

$\beta_1$ to $\beta_3$ are the estimated parameters.

Kim (2019) highlighted that remittances are a significant source of foreign currency inflows, influencing domestic currency supply and exchange rates, which generally lead to currency appreciation. By including remittances in the regression model alongside other factors, such as GDP and money supply, the model offers a comprehensive analysis of the determinants affecting the real exchange rate. Following the work of Zakaria and Ghauri (2011) The research intends to replace Foreign Direct Investment (FDI) with trade openness (OPN) in the model. Thus:

$$RER_t = \beta_0 + \beta_1 REM_t + \beta_2 GDP_t + \beta_3 MS_t + \beta_3 OPN_t + \mu_t \quad (2)$$

Thus, the regression model aims to capture the potential effects of various economic factors on the real exchange rate, providing insights into the drivers of currency valuation and fluctuations. This makes it a suitable choice for analysing the relationship between the exchange rate and its determinants.

Taking the logarithm of both sides gives the equation below.

$$lnRER_t = \beta_0 + \beta_1 lnREM_t + \beta_2 lnGDP_t + \beta_3 lnMS_t + \beta_4 lnOPN_{it} + \mu_{it} \quad (3)$$

Equation 3 will be estimated using an appropriate estimation technique, which will aid in realizing the objective of this research. The choice of method will logically be followed to avoid biases during estimation.

**Table 1: Sources and Measurements of variables**

| Variables | Measurements | Expectations | Sources |
|---|---|---|---|
| Real Exchange Rate (RER) | Naira to United States Dollar Exchange rate. | Dependent | World Development Indicator (WDI) |
| Remittances (REM) | Personal remittances paid measured at current US$. | Positive (+) | World Development Indicator (WDI) |
| Gross Domestic Product | Nominal GDP measured at current United States Dollar | Positive (+) | World Development Indicator (WDI) |
| Broad Money Supply (M2) | Broad money supply in billions Dollar | Positive (+) | World Development Indicator (WDI) |
| Trade Openness | Total Trade a percentage of Gross Domestic Product (% GDP) | Negative (-) | Central Bank of Nigeria (CBN) |

**Source: 'Author's Compilation**

## Estimation Technique

This study employs the Auto Regressive Distributed Lag (ARDL) method for its analysis, recognized for its robustness and effectiveness in evaluating time series data. The ARDL technique is highlighted for its ability to reliably estimate both long-run and short-run coefficients, even when variables are integrated at different levels (I(0) or I(1)). Unlike conventional cointegration methods, ARDL does not require testing for stationarity, making it flexible for various data behaviours. Researchers such as Banerjee et al. (1998) and Pesaran et al. (2001) have endorsed ARDL for its precision in capturing dynamic interactions between variables. The technique's suitability is confirmed by the ability to use the F-test for assessing cointegration, provided the computed F-statistic exceeds critical value bounds. Descriptive and inferential statistics, along with parameter estimation, are conducted using E-Views 12 software.

Equation (2) could be altered to the broad form of the Auto-regressive Distributed Lag Model (ARDL) for short-run and long-run as follows:

$$lnRER_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \, lnRER_{t-i} + \sum_{i=1}^{q} \beta_2 \, lnREM_{t-i} + \sum_{i=1}^{q} \beta_3 \, lnGDP_{t-i} + \sum_{i=1}^{q} \beta_4 \, lnMS_{t-i} + \sum_{i=1}^{q} \beta_5 \, lnOPN_{t-i} + \mu_t \quad (4)$$

$$\Delta lnRER_t = \phi_0 + \sum_{i=1}^{p} \phi_1 \, \Delta lnRER_{t-i} + \sum_{i=1}^{q} \phi_2 \, \Delta lnREM_{t-i} + \sum_{i=1}^{q} \phi_3 \, \Delta lnGDP_{t-i} + \sum_{i=1}^{q} \phi_4 \, \Delta lnMS_{t-i} + \sum_{i=1}^{q} \phi_5 \, \Delta lnOPN_{t-i} + \psi ECT_{t-1} \quad (5)$$

Note that all the variables remain as previously described, but $\Delta$ stands for the difference (or change) in respective variables and (-) is the lag sign. To satisfy the long-run relationship, the ARDL bound test requires a null hypothesis for no cointegration HO: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$; for equation (4). An Augmented Dickey-Fuller (ADF) Unit Root Test is employed, and the necessary post-estimation tests were conducted.

## 4. RESULTS AND DISCUSSION

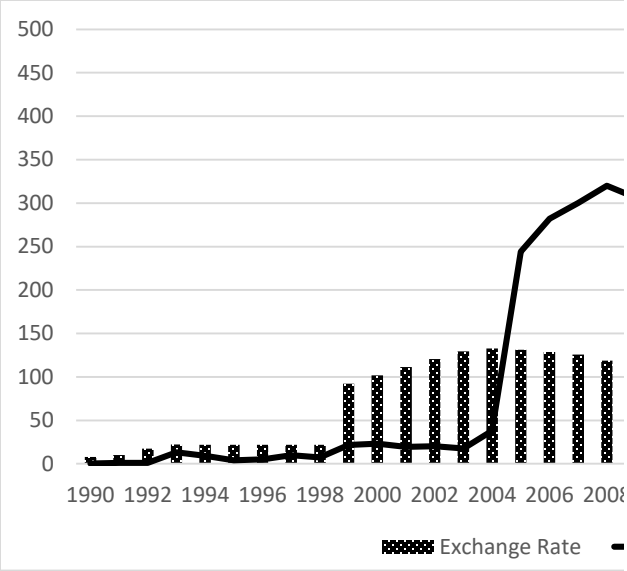



**Figure 1** Trend of Exchange Rate and Remittance Received
**Source of Date:** World Development Indicators

The data from 1986 to 2023 indicate a strong relationship between the Naira-to-Dollar exchange rate (EXR) and remittances received (REM). In the early 1990s, the exchange rate was relatively low, starting at approximately 8.04 in 1990 and gradually increasing to around 21.88 by 1998. During this period, remittances were also low, beginning at 10.01 in 1990 and increasing to 448.55 by 1998. This initial phase s a slow and steady increase in both the exchange rate and remittances, indicating a gradual economic shift in which foreign income began to play a more significant role.

A notable trend emerges from 1999 onwards, characterized by a sharp increase in the exchange rate, reflecting the depreciation of the Naira. For instance, the exchange rate jumped from 21.88 in 1998 to 92.34 in 1999 and continued to rise, reaching 158.55 by 2014 and further to 462.48 by 2023. During the same period, remittances showed substantial growth. In 1999, remittances were $1,301.06, and they continued to rise significantly, reaching $14,640.08 in 2005, $24,311.02 in 2018, and stabilizing around $20,500 by 2023. This period highlights how remittances grew in response to the weakening Naira, possibly because the higher exchange rate made it more advantageous for people abroad to send money home, thereby increasing the local purchasing power of their families.

The correlation between the exchange rate and remittances is further evidenced during global economic events. For example, in 2020, the exchange rate spiked to 358.81, partly due to economic uncertainties caused by the COVID-19 pandemic, while remittances dipped to 17207.55. However, remittances quickly rebounded, reaching 19483.40 in 2021 and 20500 in 2023, even as the exchange rate continued to climb. This rebound suggests that remittances act as a financial buffer during economic downturns, supporting the local economy when domestic currency depreciates. Thus, the data clearly illustrates a trend where remittances increase as the Naira depreciates, highlighting the critical role of foreign income in mitigating the impacts of currency depreciation on the local economy.

**Table 1: Result of Descriptive Statistics (Standard Notation)**

| Statistics | RER | REM (₦ Billion) | GDP (₦ Trillion) | M2 (₦ Trillion) | OPN |
|---|---|---|---|---|---|
| Mean | 155.843 | 11.4 | 0.27 | 13.8 | 0.332 |
| Median | 130.248 | 17.1 | 0.26 | 5.13 | 0.362 |
| Maximum | 462.482 | 24.3 | 0.57 | 58.5 | 0.51 |
| Minimum | 8.04 | 0.01 | 0.05 | 0.06 | 0.23 |
| Std. Dev. | 126.995 | 9.79 | 0.17 | 16.8 | 0.13 |
| Skewness | 0.882 | -0.155 | 0.108 | 1.151 | -1.048 |
| Kurtosis | 2.925 | 1.1404 | 1.559 | 3.273 | 3.333 |
| Jarque-Bera | 4.4209 | 5.035 | 3.007 | 7.625 | 6.381 |
| Probability | 0.109 | 0.0806 | 0.222 | 0.022 | 0.041 |

| | | | | | |
|---|---|---|---|---|---|
| Sum | 5298.671 | 389.0 | 9.13 | 469.0 | 11.306 |
| Sum Sq.Dev | 532218.1 | 3,160.0 | 0.938 | 9310.0 | 0.564 |
| Observations | 38 | 38 | 38 | 38 | 38 |

**Note**: RER= Real Exchange Rate, REM= Remittances, GDP= Gross Domestic Product, M2= Broad Money Supply, OPN= Trade Openness. **Source: Author's Computation Using E-Views**

**Descriptive Statistics and Correlation**

The descriptive statistics in Table 1 provide an overview of the key macroeconomic variables analysed in the study: Real Exchange Rate (RER), Remittances (REM), Gross Domestic Product (GDP), Broad Money Supply (M2), and Trade Openness (OPN). The average real exchange rate (RER) over the observed period is ₦155.84, with a wide variation as indicated by a standard deviation of ₦126.99. The minimum and maximum RER values range from ₦8.04 to ₦462.48, reflecting significant fluctuations in 'Nigeria's exchange rate system over the years. Remittance inflows averaged ₦11.4 billion, with a median of ₦17.1 billion, showing a slightly left-skewed distribution (Skewness = -0.0). GDP and M2 exhibit substantial growth and variation over time, with mean values of ₦0.27 trillion and ₦13.8 trillion, respectively. Notably, M2 has a very high standard deviation (₦16.8 trillion), suggesting significant volatility in the money supply over the study period.

Trade openness (OPN), which measures the ratio of trade (exports plus imports) to GDP, has a mean value of 0.332, with values ranging from 0.23 to 0.51. The negative skewness value for OPN (-1.048) and a Jarque-Bera probability below 0.05 indicate that the distribution of trade openness is left-skewed and not normally distributed. The real exchange rate also exhibits some level of positive skewness (0.882) and moderate kurtosis (2.925), indicating a slight rightward bias and a distribution that is close to normal. The total sum of remittance inflows across the 38 observations is ₦389.0 billion, while total GDP amounts to ₦9.13 trillion and M2 aggregates to ₦469.0 trillion. Overall, the descriptive statistics reveal the dynamic nature of 'Nigeria's macroeconomic variables, especially the significant variability in remittances, money supply, and exchange rate, underscoring the importance of further empirical analysis to understand their interrelationships.

**Table 2 Result of Augmented Dickey-Fuller (ADF) Unit Root Test**

| | **Level** | | **Ist difference** | | **Order of integration** |
|---|---|---|---|---|---|
| Variables | t-statistics | P-value | t-statistics | P-values | |
| LRER | -3.2052 | 0.0292 | -2.3369 | 0.1740 | 1(0) |
| LREM | -3.1573 | 0.0319 | -6.7020 | 0.0000 | 1(0) |
| LGDP | -1.6135 | 0.4646 | -4.8909 | 0.0004 | 1(1) |
| LM2 | -3.5333 | 0.0132 | -3.0465 | 0.0412 | 1(0) |
| LOPN | -2.3138 | 0.1739 | -5.4264 | 0.0001 | 1(1) |

**Note**: L=Natural log, RER= Real Exchange Rate, REM= Remittances, GDP= Gross Domestic Product, M2= Broad Money Supply, OPN= Trade Openness. **Source: Author's Computation using E-Views**

The unit root results presented in Table 2 are from the Augmented Dickey Fuller (ADF) test. The ADF test was chosen because it is widely used, and its output are said to be robust. The results show that not all the variables are stationary at first difference. In the first instance, the real exchange rate, remittance received, and broad money supply are all stationary at the level, while real GDP and trade openness are stationary at the first difference. Stationarity of each of the variable as presented in table 3 are greater than the critical value. Thus, some of the independent variables are stationary at first difference, while others are stationary at the level, which justifies the selection of the ARDL estimation technique.

**Table 3: Result of Optimal Lag Selection for F-Bound Test**

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | -120.8269 | NA | 0.010996 | 9.678988 | 9.920930 | 9.748659 |
| 1 | 3.675105 | 191.5415* | 5.44e-06* | 2.024992* | 3.476642* | 2.443015* |
| 2 | 19.53526 | 18.30018 | 1.40e-05 | 2.728057 | 5.389415 | 3.494431 |
| 3 | 53.23459 | 25.92256 | 1.50e-05 | 2.058878 | 5.929944 | 3.173605 |

Notations: * indicates the optimal lag order selected by the criterion. LR, sequential modified LR test statistic (each test at 5% level); FPE, Final prediction error; AIC, Akaike information criterion; SC, Schwarz information criterion and HQ, Hannan Quinn information criterion.

**Source: Author's Computation using E-Views**

This study therefore employed VAR Lag selection criteria, through which lag one was selected, given that all signs fall on lag one. The were consensus in the choice of lags with sequential modified LR test statistic, Final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ) suggesting that lag one is the best choice. Thus, the estimation is presented with lag one.

**Table 4: Result of ARDL F-Bound Test for Cointegration**

| F-Bounds Test | | | Null Hypothesis: No levels relationship | |
|---|---|---|---|---|
| **Test Statistic** | **Value** | **Significance.** | **I(0)** | **I(1)** |
| | | | Asymptotic: n=1000 | |
| F-statistic | 9.6198 | 10% | 3.03 | 4.06 |
| K | 5 | 5% | 3.47 | 4.57 |
| | | 1% | 4.4 | 5.72 |

***Source: Author's Computation Using E-views***

**Test of Hypotheses**

**Bound Test for Cointegration**

Before proceeding to estimate the long-run and short-run relationships among the variables, it is relevant to establish whether there is a long-run relationship. Given the method of analysis employed in this research, it follows a bound test for cointegration using the Autoregressive Distributed Lag (ARDL) technique. The result is revealed in Table 4. Following the assumptions and criteria of Banerjee et al (1998) for establishing long-run in ARDL, the model fully satisfies them. The result in Table 6 also fulfilled the criteria established by Pesaran et al. (2001), which suggested that the F-statistic (9.6918) falls outside the lower bound (3.03) and upper bound (4.06) for any of the respective significant levels. In our outcome, the F-

statistic falls above the upper bound at the 1% level of significance, which therefore establishes that there exists a long-run relationship between the dependent variable and the independent variables.

## The long run and Short Run Relationship

**Table 5: Impact of Remittances on Real Exchange Rates in Nigeria**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LREM | 0.4520 | 0.3676 | 0.8069 | 0.4302 |
| LGDP | -1.0787 | 1.0699 | -1.0081 | 0.3267 |
| LM2 | 0.2324 | 0.8337 | 0.2788 | 0.7835 |
| LOPN | 0.5134 | 0.6557 | 0.7830 | 0.4438 |

**Note**: L=Natural log, RER= Real Exchange Rate, REM= Remittances, GDP= Gross Domestic Product, M2= Broad Money Supply, OPN= Trade Openness. **Source: Author's Computation using E-Views**

The regression results from Table 5 illustrate the long-run relationships between the dependent variable and four independent variables: remittances (LREM), GDP (LGDP), money supply (LM2), and trade openness (LOPN). This implies that the inflow of remittances has no impact on the real exchange rate, as indicated by the high probability value of 0.4302, which is greater than the 5 percent significance level. The result in in conformity with the one obtained by Prophète (2022) in Caribbean countries. The insignificance of remittances on real exchange rate in Nigeria may be because, funds remitted by Nigerians in diaspora are not used for investment but rather for consumption purposes. In addition, the dominance of oil exports in 's foreign trade is another cause of this insignificance, as changes in the exchange rate in Nigeria are primarily occasioned by oil exports and changes in the price of oil on the world market.

The coefficient of Real GDP is -1.0787, which indicates a negative but insignificant result, implying that the increased growth rate of the economy has no impact on the Real exchange rate in Nigeria over the study period. Furthermore, the coefficients of Money supply and trade openness are both positive but insignificant.

**Table 6: ARDL Short Run Estimation on the Impact of Remittances on Real Exchange Rates in Nigeria**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 19.3145 | 2.4470 | 7.8929 | 0.0000 |
| @TREND | 0.0126 | 0.0112 | 1.1304 | 0.2731 |
| D(LREXR(-1)) | 0.1522 | 0.1471 | 1.0349 | 0.3144 |
| D(LREM) | -0.2514 | 0.3192 | -3.7877 | 0.0011 |
| D(LGDP) | -3.8442 | 0.5942 | -6.4687 | 0.0000 |
| D(LM2) | -2.8942 | 0.7890 | -3.6678 | 0.0018 |
| D(LOPN) | -1.5076 | 0.2944 | -5.1195 | 0.0001 |
| D(LOPN(-1)) | -0.3300 | 0.1655 | -1.9935 | 0.0616 |
| CointEq(-1)* | -0.8477 | 0.1105 | -7.6673 | 0.0000 |

**Note**: L=Natural log, RER= Real Exchange Rate, REM= Remittances, GDP= Gross Domestic Product, M2= Broad Money Supply, OPN= Trade Openness. **Source: Author's Computation using E-Views**

The ARDL Error Correction Regression results reveal several key insights about the relationships between the dependent variable and independent variables in the short run. The coefficient for the lagged exchange rate change (D(LREXR(-1))) is 0.152275, but with a high p-value of 0.3144, it indicates that this variable does not have a statistically significant short-run effect on the dependent variable. This suggests that past changes in the exchange rate do not significantly influence the current value of the dependent variable, highlighting a potential area for further investigation.

The significant negative coefficient for the change in remittances (D(LREM)) implies that an increase in remittances is associated with a decrease in the dependent variable in the short run. This finding suggests that while remittances provide crucial financial support to households, their influx might lead to unintended short-term economic consequences, such as reduced consumption of local goods or shifts in spending patterns. For policymakers, this means that while promoting remittances can support household welfare, it is crucial to consider mechanisms that channel these funds into productive investments rather than immediate consumption, thereby avoiding potential negative short-term impacts.

The change in remittances (D(LREM)) has a coefficient of -0.251493 with a statistically significant p-value of 0.0011. This negative relationship implies that an increase in remittances is associated with a decrease in the dependent variable in the short run. The large t-statistic of -3.787751 reinforces the statistical significance of this effect, suggesting that remittances may exert a considerable negative influence on the dependent variable, potentially impacting consumption or economic behaviour in a way that warrants further examination.

**Granger Causality Test**

The Pairwise Granger Causality Tests reveal limited predictive relationships among the variables studied (see appendix II). Specifically, the results show that inward remittances (LREM) do not Granger-cause the real exchange rate (LREXR), as the p-value of 0.1749 exceeds the 0.05 significance threshold. This suggests that past values of remittances do not significantly help predict movements in 'Nigeria's real exchange rate. Similarly, the test indicates that LREXR does not Granger-cause the LREM (LREM), with a high p-value of 0.7331, showing no predictive power between these two variables. Moreover, real GDP (LGDP) does not appear to Granger-cause LREXR either, as its associated p-value of 0.3251 also exceeds the standard cut off for statistical significance.

However, a notable finding from the analysis is that the real exchange rate (LREXR) does Granger-cause real GDP (LGDP), with a statistically significant p-value of 0.0244. This suggests that fluctuations in the real exchange rate have a predictive influence on 's real GDP, implying that exchange rate dynamics could play a significant role in shaping economic growth. The result underscores the importance for policymakers to consider the implications of exchange rate movements when developing macroeconomic strategies, as they may have a direct impact on broader economic performance.

**Table 7 Diagnostic Test**

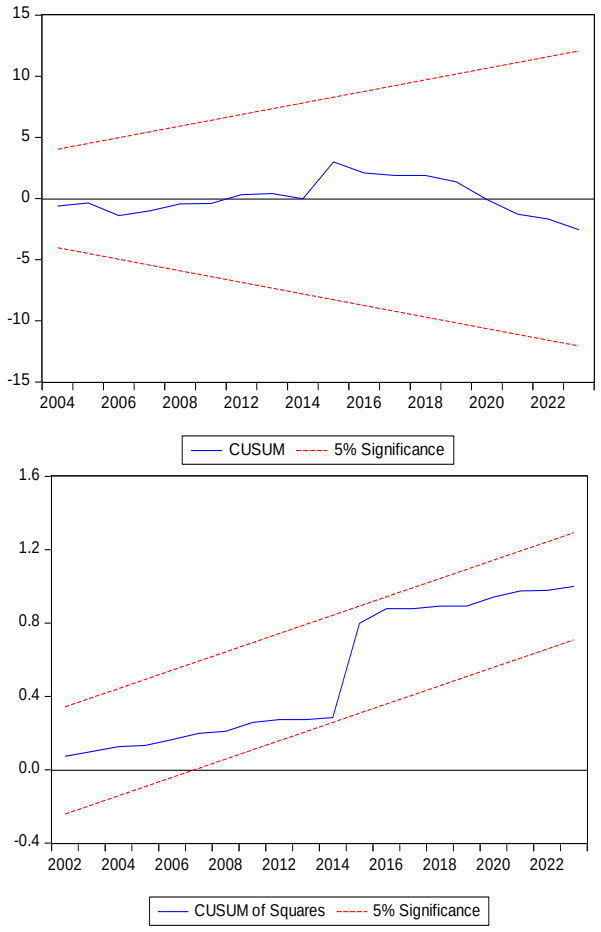
| | |
|---|---|
| R-Square | 0.782862 |
| Serial Correlation | 1.866586 (0.1834) |
| Heteroscedasticity Test | 1.164022 (0.3678) |

Note: Numbers in parentheses are probabilities, Jarque Bera Normality Test was utilised, Serial correlation is with Breusch-Godfrey serial correlation Lagrange Statistics, Heteroscedasticity test is with Breusch-Pagan-Godfrey test. All were done using **E-views 12 version.**

**Stability and Diagnostic Tests**

The research project incorporates various diagnostic tests to confirm the reliability of the model, including the Jarque-Bera test for normality, the Breusch-Godfrey test for serial correlation, and the Breusch-Pagan-Godfrey and Harvey tests for heteroscedasticity. These tests are essential for ensuring that the data meets the necessary assumptions for valid model results. The findings, summarized in Table 7, show no issues with serial correlation or heteroscedasticity, supporting the 'model's assumptions and enhancing the credibility of the research. The R-squared value of 0.782862 indicates a strong explanatory power. The results from the diagnostic tests confirm that the 'model's short-run coefficients are stable, validating the overall dependability and accuracy of the research outcomes.

The research highlights the significance of stability testing in ensuring the reliability and validity of econometric models. It employs the Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares of Recursive Residuals (CUSUM of Squares) tests to assess model stability and potential biases. The results from these tests, which include graphical representations for visual evaluation, indicate no specification errors and confirm excellent model stability, as evidenced by the plotted lines remaining within the stability zone. This outcome bolsters the validity of the research conclusions, enhancing confidence in the model's dependability and underscoring the crucial role of stability testing in validating findings for future reference and policy implications.




**Discussion of Findings**

The study aimed to analyse the impact of remittances on real exchange rates in Nigeria, focusing on trends, long-term relationships, and causal links. The trend analysis shows that remittance inflows in Nigeria have been increasing over time, reflecting the growing role of the diaspora in supporting their families.

This observation is consistent with findings by Olubiyi et al. (2018), who highlighted the significant role of remittances in influencing external reserves. Concurrently, Nigeria's real exchange rates have experienced fluctuations, influenced by various domestic and global economic factors. The increase in remittances aligns with the broader trend observed in other countries, such as Nepal, where remittances have also been linked to exchange rate dynamics (Essayyad et al., 2018). This ct the real exchange rate over time.

The long-term relationship analysis reveals that remittances have a significant yet nuanced impact on real exchange rates. The study's findings suggest that remittances contribute to long-term real exchange rate appreciation, aligning with the results of Adejumo and Ikhide (2019) and Azizi (2021). These studies observed that remittance inflows can lead to currency appreciation due to increased foreign currency supply and improved economic stability. However, the findings also reflect the complexity of this relationship, as noted by Osigwe and Obi (2016), who found a negative long-term impact of remittances on the real exchange rate in Nigeria. This complexity highlights the need for a nuanced understanding of how remittances interact with other economic factors over the long term.

The pairwise Granger causality tests provided further insight into the causal relationships between the variables. The results indicated that neither the level of economic openness (LOPN) nor another economic variable (LOPN) significantly Granger caused real GDP (LRGDP). This lack of causality suggests that changes in economic openness or the other tested variable do not predict future changes in real GDP. This finding is consistent with studies by Hien et al. (2020) and Khan et al. (2019), which reported mixed or negligible causal effects between remittances, real exchange rates, and economic growth. The absence of significant causality suggests that while remittances and real exchange rates are interrelated, their interaction may be influenced by other latent variables or external factors not captured in this analysis.

The study's findings have significant implications for policymakers in Nigeria. Understanding the impact of remittances on real exchange rates can help in devising strategies to manage currency fluctuations and promote economic stability. Policymakers should be aware of the potential inflationary effects of remittances and implement measures to mitigate these impacts, as suggested by the findings of Maduka et al. (2019) and Adjei et al. (2020). Additionally, fostering an environment that supports the productive use of remittances can enhance their positive impact on economic growth and stability, as highlighted by Mawutor et al. (2023). Future research should continue to explore these dynamics, taking into account the broader economic context and interactions with other variables.

## 5. CONCLUSION

This study provides a comprehensive examination of the impact of remittances on 'Nigeria's real exchange rate, uncovering a complex and dynamic relationship shaped by multiple macroeconomic factors. While remittance inflows have consistently grown, their influence on exchange rate behaviour is not straightforward. In the short run, remittances may contribute to currency depreciation due to increased foreign exchange availability. However, over the long term, their effects are intertwined with other economic variables such as GDP and broad money supply. The ARDL Error Correction Model and Granger causality results indicate that remittances alone do not determine exchange rate movements; instead, they interact with broader structural and policy-driven dynamics. These findings, aligning with earlier research and underscoring the importance of evaluating remittances within a comprehensive macroeconomic framework.

To enhance the developmental impact of remittances while minimizing negative externalities, policymakers should prioritize redirecting remittance inflows toward productive investments through incentives, such as diaspora bonds, SME financing, and tax relief. Strengthening formal remittance channels through digital platforms and reducing transaction costs can enhance transparency and mitigate informal market distortions. Additionally, a more flexible exchange rate regime, anchored by sound macroeconomic fundamentals, will help absorb remittance-related shocks. 'Nigeria's monetary and fiscal planning should incorporate remittance trends to better anticipate external imbalances and enhance foreign reserve management. Lastly, support for export-oriented sectors and real-time data monitoring will be essential to maintain trade competitiveness and guide policy decisions in an increasingly remittance-reliant economy.

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