EFFECT OF EXCHANGE RATE ON REMITTANCES IN NIGERIA

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DOI: https://doi.org/10.64633/wissj.v10i4.20

Keywords

Altruism model, ARDL, Exchange Rate, Nigeria, Remittances

Abstract

This studyinvestigates the effect of exchange rate on remittances inflows in Nigeria over the period of 1980-2023. The study made use of the altruistic theory of remittances to know why migrants send remittances exploring how exchange rate fluctuations influence remittance behaviour, extending beyond traditional consumption and investment motives. The ARDL model was used to distinguish the short-run and long-run effects, controlling for variables like inflation, GDP, and financial development, the ARDL results indicates indicate a positive short-run impact of exchange rate depreciation on remittances, as migrants send more money to offset economic hardships at home, but no significant long-run relationship, the Augmented Dickey-Fuller and Breusch-Godfrey LM tests, confirm the model's validity, with no autocorrelation or heteroskedasticity issues. The study found out that there is an interplay between exchange rate and remittance in the sense that while naira depreciation boosts short-term inflows, long-term effects are negligible or negative, possibly due to eroded migrant confidence. The study therefore recommends that the government should engage their diaspora in long term financial instruments to reduce exchange rate risk by issuing bonds denominated in foreign currencies, attracting migrant's savings while bypassing local currency depreciation. And banks should also offer accounts that allow migrants to hold and transfer funds in stable foreign currencies, shielding recipients from abrupt exchange rate declines.

Introduction

Exchange rate systems in Nigeria have evolved from fixed to managed float systems, with multiple exchange rate windows existing until the Central Bank of Nigeria (CBN) introduced a unified system in June 2023 (CBN, 2023). The parallel market premium is often over 60 per cent and has historically encouraged remittance recipients to use informal channels to maximise the Naira value of their remittances (PWC, 2022). Studies showed that a weaker official exchange rate inhibits formal remittance inflows, as recipients seek higher returns in the parallel market (Adeniran, 2020).

Since her independence in 1960, Nigeria has undergone fixed, flexible and mixed exchange rate regimes. Initially, the naira was pegged to the British pound and later to the US dollar under the Bretton Woods system. Following the collapse of Bretton Woods in the 1970s, Nigeria adopted a managed exchange rate system. However, constant fluctuations in oil revenues led to periodic devaluations (Obadan, 2020). In 1986, the Structural Adjustment Program (SAP) introduced a dual exchange rate system, with a secondary market exchange rate (SME) for private sector transactions, where the exchange rate was determined by market forces with interventions by the central bank (Sanusi, 2010).

In recent decades, further changes have occurred, such as the introduction of a multiple exchange rate system in 2016 to conserve dwindling foreign exchange reserves. However, this approach created arbitrage opportunities, widened the gap between official and parallel market exchange rates, and discouraged foreign investment (International Monetary Fund, 2021). In June 2023, the Central Bank of Nigeria (CBN) unified its exchange rate windows, allowing market forces to have a greater influence on the naira's value (CBN, 2023). Despite these reforms, liquidity constraints and speculative activity continue to cause exchange rate instability.

The devaluation of the Naira further exacerbates this trend. For example, between 2015 and 2023, the naira lost over 70 per cent of its value against the US dollar in the official market, while the parallel exchange rate depreciated even more (NBS (National Bureau of Statistics), 2023). This devaluation increases the value of remittances in the local currency, thereby giving household's greater purchasing power, but also distorts formal financial flows. Remittances stabilise the Nigerian exchange rate by supplementing the supply of foreign currency. According to the IMF (2021), a 10 per cent increase in remittance inflows can reduce exchange rate fluctuations in developing countries by 2-3 per cent. In Nigeria, remittances accounted for between 6% and 8% of total foreign exchange inflows in 2022, second only to oil exports (CBN, 2023). This inflow helps alleviate pressures on the balance of payments, especially during periods of declining oil revenues.

Nigeria's exchange rate directly affects its trade balance through several mechanisms. First, the value of the naira determines the competitiveness of Nigerian exports in international markets (Adeoye and Saibu, 2022). When the naira depreciates, Nigerian products become cheaper for foreign buyers, which could boost non-oil exports, such as agricultural products. However, Nigeria's heavy reliance on imported refined petroleum products (around 25% of total imports) largely negates this potential advantage (National Bureau of Statistics {NBS}, 2023). Furthermore, exchange rate fluctuations have a significant impact on inflation in Nigeria's import-dependent

economy. Research shows that a 10% depreciation of the naira leads to a 3% to 4% increase in consumer prices within 12 months (CBN, 2022).This exchange rate passes through effects caused by direct increase in prices of imported goods, higher production costs for import-dependant industries and rising transportation costs due to fuel price adjustments. Food inflation, which accounts for over 50 per cent of Nigeria's inflation basket, is particularly sensitive to exchange rate fluctuations (NBS, 2023). The devaluation of the naira after the exchange rate unification in June 2023 contributed to food inflation reaching 31.5 percent in December 2023 (NBS, 2024).

The multiple exchange rate system prior to 2023 generated significant uncertainty for investors (IMF, 2023). Foreign direct investment (FDI) inflows declined from $8.9 billion in 2011 to $3.3 billion in 2022 (United Nations Conference on Trade and Development [UNCTAD], 2023), partly due to difficulties in exchange rate management.The 2023 exchange rate unification was an important step in restoring investor confidence, although on-going fluctuations continue to pose challenges (World Bank, 2023c). Exchange rate influences the economy through various sectorial channels like the oil sector, since the oil sector is the largest source of foreign exchange (90 per cent of total exports), its dollar revenues are significantly influenced by exchange rate. While the devaluation of the naira increases the naira value of oil revenues, it also increases the cost of joint venture cash calls in local currency (Nigeria National Petroleum Corporation [NNPC], 2023).

Statement of the problem

The fluctuation of exchange rate, create uncertainty for both remitters and recipients, when the Naira depreciates, the local currency face value of remittances increase, providing recipients with more purchasing power. However, when the Naira appreciates, the value of remittances decrease reducing, it economic impact (Okonkwo&Eze, 2020). This uncertainty makes it difficult for households to effectively plan and allocate remittance funds, undermining their ability to meet basic needs or invest in income-generating activities; hence the need to examine the impact of the exchange rate on remittances in Nigeria.

Exchange rate fluctuations affect the value, volume, and entry channels of remittances, posing a challenge for both senders and recipients. While a depreciating Naira can improve the local currency value of remittances, it also exacerbates inflation and economic instability eroding the real value of these inflows. Additionally, it might also be possible that the increase in remittances is a mirage resulting from changes in measurements and may not reflect the real financial inflows. Even if the increases are accurately measured, cross country regression would not be able to detect the true effects of remittances, hence a country specific study is appropriate (Clements &McKenzi, 2014).

This paper seeks to address the problem of how exchange rate fluctuations impact remittance inflows, their economic value, and the broader implication for the Nigerian economy, as well as highlighting the need for further research and policy actions to better understand and address the complex relationship between exchange rate and remittances in Nigeria.

Research question

What is the effect of exchange rate on remittance inflows in Nigeria from 1980-2023?

Objective of the study

Investigate the effect of exchange rate on remittance inflow in Nigeria from1980-2023.

Literature Review

Conceptual Review

Exchange rate

Exchange rates encompass multiple definitional approaches that require careful differentiation. The nominal exchange rate measures the value of one currency relative to another, whereas the real exchange rate accounts for inflation differences, a crucial distinction given that Nigeria's 60 per cent nominal naira depreciation (2022-2024) corresponds to only a 40 per cent real depreciation due to high domestic inflation (NBS, 2024; CBN, 2023). Similarly, bilateral exchange rates (e.g. naira-dollar) differ from effective exchange rate weighted by the currencies of trading partners. Nigeria's 45 per cent dollar depreciation in 2023 corresponds to only a trade-weighted decline of 30 per cent (CBN, 2023). These differences, explains why currency fluctuations do not always produce the expected trade effects (Adeoye&Salibu, 2022; Obstfeld&Rogoff, 2022).

Financial markets also distinguish between spot rates (immediate transactions) and forward rates (future). Nigeria's 90 day forward premium of 1520 naira per dollar compared to 1450 naira per dollar spot in January 2024 reflects devaluation expectations (FMDQ, 2024). Many developing countries maintain parallel market rates alongside the official rates Nigeria's 60 per cent premium (1200 naira per dollar parallel compared to 750 naira per dollar official in 2023) revealed structural problems such as foreign exchange restrictions and speculative pressure (CBN, 2023; IMF, 2023). These dual rates lead to economic distortions, including arbitrage opportunities and misallocation of resources, which triggered Nigeria's (partially successful) unification attempt in 2023 (world bank, 2024).

Exchange rate systems exhibit another important difference. Nigeria is currently transitioning from a fixed exchange rate peg (1973-1986) to various managed floating systems. This choice involves fundamental trade-offs: a fixed exchange rate provides stability but requires sufficient reserves, while a flexible exchange rate dampens shocks but increases volatility (Eichengreen, 2022). Nigeria's current managed floating exchange rate system faces problems of low reserves and credibility. This highlights the "impossible trinity" of simultaneously maintaining monetary autonomy, capital mobility, and exchange rate stability (IMF, 2023). These challenges for monetary regimes are particularly acute for commodity-dependent economies facing external shocks.

A clear conceptualization of exchange rates remains essential for effective policymaking. Nigeria's experience demonstrates how definitions—whether they measure real or nominal exchange rate regimes or select appropriate regimes—significantly influence economic outcomes. Future reforms should prioritize deepening foreign exchange markets, improving transparency, and aligning measurement approaches with policy objectives, particularly for developing countries vulnerable to external pressures (Ogunleye, 2023; World Bank, 2024). These measures will help bridge the gap between exchange rate theory and practical economic management.

Remittances

Remittances are subject to multiple definitional approaches that significantly influence their measurement and economic interpretation. The restrictive definition, which focuses exclusively on personal remittances between migrant workers and their families, amounted to US$20.1 billion for Nigeria in 2023, while broader definitions, which include additional flows such as compensation and capital transfers, raise the estimate to US$24.8 billion (CBN, 2024; World Bank, 2023b). This 23% discrepancy significantly compromises the assessment of remittances' contribution to GDP and underscores the importance of a clear definition. Measurement challenges are compounded by Nigeria's substantial informal flows, estimated at 40% of total remittances through channels such as hawala systems and personal couriers (PwC, 2023). These unregistered remittances, particularly frequent in rural areas and for high-value transactions, create a significant gap between official statistics and actual flows.

The distinction between gross and net remittances introduces an additional layer of complexity to economic analysis. While Nigeria recorded gross inflows of US$20.1 billion in 2023, net remittances fell to US$18.3 billion after accounting for outflows and transaction costs (NBS, 2023; World Bank, 2023c). Temporal measurement issues further complicate remittance tracking. Seasonal fluctuations show that remittances in the fourth quarter of 2023 (US$6.2 billion) exceeded the quarterly average (US$4.6 billion), and data on informal flows are 18 months behind in reporting (CBN, 2024; NBS, 2023). These temporal discrepancies pose challenges for policymakers who need real-time data to respond to economic fluctuations.

The conceptual differences between remittances from migrants and those from the diaspora also require careful consideration. Nigeria's remittances are predominantly from temporary workers (70 per cent), with the remaining 30 per cent coming from settled diaspora communities (IFAD, 2022). The intergenerational decline in remittances second generation remittance fell by 60 per cent underscores the need to distinguish between these groups in long term planning. Further challenges in categorisation include settling thresholds for settlement duration and measuring the development impact of diaspora investments compared to consumption oriented migrant remittance.

Theoretical Review

The theoretical review on the impact of exchange rate on remittances involves examining how exchange rate fluctuations influence the behaviours of remittance senders and recipients.

Altruism Theory

The study by Lucas and Stark (1985), titled "Motivations for Sending Remittances: Evidence from Botswana," sparked a theoretical debate about the factors influencing remittances, which continues to be discussed and expanded upon today. Lucas and Stark analyzed household remittances and proposed three key factors: "pure altruism," "pure self-interest," and "moderate altruism or enlightened self-interest." Contracts between the migrant and the household left behind, such as co-insurance, exchange-motives, and loan repayment, fall under the latter group.

It is natural to assume that remittances are sent to the family left behind due to altruistic feelings of the migrant. This can be modeled in a

Becker-type setting where the migrant derives positive utility from the consumption of the family. The migrant thus cares about the poverty, shocks, etc. of the family and always sends remittances. In this case, there is a positive relationship between adverse conditions of the receiving household and remittances sent. Remittances should increase with migrant income (the migrant has more to give) and altruism and decrease with recipient income (Funkhouser, 1995). However, income does not necessarily have a linear effect. As E.D Norris (2015), demonstrated, income may have a different effect at different points of the income distribution.For this study we will be using the Altruism theory of remittance.

Empirical Review

Oussama et al (2025) previous studies analysing the impact of remittances on the exchange rate were based on a symmetric approach and assumed a symmetric impact. Their article examines the asymmetric impact of remittances on the real effective exchange rate (REER) in Morocco. Their results showed that remittances have a negative impact on the REER in both the long and short run, thus refuting the "Dutch disease" hypothesis in the Moroccan context. The results also demonstrate a long term asymmetric effect of remittances on the REER. In light of these findings, the Moroccan authorities were recommended to implement measures to pool the savings of Moroccan migrants and redistribute them for productive investment, by strengthen financial inclusion and providing tailored financial services to the families who remain behind and receive these remittances.

Namarta, Ghulam, Suresh, and Tariq (2024) this study investigated the impact of geopolitical risk (GPR) on foreign remittances (FRs) for the top remittance-receiving countries.samples includes Mexico, France, Egypt, China, the Philippines, India, Vietnam, Ukraine, Germany and Belgium for the annual period of 1998–2022 using the nonlinear panel autoregressive distributed lag (ARDL) model to determine the asymmetry in the relationship.The results suggest that, in the short term, positive GPR shocks have a positive and significant impact on FRs received. On the other hand, the long-run results suggest that adverse GPR shocks negatively affect FRs received in the sampled countries. Additionally, the study confirms the asymmetric impact of GPR on top remittances received in countries. Policymakers, migrants and recipients should consider the asymmetric nature of GPR while making decisions regarding policies and the transfer of remittances. This information can be used to create more effective policies for controlling and reducing the effects of GPR on overseas remittances, such as assisting migrant workers and developing methods to lessen the volatility of these flows.

Dereje (2023) in his study examined the relationships that are often assumed but rarely tested in the context of Ethiopia's path to sustainable development. An autoregressive distributed lag model (ARDL) is used on annual time series data from 1982 to 2021 to examine the short and long run effects of foreign direct investment (FDI), remittances, real exchange rates and imports on Ethiopia's economic growth. By including additional control variables, the study provided nuanced perspectives not previously found in the literature. The results revealed interesting patterns that, while consistent with previous findings, also differ from them. Contrary to earlier studies, foreign investment proves to be a significant driver of growth over time. However, remittances show only temporary importance, underscoring the need for prudent policy

considerations. The influence of the exchange rate on economic growth turns out to be unexpectedly complex and nonlinear, challenging conventional assumptions. The empirical validation of these multifaceted realities highlights the importance of this analysis. Furthermore, the robustness tests conducted in the study confirm the reliability of the results and shed light on other nuances. For example, the relationship between imports and growth is context-dependent and presents ambiguities that require careful consideration. The theoretical and practical implications of the research offer valuable insights for researchers and policymakers.The recommendations emphasize promoting sustainable prosperity through evidence based strategies that prioritize community development.

Methodology

Model Specification

Previous studies investigating the effect of exchange rate on remittances in Nigeria have used economic procedures in their estimations with exchange rate used as one of the explanatory variables. The altruism model was modified using remittance as the dependent variable, while variables such as GDP per capita, GCF (gross capital formation), exchange rate, inflation rate, population growth, and financial development were used as the independent variable. These variables are justified because they are known to affect remittances inflow.

$REM_t = f(EXHR_t GDP_t, POP_t, GCF_t, INF_t, FDV_t)$……..1

Where REM stands for remittances, exchange rate (EXHR) real gross domestic product (GDP), population growth (POP), and gross domestic formation (GCF), FDV is for financial development, and INF stands for domestic inflation rate.

Measurement of Variables

The data included in the study includes; Gross capital formation (GCF), GDP per capita (GDP), Exchange rate (EXHR), financial development (FDV), and Inflation (INF)**.** Gross capital formation (GCF) -Gross capital formation consists of outlays in addition to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements, plant, machinery, and equipment purchases, and the construction of roads, rail transport, and the like, such as industrial and commercial buildings, offices, hospitals, private residential dwellings, and schools**.** Inflation (INF) is the consumer's price index measures.GDP per capita (GDP) - This is the Gross domestic product per capita based on constant local currency. Aggregates are based on a constant value of 2015 U.S. Dollars. While financial development (FDV), is measured through the financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment.

Estimation Techniques

This study adopted Autoregressive distributive lag (ARDL) model to estimate the long run relationship between exchange rate and remittances. The ARDL co-integration test which is also known as the ARDL bounds testing model is a general dynamic specification, which applies lags of the dependent variable and the lagged and contemporaneous values of the explanatory variables, through which the short-run impacts can be directly estimated, and the long-run relationship can be indirectly estimated. This model is preferred to other

models due to its advantage over other co-integration methods like Johansen; Engle and Granger, as the bounds test allows the co-integration relationship to be estimated by OLS once the lag order of the model is identified and its ability to combine variables with *I*(0) and *I*(1) together which means performing unit root test is not necessary. Nevertheless, this study will perform unit root test so as to ensure the variables are not *I*(2) or beyond because the bounds test is based on the assumption that the variables are *I*(0) or *I*(1) and for its benefit of estimating both the long-run and short run parameters of the models simultaneously.

The ARDL approach by Pesaran et al. (2001) requires the testing of the null hypothesis of no co-integration (H_0= θ_1= θ_2= θ_3= θ_4 =$\theta_5 = \theta_6 =$ 0) against its alternative (H_1: θ_0= θ_1= θ_2= θ_3= θ_4 =$\theta_5 = \theta_6 \neq 0$) and two series of F-statistic critical values are calculated. The first one was calculated using variables which were all *I*(0) time series, and the second one was calculated using all *I*(1) variables. To know if there is co-integration in the long-run, the F-statistics calculated is compared with the upper critical bound value. The null hypothesis is rejected when the estimated F-statistics is greater than the upper critical bound value, indicating that there is a long-run co-integration relationship. The null hypothesis will not be rejected when the F-statistics are smaller than the bound value, indicating that there is no co-integration relationship between them.

Explicitly, equation 1 can be rewritten as:

$$REM_t = \alpha_0 + \alpha_1 EXHR_t + \alpha_2 GDP_t + \alpha_3 POP_t + \alpha_4 GCF_t + \alpha_5 INF_t + \alpha_6 FDV_t + \epsilon_t \quad \ldots\ldots 1$$

In estimating the relationship among the variables, below is the ARDL model to be used for the study:

$$REM_t = \beta_{10} + \beta_{11} REM_{t-1} + \beta_{12} EXHR_{t-1} + \beta_{13} GDP_{t-1} + \beta_{14} POP_{t-1} + \beta_{15} GCF_{t-1} + \beta_{16} INF_{t-1} + \beta_{17} FDV_{t-1} + \beta_{18} \sum_{i=1}^{p} \Delta REM_{t-1} + \beta_{19} \sum_{i=0}^{p} \Delta EXHR_{t-1} + \beta_{20} \sum_{i=0}^{p} \Delta GDP_{t-1} + \beta_{21} \sum_{i=0}^{p} \Delta POP_{t-1} + \beta_{22} \sum_{i=0}^{p} \Delta GCF_{t-1} + \beta_{23} \sum_{i=0}^{p} \Delta INF_{t-1} + \beta_{24} \sum_{i=0}^{p} \Delta FDV_{t-1} + \varepsilon_t \quad \ldots\ldots 2$$

Where ε_t and Δ are the white noise term and the first difference operator respectively. The ARDL method estimates $(p+1)^k$ number of regressions in order to obtain the optimal lag length for each variable, where p is the maximum number of lags to be used and k is the number of variables in the equation.

This study used an appropriate lag selection based on a criterion such asAkaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC). The ARDL co-integration method is based on the F or Wald statistics. The F-test is used for testing the existence of long run relationship among the variables. The null hypothesis is tested by considering the Unrestricted Error Correction Model while excluding the lagged variables ΔRem_t, ΔGdp_t, ΔGcf_t, ΔPop_t, $\Delta Exhr_t$, ΔInf_t, ΔFdv_t based on the Wald or F statistic. The asymptotic distribution of the F-statistic is non-standard under the null hypothesis of no co-integration relationship between the examined variables, without recourse to whether the underlying explanatory variables are purely I(0) or I(1). The null hypothesis of no co-integration (H_0: $\beta_{10} = \beta_{11} = \beta_{12} = \beta_{13} = \beta_{14} = \beta_{15} = \beta_{16} = \beta_{17}$) is therefore tested against the alternative hypothesis (H_1: $\beta_{10} \neq \beta_{11} \neq \beta_{12} \neq \beta_{13} \neq \beta_{14} \neq \beta_{15} \neq \beta_{16} \neq \beta_{17}$).

This study computed two sets of critical values for a given significance level. One set assumes that all variables are I(0) and the other set assumes they are all I(1).If the computed F-statistic (test statistic) is above the upper bound critical value, then the null hypothesis will be rejected irrespective of the orders of integration for the time series. On the other hand, if the test statistic falls below the lower bound critical value, then the null hypothesis cannot be rejected. Lastly, if the test statistic falls within the critical value bounds, the result is inconclusive. Consequently, the order of integration for the underlying explanatory variables must be known before any conclusion can be drawn. If there is evidence of co-integration among the variables, the following long-run model is estimated:

$$REM_t = \varphi_1 + \beta_1 \sum_{i=1}^{p} REM_{t-1} + \alpha_1 \sum_{i=0}^{p} EXHR_{t-1} + \gamma_1 \sum_{i=0}^{p} GDP_{t-1} + \psi_1 \sum_{i=0}^{p} POP_{t-1} + \Pi_1 \sum_{i=0}^{p} GCF_{t-1} + \omega_1 \sum_{i=0}^{p} INF_{t-1} + \rho_1 \sum_{i=0}^{p} FDV_{t-1} + \varepsilon_t \quad \ldots\ldots 3$$

The next step is the estimation based on ECM-ARDL (thereafter ECM) model. If there is a co-integration between the variables, then the ECM model can be utilized. This model is derived from obtaining the short-run dynamic parameters by estimating an error correction model associated with the long-run estimates. This can be expressed as follows;

$$\Delta REM_t = \varphi_1 + \beta_1 \sum_{i=1}^{p} \Delta REM_{t-1} + \mu_1 \sum_{i=0}^{p} \Delta EXHR_{t-1} + \rho_1 \sum_{i=0}^{p} \Delta GDP_{t-1} + \Gamma_1 \sum_{i=0}^{p} \Delta Pop_{t-1} + \phi_1 \sum_{i=0}^{p} \Delta GCF_{t-1} + \partial_1 \sum_{i=0}^{p} \Delta INF_{t-1} + \delta_1 \sum_{i=0}^{p} \Delta FDV_{t-1} + \varepsilon_t \quad \ldots\ldots 4$$

According to Pinn KSC et al, (2011).If there is no co-integration among the variables, then the ECM model is included in the short-run equation below;

$$\Delta REM_t = \varphi_1 + \beta_1 \sum_{i=1}^{p} \Delta REM_{t-1} + \mu_1 \sum_{i=0}^{p} \Delta EXHR_{t-1} + \rho_1 \sum_{i=0}^{p} \Delta GDP_{t-1} + \Gamma_1 \sum_{i=0}^{p} \Delta Pop_{t-1} + \phi_1 \sum_{i=0}^{p} \Delta GCF_{t-1} + \partial_1 \sum_{i=0}^{p} \Delta INF_{t-1} + \delta_1 \sum_{i=0}^{p} \Delta FDV_{t-1} + \theta \mathrm{ECM} + \varepsilon_t \quad \ldots\ldots 5$$

Results and Discussion

Table 1 unit root test

ADF (AUGUMENTED DICKEY FULLER)			PP (PHILIP PERRON)		REMARKS
Variables	**Level**	**1st Difference**	**Level**	**1st Difference**	
REM	-1.5087 (0.5197)	-6.6198*** (0.0000)	-1.3118 (0.6156)	-7.6457*** (0.0000)	I(1)
POP	-3.3418** (0.0202)	-2.8147* (0.0659)	0.7025 (0.8353)	-5.3010*** (0.0001)	I(1)

GCF	-2.1569 (0.2246)	-5.9019*** (0.0000)	-2.1569 (0.2246)	6.0701*** (0.0000)	
INF	-3.1664** (0.0291)	-6.1219*** (0.0000)	-3.0266** (0.0403)	-12.1936*** (0.0000)	I(0)
GDP	-1.2507 (0.6430)	-4.5436*** (0.0007)	-0.9709 (0.7552)	-4.5975*** (0.0006)	I(1)
FDV	-1.9028 (0.3279)	-5.4743*** (0.0000)	-1.9402 (0.3114)	-19.3529*** (0.0001)	I(1)
EXHR	-2.0236 (0.2760)	-4.5468*** (0.0007)	-2.1418 (0.2300)	-4.5268*** (0.0007)	I(1)

Source: Author computation 2026

*Notes: ***, **, * denotes level of significance for 1% and 5%, and 10%, probability values are in parentheses.*

This section examines the stationarity of the series being investigated using the unit root tests.

To do this, the study employed the Augmented Dickey Fuller (ADF) and Philip Perron (PP) test. This study performs unit root tests in log level and first differences in order to determine univariate properties of the series being examined. That is, to test for the presence of the unit roots or non-stationary. Both tests involve testing the null hypothesis of a unit root or non-stationary of the series against the alternative of stationarity.

The importance of stationarity of time series used in regression border on the fact that a non-stationary time series is not possible to generalize to other time periods apart from the present. The variables in levels reports outcomes that imply that the null hypothesis of the unit roots for the time series for the variables cannot be rejected at the 5 percent level. From the Table of unit roots tests, some of the variables are insignificant in terms of the test statistics at 5%, 10% and 1% levels. This shows that null hypothesis of the unit roots for the time series data for the variables cannot be rejected when variables are taken in level.

Table 2: Co-integration result on the effect of exchange rate on remittances

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
F-statistic	5.488792	10%	1.99	2.94
K	6	5%	2.27	3.28
		1%	2.88	3.99

Source: Author's computation 2026

Having established that some variables are integrated at level I (0) while some at integrated at first difference I (1). The study then ascertained whether the variables are co-integrated, testing their relationship in the long run, using the co-integration ARDL bound test. The results show that there is a long run relationship among the variables since the f-statistics is greater than the upper value at all levels of significance (1%, 5%, and 10%).

Table 3 the long run result on the effect of exchange rate on remittance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	58.0661***	19.450	2.985	0.0137
EXHR	-0.013	0.008	-1.555	0.1510
LOG(POP)	11.015*	5.319	2.071	0.0652
LOG(GDP)	-10.060***	1.990	-5.055	0.0005
INF	-0.253***	0.032	-7.833	0.0000
LOG(FDV)	3.922***	0.928	4.224	0.0018
LOG(GCF)	1.587	1.580	1.004	0.3390

Source: Author's computation 2026

*Notes: ***, **, * denotes level of significance for 1% and 5%, and 10%, probability values are in parentheses.*

Exchange rate is found to have a negative impact on remittance in the long run and insignificant which also aligns with the study of Singh et al., (2010) who found out that sharp currency depreciation in recipient countries reduces the real value of remittances when converted to local currency discouraging migrants from sending as much.

Table 4 the short run result on the effect of exchange rate on remittance

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(EXHR)	0.013***	0.003	4.820	0.0007
D(EXHR(-1))	0.031	0.004	8.238	0.0000
D(EXHR(-2))	0.021	0.003	7.272	0.0000
D(EXHR(-3))	0.015	0.003	5.905	0.0002
DLOG(POP)	-51.923***	7.236	-7.175	0.0000

DLOG(GDP)	-9.894***	2.253	-4.391	0.0014
DLOG(GDP(-1))	-16.818	3.281	-5.126	0.0004
DLOG(GDP(-2))	-7.079	2.065	-3.429	0.007
DLOG(GDP(-3))	9.847	2.125	4.633	0.0009
D(INF)	-0.054***	0.007	-7.799	0.0000
D(INF(-1))	0.137	0.018	7.767	0.0000
D(INF(-2))	0.089	0.013	6.919	0.0000
DLOG(FDV)	0.334	0.333	1.004	0.339
DLOG(FDV(-1))	-1.497	0.428	-3.496	0.006
DLOG(DCP(-2))	-1.743	0.394	-4.419	0.001
DLOG(GCF)	-0.201	0.391	-0.513	0.619
DLOG(GCF(-1))	0.524	0.363	1.445	0.179
DLOG(GCF(-2))	2.305	0.362	6.360	0.0001
DLOG(GCF(-3))	2.586	0.377	6.853	0.0000
CointEq(-1)*	-0.883***	0.102	-8.639	0.0000
R-squared	0.940			
Adjusted R-squared	0.874			

Source: Author's computation 2026

*Notes: ***, **, * denotes level of significance for 1% and 5%, and 10%, probability values are in parentheses.*

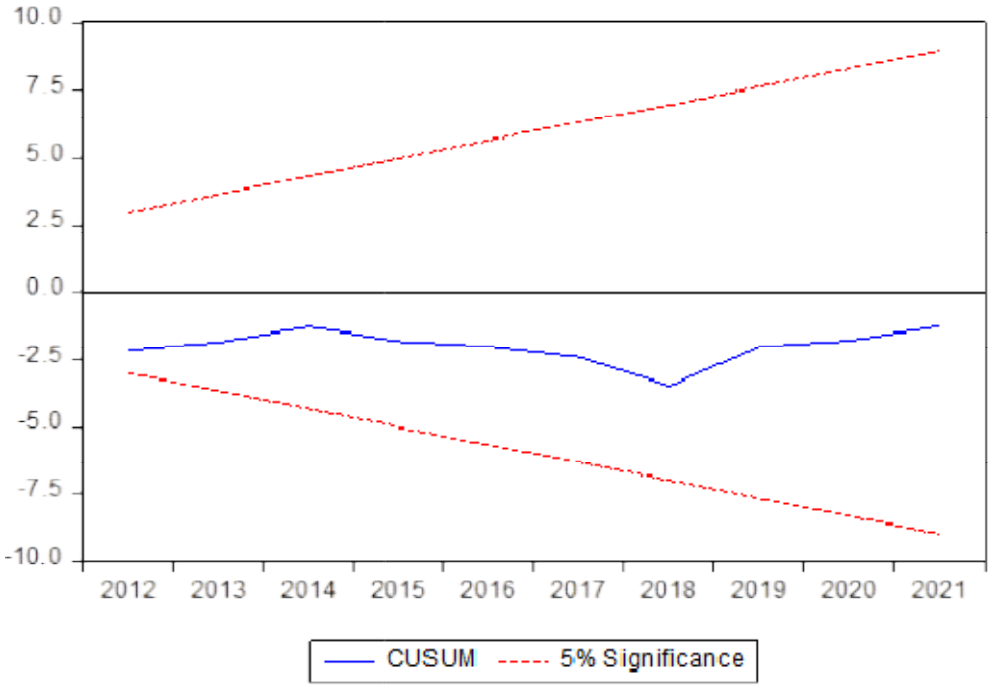
In table 4 exchange rate is found to have a positiveimpact on remittance in the short run and significant also, equilibrium (ECM) has a negative impact on remittance in the short-run at 1 per cent significance. The independent variables in the R squared shows that they account for 97% and also 87% in the adjusted R squared.

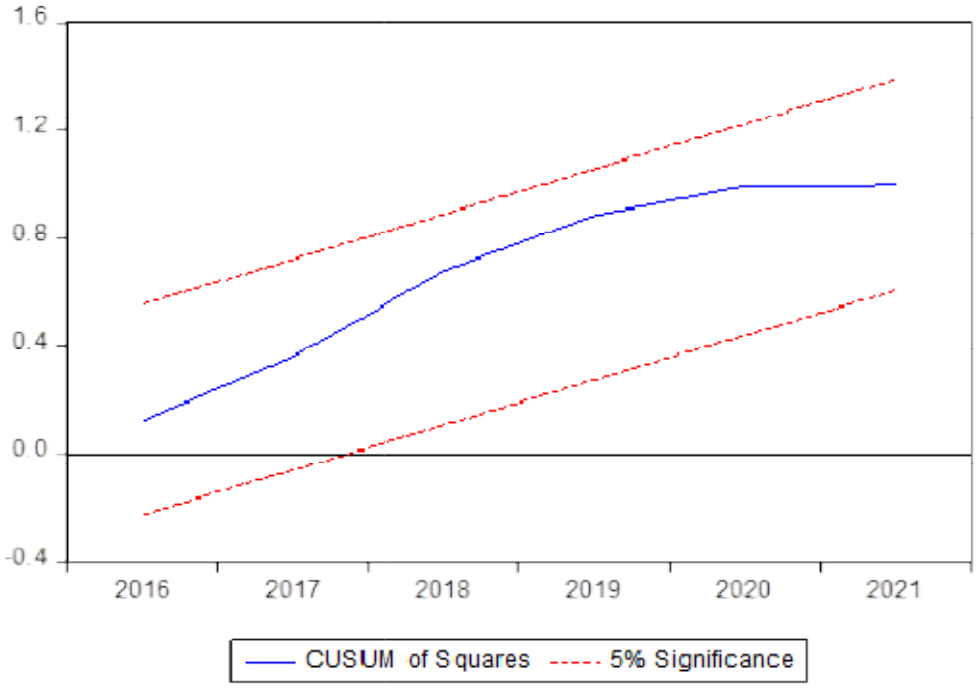
Post estimation tests

Table 5 Diagnostic test on the effect of exchange rate on remittances

Test	F-statistics	Prob.
Normality	1.4512	0.4840
Breusch-Pagan-Godfrey Heteroskedasticity	0.4665	0.9423
Breusch-Godfrey Serial Correlation LM	2.3919	0.1534
Ramsey RESET	1.6889	0.1255

Source: Author computation 2026





Source: Author's computation 2026

The post estimation tests are presented in Table 5 J-B normality is employed to test the distribution of the residual. This is often important since one of the presumptions of classical linear regression model (CLRM) residual is normally distributed with zero mean and constant variance. To test for serial autocorrelation in the model, the Breusch-

Godfrey LM test is employed while Autoregressive conditional heteroskedasticity (ARCH) is used to check the autocorrelation in the variance of the error term. Ramsey's reset test is used to test the functional misspecification of the model. The results from the diagnostics tests indicate there is no misspecification of the model. Likewise, heteroscedasticity and serial correlation problems are absent. For instance, the probability of the J-B normality residual is insignificant which means the residual is normally distributed. Likewise, the probabilities of Ramsey's reset test and Autoregressive conditional heteroskedasticity are insignificant which show that the model is well specified and has no heteroskedasticity problem respectively.

Discussion of Findings

The results on the impact of exchange rate on remittance inflows in Nigeria, found out that remittance, gross domestic product, exchange rate, inflation, population, gross capital formation and financial development are co-integrated. This means that there is a long run relationship between the variables. The results clearly shows that the positive effect of exchange rate on remittance in the short run seems to demonstrate that when exchange rate is high the inflows of remittance in the short run into the nation will also be high, a few studies to that effect fromChukwu et al (2020) and Ahmed et al (2021) were also able to guide us to that effect.

The results revealed that exchange rate has a negative and insignificant impact and non-significantly has an impact on remittances inflow in the long run this results is consistent with existing findings of (Ratha, 2008), that says when a recipient country currency weakens persistently, the local currency value of remittances declines unless senders increase the nominal amount transferred. However, migrants often face fixed earning in host country currencies, making it difficult to compensate for long term depreciation. For example, if a country currency loses 30% of its value over a decade, remittance receiving households effectively experience a significant reduction in real income (Yang, 2008).

Conclusion

The study found a long-run relationship using the F-Bounds test (co-integration technique) among the series. However, when using the ARDL without lag for long run relationship between exchange rate and remittance inflows in Nigeria, exchange rate exhibited a negative but insignificant effect on remittance inflows which means that sharp currency depreciation in recipient countries reduces the real value of remittances when converted to local currency discouraging migrants from sending as much. Furthermore, the exchange rate showed a positive and significant effect on remittance inflows in the short- run which means arbitrage behavior is common; migrants increase remittances during depreciation spikes to exploit favorable exchange rate.

Recommendation

Based on the findings of this study we proffer the following recommendations. It is hoped that the recommendations will help to improve exchange rate and remittances thus provide a consequent boost to Nigeria's economic growth and development.

Central Bank of Nigeria should adopt measures to promote exchange rate stability by building adequate foreign exchange reserves which helps buffers against speculative attacks and sudden currency devaluation.

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