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Research Article

An Examination of the Interrelationship Among Remittance Inflows, Foreign Direct Investment and Economic Growth in Nigeria

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Abstract

The globalization of the world economy, coupled with the recent rise of anti-globalization sentiments in some regions, has made it challenging for underdeveloped nations like Nigeria to fully understand the drivers of economic growth. After gaining independence, Nigeria, like many other growing economies in sub-Saharan Africa, has been striving to achieve and sustain long-term economic growth. The recent downturn in FDI can be attributed to recurring political instability, sluggish economic growth, and a weak global economy, leading to dwindling investment in manufacturing and related sectors. Consequently, examining the long-term relationship between remittances, FDI, and economic growth is crucial for policymakers and government advisers. The present study sought to appraise the relationship among remittance inflow, foreign direct investment (FDI), and economic growth in Nigeria. Time series data, which spanned the period of 1986-2022, was utilized. The vector error correction model was employed for the estimation. From the study, remittance was found to have a negative and non-significant relationship with economic growth. A bi-directional causation was established between FDI and economic growth. Lastly, remittance had no significant relationship with foreign direct investment. The study hence recommends that policymakers should draw up sufficient FDI inflow strategies that would translate to economic growth. This could be done through building confidence in the domestic economy through political stability and cooperation with relevant stakeholders.

Keywords

Foreign Direct Investment, Economic Growth, Investments, Remittances Inflows

1. Introduction

After gaining independence, Nigeria, like many other growing economies in sub-Saharan Africa, has been striving to achieve and sustain long-term economic growth. The globalization of the world economy, coupled with the recent rise of anti-globalization sentiments in some regions, has made it challenging for underdeveloped nations like Nigeria to fully understand the drivers of economic growth. Nevertheless, economic literature suggests that numerous factors contribute to growth. Key domestic determinants include sound macroeconomic policies, good governance, human capital, political stability, and national savings [19]. In recent years, external factors such as imports, remittances, and for-

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eign direct investment (FDI) have become increasingly crucial in driving economic growth, particularly for developing countries (AzmanSaini, Law, & Ahmed, 2010).

Consequently, developing countries, particularly those with high emigration rates, are receiving substantial remittances from the growing number of migrants living and working abroad, whose contributions have become both steady and increasing. For example, remittances rose from about 2 percent in 2000 to 8.3 percent by 2005. The flow of foreign investment into Nigeria has also shown consistent growth. After negative investment levels in the 1980s, FDI increased to $4.98 billion in 2005, peaked at $8.84 billion in 2011, but declined to $7.07 billion in 2012 and further to $3.3 billion in 2021. The recent downturn in FDI can be attributed to recurring political instability, sluggish economic growth, and a weak global economy, leading to dwindling investment in manufacturing and related sectors. Consequently, examining the long-term relationship between remittances, FDI, and economic growth is crucial for policymakers and government advisers.

Remittance flow statistics have ranked petrodollars and remittances from Nigerians in the diaspora as the first and second largest foreign exchange earnings. Based on the World Bank [30], remittances which stood at $1.392 billion in 2001 rose drastically by 767% to $10.681 billion in 2011. Statistics on Nigerian's remittance inflow have it that in 2011 remittance was 5% of GDP, this figure dropped to 4% in 2012, it dwindled further to 3% in 2013, in 2015 and 2018, remittance accelerated to 4% and by the year 2022 it stood at 4.3% of GDP. The importance of FDI to an economy is also reflected in the plethora of huge empirical contributions from several scholars all over the world [5, 9, 23, 18, 24]. However, literature on the interrelationship between FDI, Remittances, and economic growth appeared to be non-existent in extant literature. Although, several studies exist concerning remittance and economic growth [2, 7, 8, 10, 11, 21, 22, 27-29]. However, their findings were inconclusive. Therefore, this research adds its quota to the extant literature by exploring the interrelationship between FDI, remittance, and economic growth in Nigeria. The study employed data covering the period from 1986 to 2022.

2. Literature Review

2.1. Conceptual Review

Remittances are simply the free transfers that income-earning migrants or benevolent organizations resident abroad send to their family members, and other relatives or associations in developing countries to solve specific and personal needs. These flows are classified into are called migrant or international remittances. The migrant remittances that this study focuses on are all such transfers from migrants to their close relatives for individual needs. From the microeconomic viewpoint, the end-use of remittances is the direct or indirect motivating factor that propels migrants to remit part of their earnings to their relations back home.

Foreign Direct Investment (FDI) entails a situation whereby foreign investors decide to position their company in another country. Foreign investors' ownership of such businesses could be fully or partially dependent on the level of interest of the foreign business person or organization.

Foreign direct investment (FDI) can also be a process whereby foreign investors are involved in the acquisition of assets in another country which may position them at the center of the corporate governance level of such business. Such a link can involve the acquisition of (or merger with) already existing production facilities by getting hold of a majority share, or the establishment of a new facility.

2.2. Empirical Review

The impact of imports, remittances, direct foreign investment, and economic growth in the Republic of the Fiji Islands was examined [15] using the ARDL approach with data from 1980-2015. The research output in the long and short-run, indicated that remittances and foreign direct investment positively influenced economic growth. Investigation on the effect of foreign direct investment, remittances and official development assistance (ODA) on economic growth in developing countries by adopting the panel data methodology using data from 1990 to 2016 [31]. The empirical findings from this analysis suggest the use of economic-type solutions to resolve some of the shortcomings encountered in terms of unexpected effects. Governments in these countries should improve the business environment by establishing a framework that further encourages domestic and foreign investment.

Remittance and trade were found to exhibit a long-run relationship with economic growth in the work on the relationship between remittance and economic growth in Nepal for the period of 1976 to 2017 [13] and that of economic growth in Fiji [20]. However, the study did not find any evidence of the short-run relationship between remittances and economic growth, but trade exhibited a significant short-run effect on economic growth for the period under consideration. The study suggested that policymakers should develop policies that drive both the inflow of remittance and foreign direct investment. The extent to which remittances and FDI should be promoted was not stated clearly though.

In an article on the growth implication for foreign direct investment and remittances in Nigeria for the period of 1980 to 2019 with the help of Ordinary Least Square, it was observed that FDI had a negative relationship with economic growth while remittances have a positive effect on economic growth [1]. They therefore advise the government and the monetary authority to encourage inflows of FDI and also to implement monitoring mechanisms to oversee the level of remittance flows. From the global perspective, a similar study by [3, 16] on how FDI and remittances impact the economic growth of Afghanistan, Bangladesh, India, Sri Lanka, and

Pakistan for the period of 2008 to 2020 was conducted. The fully modified ordinary least square (FMOLS) and dynamic ordinary least square (DOLS) approaches were utilized to analyze the model. The results revealed a positive and significant impact of foreign direct investment (FDI) and remittances on the economic growth of the selected countries. Using the Vector Autoregressive (VAR) method, [12] investigated how remittance affects Balkan countries' economic development. The analysis spanned from 2000 to 2017. The regression outcome suggests that population growth, remittances, and labor force participation are insignificant factors for sustainable growth.

From the negative strand, studies have shown that remittances do not have strong implications for economic growth. Specifically, the effect of remittance inflow on the economic growth of Nigeria using data that spanned 1981 to 2021 was examined with the autoregressive distributed lag (ARDL) method [25]. Their finding established that the inflow of personal remittance could be detrimental to economic growth in Nigeria in the short run especially when the remittances are not channeled to productive engagement by recipients in the home country. However, the result revealed that in the long run, remittance inflow possesses a significant and positive impact on economic growth in Nigeria. The above outcome is not farfetched from the study of remittances and financial sector development impact on economic growth in Nigeria from 1981 to 2017 with the autoregressive distributed lag (ARDL) technique [4]. The analysis revealed that the variables are bound together in the long run. A negative and significant influence was found to exist between remittance and economic growth in the long-run and short-run. Interestingly the study revealed a complementary economic growth effect by both remittance and financial sector development. This finding is similar to those of [14] who used the Johansen cointegration test to analyse the impact of remittance on growth. From its result, it was observed that remittance due to its volatile nature exacerbated the instability and output fluctuation; thus, posing a detrimental impact on growth.

Literature on FDI and economic growth has also been mixed. While some studies revealed that FDI possesses positive implications for economic growth others showed that FDI is detrimental to growth for instance, [6] investigated the impact of foreign financial inflows on the economic growth of 31 sub-Saharan African countries over the period 2009 to 2019. The study employed a two-step system GMM technique. FDI was found to have a positive and significant implication for economic growth while remittance inflows negatively and insignificantly impaired growth while, [17] empirically examined the effect of The Remittance, Foreign Direct Investment, Export and Economic Growth in Bangladesh: using the annual data from 1976 to 2019. ARDL model identified the positive and negative casualties because remittance and export have a significant positive role, and FDI has an adverse role in the economic growth process.

A study on the effect of remittance inflow on savings in Nigeria, showed that individuals with a bank account who also receives remittances have higher tendency to save compared to individuals without any account. Savings when translated to investment can in turn trigger growth [26].

3. Methodology

3.1. Theoretical Framework

This article is hinged on the accelerator model that incorporates the kind of feedback from current output to investment that Keynes saw occurring through the effect of current output on investors' expectations. The accelerator model is based on the assumption that firms' desired capital-output ratio is constant overtime. This implies that the desired capital stock for a given time, say t is proportional to the level of output in t, $K_t^* = \sigma Y_t$, where σ is the desired capital-output ratio. Suppose that firms invest in period t in order to bring their capital stocks to the desired level K_{t+1*} in period t + 1. Then, if depreciation is zero for simplicity, $I_t = K_{t+1*} - K_t$. But since $K_t = K_{t*}$, that means that $I_t = \sigma (Y_{t+1} - Y_t)$. Thus, the simplest accelerator model predicts that investment is proportional to the increase in output in the coming period.

Firms, of course, do not observe future output with certainty, so the Y_{t+1} term must be interpreted as an expectation. The dependence of investment on expectations is both realistic and central to Keynes's ideas. However, since we cannot observe expectations of firms about future output, this feature of the accelerator model posed problems for those who wished to implement it. The most common way of resolving this difficulty was to assume that firms expect the change in output in the coming period to be equal to the change in the current period. In mathematical terms, they assume that $E_t (Y_{t+1} - Y_t) = Y_t - Y_{t-1}$. The model it reflects quite reasonably what Keynes thought was happening in investments; that firms observed a rise or decline in output and extrapolated that change into the future in determining their investment spending.

Since the capital-output ratio in most economies is larger than one (often three or more in advanced economies), moderate expected changes in output are capable of triggering relatively large changes in investment in the accelerator model. Similarly, investments and remittances are dependent on expectations of the performance of the domestic economy. Hence, a growth in domestic economy would trigger both FDI and remittance which can into boost growth in the recipient countries.

3.2. Model Specification

This study institutes an econometric model to illustrate the relationship between Remittance, foreign direct investment and economic growth in Nigeria by modifying Adeleye, Ologunwa and Ogunjobi (2021) model. The functional form of the model in this study is thus specified as;

$$EGR = f(REM, FDI, EXR, INF, GFCF) \quad (1)$$

Specifying the vector autoregressive econometric terms and taking logarithm of data with large magnitude dataset to eliminate the problem of extremely large variable coefficient, the model is re-specified as thus;

$$EGR_{1=\ \beta_0} + \beta_1 \sum_{i=1}^{r-1} EGR_{t-1} + \beta_2 \sum_{i=1}^{r-1} REM_{t-1} + \beta_3 \sum_{i=1}^{r-1} FDI_{t-1} + \beta_4 \sum_{i=1}^{r-1} EXR_{t-1} + \beta_5 \sum_{i=1}^{r-1} GFCF_{t-1} + \beta_6 \sum_{i=1}^{r-1} INF_{t-1} + \varepsilon_{t-1} \quad (2)$$

$$REM_{1=\ \alpha_0} + \alpha_1 \sum_{i=1}^{r-1} EGR_{t-1} + \alpha_2 \sum_{i=1}^{r-1} REM_{t-1} + \alpha_3 \sum_{i=1}^{r-1} FDI_{t-1} + \alpha_4 \sum_{i=1}^{r-1} EXR_{t-1} + \alpha_5 \sum_{i=1}^{r-1} GFCF_{t-1} + \alpha_6 \sum_{i=1}^{r-1} INF_{t-1} + \varepsilon_{t-1} \quad (3)$$

$$FDI_{1=\ \gamma_0} + \gamma_1 \sum_{i=1}^{r-1} EGR_{t-1} + \gamma_2 \sum_{i=1}^{r-1} REM_{t-1} + \gamma_3 \sum_{i=1}^{r-1} FDI_{t-1} + \gamma_4 \sum_{i=1}^{r-1} EXR_{t-1} + \gamma_5 \sum_{i=1}^{r-1} GFCF_{t-1} + \gamma_6 \sum_{i=1}^{r-1} INF_{t-1} + \varepsilon_{t-1} \quad (4)$$

A priori expectations:

$$\beta_1, \beta_2, \beta_3, \beta_4, \beta_{5>0}, \beta_6 < 0$$

$$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5 > 0, \alpha_6 < 0$$

$$\gamma_1, \gamma_2, \gamma_3, \gamma_4, \gamma_5 > 0, \gamma_6 < 0$$

Where; EGR represents Economic growth rate, REM is Remittance inflows measured as personal remittance received (% of GDP), FDI is foreign direct investment being the total FDI inflows in billion dollars, EXR represent nominal exchange rate (N/$), INF represents inflation rate measured by consumer price index (% change) and GFCF is gross fixed capital formation, a proxy of domestic investment in billion naira.

3.3. Method of Data Analysis

The Vector Error Correction Model (VECM) was utilized in this study to analyze the interrelationship among remittance, FDI, and economic growth in Nigeria. The VAR (Vector Auto-regression) model is widely employed for forecasting interconnected time series systems and examining the dynamic effects of random shocks on the variables within the system. By treating each endogenous variable as a function of the lagged values of all endogenous variables, the VAR approach avoids the necessity for structural modeling. The mathematical formulation of the VAR model used in this study is:

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \ldots + A_p Y_{t-p} + BX_t + \varepsilon_t$$

Where Y_t represents a vector of endogenous variables, X_t is a vector of exogenous variables, $A_1, \ldots, A_p$ and B are matrices of coefficients to be estimated, and ε_t is a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables. However, where the endogenous variables are found to be co-integrated, the VAR becomes unsuitable and this justifies the use of the Vector Error Correction (VEC) model in this study. The co-integration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments. Alongside the VECM, other required preliminary tests and post-diagnostic tests such as descriptive statistics, correlation tests, the Augmented Dickey-Fuller unit root tests, the Johansen cointegration tests, and the Impulse Response Function (IRF) were also conducted. The IRF traces the reaction of all the variables in the VAR system to innovations in one of the variables and therefore can be used to analyze the effects of structural innovations. Thus, IRF can be interpreted as showing the portion of variance in the prediction for each variable in the system that is attributable to its innovations and to shocks to other variables in the system.

4. Presentation and Discussion of Results

4.1. Descriptive Statistics

The descriptive statistics of the study are presented thus:

Table 1. *Descriptive statistics.*

	EGR	REM	FDI	EXR	GFCF	INF
Mean	4.162427	3.030160	1.582739	131.1854	30.74020	19.42647
Median	4.195924	2.857986	1.380374	125.8081	28.64594	12.87658
Maximum	15.3291	8.333830	5.790847	425.9792	54.94827	72.83550
Minimum	-2.03511	0.004883	-0.03912	1.754523	14.16873	5.388008
Std. Dev.	3.854065	2.430854	1.257269	118.7234	12.70218	17.32921
Skewness	0.515553	0.271489	1.655711	0.910852	0.300443	1.764587

	EGR	REM	FDI	EXR	GFCF	INF
Kurtosis	3.459191	1.857488	5.799086	3.034101	1.910055	4.837096
Jarque-Bera	1.964139	2.466912	28.98395	5.117979	2.388109	24.40456
Probability	0.374535	0.291284	0.000001	0.077383	0.302990	0.000005

Source: Authors computation using Eviews 10; (2024)

From the descriptive statistics shown in Table 1, the mean, median, maximum, and minimum variables are presented accordingly. The results showed also that all the variables are positively skewed implying a long right tail. It also showed that economic growth (EGR) foreign direct investment (FDI) and inflation rate (INF) are leptokurtic, remittance flow (REM), and gross fixed capital formation (GFCF) were platykurtic while exchange rate (EXR) was mesokurtic indicating the degree of peakedness of the variables. The results imply a steep, flat, and moderate peakedness of the variables respectively. Finally, the Jarque Bera and its corresponding probability value indicate that EGR, REM, EXR, and GFCF are normally distributed given a probability value of greater than 0.05. While FDI and INF were not normally distributed.

4.2. Correlation Analysis

This indicates the degree of relationship among the variables. It however does not imply causation. The correlation analysis of the variables is presented in Table 2;

Table 2. *Correlation Matrix.*

	EGR	REM	FDI	EXR	GFCF	INF
EGR	1.0000					
REM	0.0434657	1.0000				
FDI	-0.052737	0.0155788	1.0000			
EXR	-0.096110	0.633709	-0.400853	1.0000		
GFCF	-0.207263	-0.776327	0.1864522	-0.609638	1.0000	
INF	-0.314859	-0.361168	0.4538341	-0.345601	0.3974804	1.0000

Source: Authors' compilation Eviews 10 Output (2024)

The correlation matrix showed that all the independent variables but remittance (REM) were negatively correlated with the dependent variable, economic growth (EGR). Specifically, FDI, EXR, GFCF, and INF were negatively correlated with economic growth judging by their correlation coefficients of -0.0527, -0.0961, -0.2072, and -0.3148 respectively while REM with its coefficient of 0.0434 shows that remittance is weakly and positively related with EGR. In sum, the results show that the pairwise Pearson's correlation coefficients ranged from -0.77 to 0.63. This indicated that all the pairwise Pearson's correlation coefficients were less than 0.90 The implication is to expect an absence of multicollinearity among regressors in the estimated regression model.

4.3. Unit Root Test

Table 3. *Augmented Dickey-Fuller Test.*

Variables	Levels		Remarks	First Difference		Remarks
	ADF Stats	5% Crit. Value		ADF Stats	5% Crit. Value	
EGR	-4.0371	-2.9458	Stationary	-	-	-

Variables	Levels		Remarks	First Difference		Remarks
	ADF Stats	5% Crit. Value		ADF Stats	5% Crit. Value	
REM	-1.9099	-2.9458	Non-stationary	-6.1761	-2.9484	Stationary
FDI	-3.8143	-2.9458	Stationary	-	-	-
GCFC	-1.6159	-2.9484	Non-stationary	-4.8614	-2.9484	Stationary
INF	-3.4793	-2.9484	Stationary	-	-	-
EXR	2.3719	-2.9458	Non-stationary	-4.0451	-2.9484	Stationary

Source: Authors compilation using Eviews 10 Output (2024)

The Augmented Dickey-Fuller (ADF) test was applied in this analysis to ascertain the unit root status of the time series the result is contained in Table 3.

The results of the unit root test for stationarity as presented in Table 3 showed that EGR, FDI, and INF are stationary at levels meaning they are integrated of order zero or I (0) because their ADF Statistics exceeded the critical values, While REM, GFCF and EXR are stationary after the first difference implying, they are integrated of order one or I(1) variables. Since the variables were found to be stationary at a different order of integration, we proceeded to conduct a cointegration test to validate if a long-run relationship exists among the variables.

4.4. Cointegration Test

Table 4. *Johansen Cointegration Test.*

Hypothesized No of CE(s)	EigenValue	Trace Statistics	Prob**	Max-Eigen Statistics	Prob**
None*	0.828471	133.9166	0.0000	61.70510	0.0001
At most 1*	0.667193	72.21148	0.0318	38.50669	0.0130
At most 2	0.376512	33.70479	0.5180	16.53491	0.6200
At most 3	0.260699	17.16988	0.6275	10.57174	0.6898
At most 4	0.121207	6.598137	0.6248	4.522219	0.8005
At most 5	0.057587	2.075918	0.1496	2.075918	0.1496

Trace test indicates 5 co-integrating eqn(s) at the 0.05 level *denotes rejection of the hypothesis at the 0.05 level Source: Authors' computation using Eviews 10 Output (2024)

From the result in Table 4, the Trace statistics indicate the existence of 2 cointegrating equations, while the Maximum-Eigen statistics confirm likewise. Since the variables are co-integrated, this satisfies the convergence property. We therefore conclude that the variables will possess a long-run equilibrium.

4.5. Vector Error Correction Model Result

The Vector Error Correction Model result which shows the short-run dynamics from long-run stable convergence in the time series, is presented as follows:

Table 5. *Vector Error Correction Model Result.*

Error Correction:	D(EGR)	D(REM)	D(FDI)	D(EXR)	D(GFCF)	D(INF)
CointEq1	-0.550788	-0.003076	-0.061623	-1.224976	0.098009	-2.040006
	(0.13600)	(0.05304)	(0.04404)	(0.63728)	(0.11950)	(0.35635)
	[-4.04991]	[-3.05800]	[-3.39910]	[-2.92220]	[1.82015]	[-5.72467]
D(EGR(-1))	0.499165	0.018774	0.124559	1.678133	0.145309	0.762380
	(0.17888)	(0.06977)	(0.05793)	(0.83822)	(0.15718)	(0.46872)
	[2.79053]	[0.26909]	[2.15017]	[2.00202]	[0.92447]	[1.62652]
D(REM(-1))	-0.686073	-0.028408	0.207826	-1.332631	0.197781	-0.419196
	(0.54159)	(0.21124)	(0.17540)	(2.53790)	(0.47590)	(1.41914)
	[-1.26677]	[-0.13448]	[1.18485]	[-0.52509]	[0.41559]	[-0.29539]
D(FDI(-1))	1.682313	-0.116654	0.526749	-5.546782	-0.230310	2.811123
	(0.58451)	(0.22799)	(0.18930)	(2.73903)	(0.51362)	(1.53161)
	[2.87816]	[-0.51168]	[2.78262]	[-2.02509]	[-0.44841]	[1.83540]
D(EXR(-1))	0.114493	0.034817	-0.037739	0.472939	0.004579	-0.209595
	(0.03961)	(0.01545)	(0.01283)	(0.18562)	(0.03481)	(0.10379)
	[2.89051]	[2.25358]	[-2.94152]	[2.54789]	[0.13156]	[-2.01935]
D(GFCF(-1))	0.511351	-0.014470	0.271502	2.071982	0.422658	-2.329934
	(0.22557)	(0.08798)	(0.07305)	(1.05702)	(0.19821)	(0.59106)
	[2.26693]	[-0.16446]	[3.71662]	[1.96021]	[2.13237]	[-3.94193]
D(INF(-1))	-1.185463	0.053482	0.046036	0.482645	0.125513	0.215631
	(0.05449)	(0.02125)	(0.01765)	(0.25535)	(0.04788)	(0.14279)
	[-2.17556]	[2.51680]	[2.60852]	[1.89011]	[2.62142]	[1.51014]
C	-0.309908	0.698075	0.026969	12.23346	-0.392979	1.027193
	(0.81021)	(0.31602)	(0.26240)	(3.79665)	(0.71194)	(2.12301)
	[-0.38250]	[2.20897]	[0.10278]	[3.22217]	[-0.55198]	[0.48384]
R-squared	0.769749	0.442588	0.555332	0.560668	0.618135	0.647175
Adj. R-squared	0.606350	0.375630	0.488195	0.494915	0.525430	0.555702
F-statistic	2.262866	3.171574	2.125999	2.175940	4.076118	7.075029

Source: Authors' compilation using EViews 10 Output (2024)

The short-run error correction model is presented above. The economic growth model shows that a 1-period lag of economic growth has a positive and significant impact on the current level of economic growth as shown by the t-statistics that is greater than 2 (rule of thumb). This implies that previous growth triggers current economic growth. The result also showed that remittance has a negative and non-significant impact on economic growth in the short-run period. These findings refute the study on Fiji Island, as well as those of Nepal [15, 13] and [1]. The results also show that foreign direct investment (FDI), exchange rate, and gross fixed capital formation possess positive and significant impact on economic growth in the short run judging from their respective t-statistics that exceed two (2). Explicitly, the result indicates that a 1 unit increase in these variables would translate to a 1.68%, 0.114%, and 0.511% increase in economic growth. Moreover, (INF), inflation rate impedes economic growth because it was found to have a negative but significant impact on economic growth in the short run. This is in line with the apriori sign expectation. These findings of FDI on economic growth align with those of [16] as well as those of [1]. The error correction mechanism by (CointEq)

was correctly signed and was also significant showing that any deviation in the model will converge in the long run. The R-square and adjusted R-square which show the overall goodness of fit showed that 77% of the variation in dependent variable is explained by the explanatory variables in the model. Similarly, the F-statistics indicated an overall goodness of fit.

In the Remittance model, the results showed that the variables; EGR, FDI, and GFCF do not significantly drive remittance flow into the economy except for exchange rate and inflation which both have positive and significant impacts on remittance. These findings imply that an increase in both the inflation rate and exchange rate promotes the inflow of remittance. The model had a good fit as the R square indicated that 44% of variations in remittance are captured by the explanatory variables in the model. Also, F-statistics greater than 2 (rule of thumb) implies that the model is significant. Similarly, the error correction mechanism showed that the model will adjust correctly in the long run, hence there is a possibility for convergence in the long-run if there be any short-run deviation in the model.

Lastly, for the foreign direct investment model, the analysis outcome showed that a 1-period lag of EGR, FDI, EXR, GFCF, and INF all have a significant impact on current FDI while the other variables showed a positive relationship, EXR indicated a negative relationship. More specifically, the results showed that a 1 unit increase in these variables: EGR, FDI GFCF, and INF would translate to a 0.12%, 0.53%, 0.27%, and 0.05% increase in FDI. Moreover, remittance showed a positive but non-significant relationship with FDI. This finding on FDI and remittance negates those of [12] who found a positive and significant relationship between foreign direct investment and remittance for Balkan economies. The error correction term (CointEq) indicated a long-run convergence of short-run deviation in the model. The model also showed a goodness of fit based on the values of R-square and adjusted R-square when allowance was made for degree of freedom. The R-square thus indicates that 55% of variation in the model is captured by the explanatory variables.

Table 6. *Long run Dynamics.*

Error Correction:	D(REM)	D(FDI)	D(EXR)	D(GFCF)	D(INF)
CointEq1	0.496971	1.723811	-0.020203	-0.230117	0.395167
	(0.39940)	(0.65935)	(0.00950)	(0.06754)	(0.04193)
	[1.24429]	[2.61441]	[-2.12713]	[-3.40688]	[9.42374]

Source: Authors' compilation using Eviews 10 Output (2024)

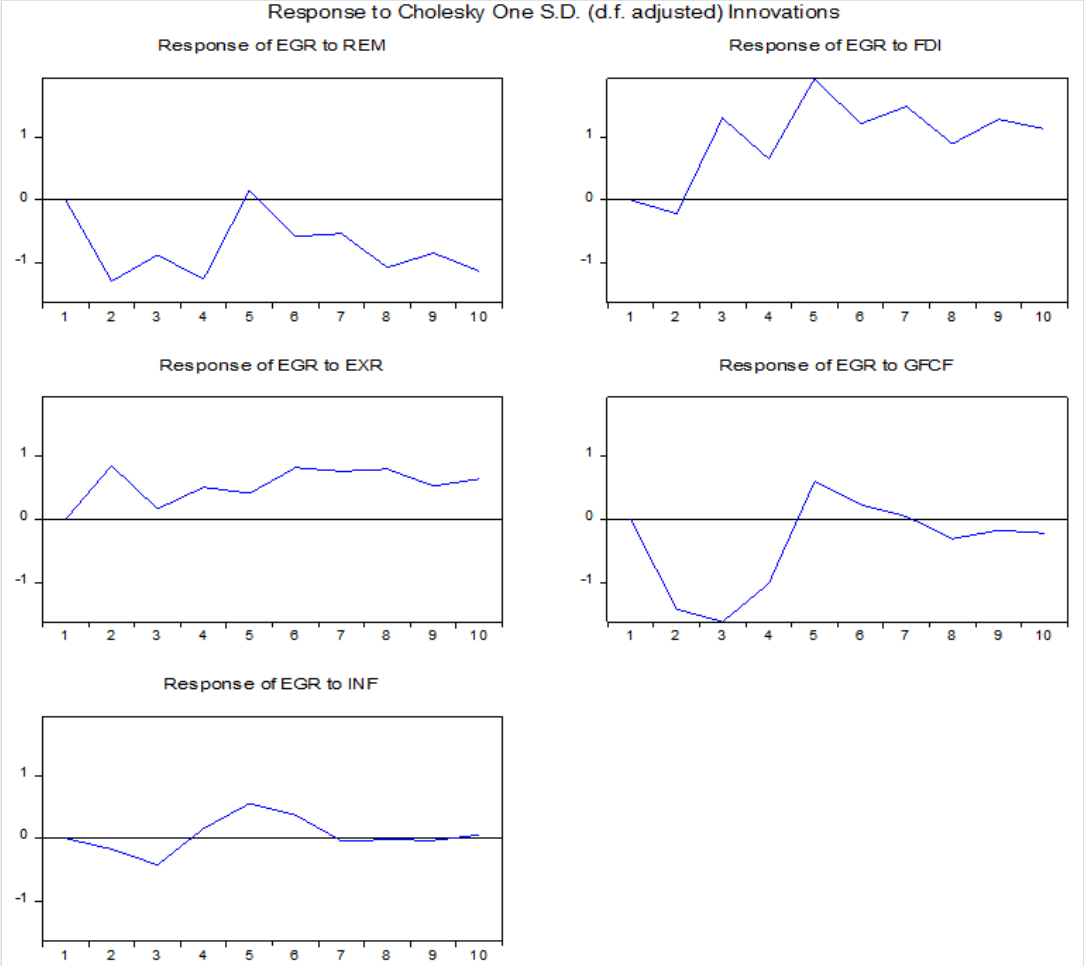
The long-run dynamics of the model as presented in Table 6 showed that FDI and INF have a significant positive relationship with economic growth in the long run while, EXR and GFCF had negative and statistically significant relationship with economic growth in the long run as shown by their respective t-statistics which exceed two (2). Lastly, the long-run results showed that remittance has a positive but non-significant impact on economic growth in the long-run period.

4.6. Impulse Response Function

The Impulse response function shows how a dependent variable responds to shock stemming from the independent variable, hence, we observed the economic growth response to shocks in Remittance inflow, Foreign Direct investment inflow, exchange rate, Gross fixed capital formation, and Inflation.

From the figure, Economic growth (ERG) responds to remittance negatively over the periods, in period 5, economic growth response was a little bit positive however this was overwhelmed by an immediate negative ripple effect which persisted over the remaining periods. This aligns with the VECM result which showed a negative and insignificant relationship between remittances and economic growth. Economic growth response to shocks in foreign direct investment was negative in the first two periods, thereafter, the response was positive though the degree of positivity varies over the observed periods. Economic growth responds to exchange rate positively over the period under investigation, although an element of upward and downward fluctuation was observed throughout the periods. Economic growth responded to gross fixed capital formation negatively in the first 4 periods from the 5th to the 7th periods, a positive response was observed.

Lastly, economic growth responded to shocks in inflation negatively in the first three periods then followed by positive responses which ended in the seventh period, periods thereafter, the response to shocks was very minimal as it converged to zero.



Source: Authors' compilation from Eviews 10 output.

Figure 1. *Impulse response functions among variables.*

4.7. Post-diagnostic Test

This section houses the residuals normality test, Serial correlation, and the Heteroscedasticity test.

Table 7. *VEC Residual Normality Tests.*

Component	Jarque-Bera	Df	Prob.
1	1.352341	2	0.5086
2	14.06508	2	0.0009
3	1.525494	2	0.4664
4	1.153915	2	0.5616
5	1.891290	2	0.3884
6	0.449933	2	0.7985
Joint	20.43805	12	0.0692

Source: Authors' compilation using Eviews 10 Output (2024)

From the VEC Residual normality test above, it is observed that the joint Jarque-Bera value of 20.43805 was found to have an equivalent probability value of 0.069, which is greater than 0.05; hence, we concluded that the residual is normally distributed.

Table 8. VEC Residual Serial Correlation LM Tests.

VEC Residual Serial Correlation LM Tests						
Lag	**LRE* stat**	**Df**	**Prob.**	**Rao F-stat**	**Df**	**Prob.**
1	41.11124	36	0.2566	1.152841	(36, 24.7)	0.3605
2	41.62426	36	0.2392	1.175601	(36, 24.7)	0.3413
3	29.94033	36	0.7514	0.720719	(36, 24.7)	0.8184

Source: Authors' compilation using Eviews 10 Output (2024)

From Table 8, the estimated model had a residual series with no serial correlation problem. This was revealed by the probability value of the LM Tests, which was greater than 0.05. This implies that the null hypothesis of no serial correlation in the residual series cannot be rejected. Hence, there is no serial correlation in the model since the probability value of 0.3605 is greater than 0.05.

Table 9. VEC Residual Heteroskedasticity Tests (Levels and Squares).

Joint test:		
Chi-sq	**Df**	**Prob.**
548.3932	546	0.4632

Source: Authors' compilation using Eviews 10 Output (2024)

Following the VECM Residual Heteroskedasticity Tests (Levels and Squares) which was not significant at 5% based on the chi-sq statistics with a probability value of 0.4632 which is greater than 0.05. Consequently, we failed to reject the null hypothesis of no heteroskedasticity in the residual series. Hence, we conclude that there is no Heteroskedasticity problem in the model.

5. Conclusion and Recommendation

The primary aim of this study was to examine the interconnectivity among remittances, foreign direct investment, and economic growth in Nigeria. The study employed annual data from the period 1986 to 2022 with the vector error correction model (VECM) technique. From the findings of the estimate; the study concludes that foreign direct investment significantly impacts economic growth, while remittance holds a non-significant negative relationship with economic growth. Similarly, the study posits that there exists no significant relationship between foreign direct investment and remittance inflow in Nigeria.

Based on these findings, it is recommended that;

(1) Policymakers should draw up sufficient policies that would attract more FDI to enhance its economic growth. This could be done by building confidence in the domestic economy through political stability and cooperation with relevant stakeholders based on mutual benefits which will ultimately boost the confidence of investors; encouraging legislative reforms to better protect the investors and their investments; and upgrading the existing infrastructure to improve the connectivity and communication as well as transportation within the country and across the region.

(2) The Nigerian government should advance policies that would attract foreign Nigerian businessmen and entrepreneurs to invest as this could be the steady base for future FDI and economic growth.

(3) Appropriate policy actions should be introduced to ensure that remittances are not just consumed by the recipients but directed towards productive ventures which could trigger development.

Abbreviations

ARDL	Autoregressive Distributed Lag
FDI	Foreign Direct Investment
DOLS	Dynamic Ordinary Least Squares
FMOLS	Fully Modified Ordinary Least Squares
GMM	Generalized Moments of Motions
GDP	Gross Domestic Product
ODA	Official Development Assistance
VAR	Vector Autoregression
VECM	Vector Autoregressive Distributed Lag

Conflicts of Interest

The authors declare no conflicts of interest.

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