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Diaspora Remittances and Economic Growth of Nigeria: A Multi Sectorial Analysis

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Abstract

This research work examined the effect of diaspora remittances on sectorial growth in Nigeria from 1990-2023. Three sectors considered were: agricultural sector, industrial sector and services sector. Three variables were used as independent variables: workers remittances, migrant remittances and exchange rate. Three models were formulated. The data were sourced from the National Bureau of Statistics and the World Bank and analyzed using the Error Correction Model (ECM). The results indicated that funds sent by individuals working abroad to their families back home (otherwise called workers remittances) and funds sent by individuals living abroad who intend to relocate their base back home from overseas and invest in their home country (otherwise called migrant remittances) both increased growth of the agricultural, industrial and services sectors significantly. The conclusion was that both workers and migrant remittances have helped to increase sectorial output growth in Nigeria. It was recommended that government stabilize exchange rates and advance policies that will sustain industries in Nigeria to encourage private investments that will boost growth of the real sector.

Keywords: migrant remittance, worker remittance, sectorial growth, services sector

Introduction

In the past two decades, developing countries have experienced a significant rise in remittance inflows. Nigeria stands out as the leading recipient in Africa, receiving more than 50% of diaspora remittances (World Bank, 2021). The World Bank's data also reveals a sharp increase in migrants moving to developed nations, paralleled by a surge in remittances sent back to developing countries, reaching a staggering $4 trillion in 2021 alone (World Bank, 2021). According to official figures, these migrant remittances now exceed the financial assistance provided through official development aid in African

developing nations (World Bank, 2021). Currently, remittances account for 5.3% of GDP in these countries, a figure projected to climb to 10-20% soon (Anetor, 2019).

Nigeria, being the primary recipient of diaspora remittances among African nations, has witnessed a substantial increase in migrant remittances. The figures have surged from ₦80.4 million in 1990 to about ₦142.1 billion in 2000 and remarkably reached ₦6.289 trillion in 2020. A similar upward trend was observed in workers' remittances, which escalated from ₦351 million in 1990 to ₦1.2 trillion in 2000 and ₦2.938 trillion in 2010, ultimately soaring to approximately ₦10.571 trillion by the end of 2020 (World Bank, 2021). In 2018, total remittance inflows to Nigeria, combining both migrants and workers, exceeded $20.81 billion, marking a significant increase from the less than $10 billion recorded in 2010—a rise of over 150 percent in a decade. By 2023, remittance inflows constituted about 5 percent of Nigeria's gross domestic investment (World Bank, 2023). These international financial inflows, which include foreign grants, development assistance, workers' remittances, and Foreign Direct Investment (FDI), have complemented revenues from international trade, particularly exports to other economies. Nigeria has experienced substantial emigration of both skilled and unskilled workers to developed economies in recent years, a phenomenon attributed to the pursuit of better opportunities (Ilu, 2019).

The consistent increase in diaspora remittance inflows has captured the attention of various stakeholders, including governments, private entities, and international organizations, recognizing it as a significant external financing source. Statistical data indicate that diaspora remittances have surpassed other forms of capital inflows, such as Foreign Direct Investment (FDI) and Foreign Portfolio Investments (FPI), in several developing economies. For some nations, it serves as a primary source of foreign exchange. Importantly, diaspora or migrant remittance is voluntary, aiming to enhance the well-being of recipients and their respective countries. Egbulonu, Dim and Agba (2018) posited that during periods of economic downturns, when compared to other economic inflows, diaspora remittances stand out as a crucial factor for economic growth and domestic investments, emphasizing its importance. This research endeavor seeks to explore the impact of diaspora remittances on the sectoral growth of Nigeria, focusing specifically on the agricultural, industrial, and service sectors of the economy (Englama, 2007).

The decision to send money abroad is influenced by a variety of factors, including societal and economic conditions, wage rates, and exchange rates around the world (Claire, 2020). It's interesting to note that the intent behind remittances has expanded beyond simple consumption to include manufacturing and other economic goals (Englama, 2007). Remittances in Nigeria overtook foreign direct investment (FDI) and official development assistance (ODA) as at 2014, according to data from the World Development Indicators (WDI) (Ime, Orok, & Udoka, 2020). By 2023, the World Bank (2023) put remittance inflow into Nigeria as the second-largest source of foreign exchange earnings to the country. About 82 per cent of the overall remittance inflow to West African nations between 2017 and 2023 went to Nigeria, according to World Bank estimates for 2023, placing Nigeria among the top five global beneficiaries of remittances (World Bank, 2023). Despite this significant inflow of remittances, little is known about how these funds are invested or how they affect Nigeria's many economic sectors. The fact that most remittances (about 70%) are used for consumption and only a tiny percentage (30%) for investment presents a considerable obstacle (Ratha, 2022).

Furthermore, existing literature lacks comprehensive studies on the multifaceted relationship between diaspora remittances and economic growth, specifically in sectors like agriculture, industry, and services. Previous research has often focused on cross-country data, neglecting country-specific nuances (Saidu and Salisu, 2020; Asongu and Odhiambo, 2021; Amakom and Iheoma, 2019; Uddin, Rahman, and Majumder, 2022; Veljanoska, 2021). The few studies conducted in Nigeria also have this limitation (Wagner and Aras, 2022; Emmanuel and Omeje, 2022; Onime and Ijeoma, 2021; Ime, Orok, and Udoka, 2020). Consequently, there is a noticeable gap in the economic literature regarding remittances and their impact on multiple sectors, prompting this study.

By examining the effects of remittances from Nigeria's diaspora on the country's economic expansion and paying particular attention to the agricultural, industrial, and service sectors, this study seeks to close these gaps. This study aims to provide important insights into the relationship between remittances and economic development by examining the distinctive dynamics of both sectors within the Nigerian environment, providing a nuanced perspective that is in line with the country's particular economic landscape.

The following questions are considered relevant to the study:

1. How do remittances from migrants impact the growth of Nigeria's agricultural, industrial, and services sectors?
2. How significantly do workers' remittances influence the output of Nigeria's agricultural, industrial, and services sectors?

The primary aim of this study is to investigate the impact of diaspora remittances on various sectors of the Nigerian economy. The specific objectives include:

1. Assessing the influence of migrant remittances on the growth of Nigeria's agricultural, industrial, and services sectors.
2. Analyzing the extent to which workers' remittances affect the output of Nigeria's agricultural, industrial, and services sectors.

Given that Nigeria receives the most remittances from the diaspora in Sub-Saharan Africa, this study is essential for evaluating the country's economic situation. It highlights the industries most impacted and offers information into the methods through which these remittances are directed. Consequently, the hypotheses formulated for this study are stated in their null forms as follows:

H_1: Migrant remittances do not significantly impact the outputs of Nigeria's agricultural, industrial, and services sectors.

H_2: Workers' remittances do not significantly affect the outputs of Nigeria's agricultural, industrial, and services sectors.

The study focuses on the timeframe from 1990 to 2023, aligning with its objectives and the available dataset. This period was chosen due to the accessibility of reliable time series data and the necessity to conduct comprehensive econometric analyses on the dataset.

Literature Review

Meaning of diaspora remittances

Scholars have defined diaspora remittances in various ways, tailored to the transfer's mode, uses, and nature. In contemporary definitions, remittances encompass investments made through acquiring asset-producing instruments in companies located in the migrants'

countries of origin. According to the IMF, these remittances serve as a vital lifeline for development (Ratha, 2022). Alessandra and Ivo (2006) characterized diaspora remittances as both monetary and non-monetary items earned by migrants working abroad, which they subsequently send back to their families in their home country. These funds are considered workers' remittances, originating from labor formally undertaken by migrant workers. Consequently, diaspora remittances constitute a part of the income earned by migrants abroad, which is sent back to their families or households residing in the migrants' country of origin in the case of international remittances or from one region, typically urban areas, to another region, often rural areas. These remittances, predominantly in the form of cash or goods, nonetheless constitute a significant portion of the recipients' income. Harrison (2003) defined remittances as the total of workers' earnings, compensation of employees, and migrant transfers, while Ratha (2022) sees diaspora remittances as cash sent from one country to dependents in another, serving as a significant means to alleviate poverty in the developing world. Two important types of remittances considered in tis research are workers’ remittances and migrant remittances.

Loto and Alao (2019) made a clear distinction in diaspora remittances by categorizing them into two types: workers' remittances and migrant remittances. They defined workers' remittances as funds sent by individuals working abroad to their families back home. In contrast, migrant remittances, or what they referred to as transfers, are funds sent by individuals living abroad who intend to relocate their base back home from overseas and invest in their home country. The World Bank (2021) emphasized this difference, highlighting that migrant remittances are more strategically utilized for investments in the recipient economies, whereas workers' remittances are primarily used for consumption purposes.

Workers' remittances represent the funds sent by individuals living abroad to their families in their home country. This form of remittance inflow has substantial global and, particularly, regional impact, especially in developing countries, notably in Africa (Agarwal and Horowitz, 2002; Adeseye, 2021). According to a theoretical perspective, these remittances are mainly utilized for consumption and have limited impact on investment. Benmamoun & Lehnet (2013) noted that workers' remittances are often driven by migrant

workers' desire to support their families, friends, or invest in their home country. The World Bank and International Monetary Fund (IMF) have categorized workers' remittances into three types: direct transfers made in kind or cash from migrants to their households in their home countries, compensation and other payments made to employees who worked in countries other than their home countries, and migrant capital transfers in the form of financial assets when individuals move from one country to another for more than one year (Orozco, 2020).

Although diaspora remittances can potentially impact the development of recipient nations' domestic economies, they must first be converted into the local currency (Naira) before being used, making exchange rates a crucial factor (Kilonzo, 2016). Consequently, exchange rates have significant implications for diaspora remittances, affecting the domestic currency's value in relation to the dollar or euro, depending on the currency in which the remittances are transmitted.

Theoretical Framework

Economic growth is a major focus of economic literature. The popular growth theory and model have been the one propounded by Solow (1956), Lewis (1954), Harris and Todaro (1970), Romer (1986) among others. These set of economists believed that the sources of economic growth begins with surplus labour to physical capital investment and supported by technological, change, foreign aid, foreign investment, investment in human capital, etc. However, there is another paradigm of knowledge known as the New Economics of Labour Migration. The theory holds that the majority of labor migration occurs between capital-rich and labor-poor countries, with capital moving in the opposite direction in anticipation of higher returns on investments made in capital-poor countries. According to this argument, highly trained employees relocate to countries with less capital so they may earn greater returns on their expertise (Claire, 2020).

The new economics of labour migration sees the collective decision to maximise income and employment opportunities and to minimise risks as the reason for capital accumulation through remittances. Migration is considered to be an insurance strategy, as remittances will serve to absorb any negative shock of the remaining household and to

smoothen consumption. Remittance has been classified as major component of international capital flow and is seen as a major source of monetary inflow into an economy. The importance of remittances has been incorporated as a source of growth in a conventional neoclassical growth model. The classical theory centers on capital transfer and industrialization to poor nations to move the economy forward. The neoclassical theory believed in marginal labour productivity and wage level increase in the migrant sending societies. The Neo-Marxist theory believed that migration and remittances will produce and reinforce the capitalist way of dealing with inequalities. To this effect, this research work is anchored on the new economics of migration theory and the neoclassical growth model. These two models explain the vital role of capital accumulation in output growth and this is the main focus of this study. Output growth is disaggregated into sectorial growth indices for more efficient modeling.

Empirical Review

Akpan, Okon, and Udoka (2018) investigated the connection between remittances and various indicators of agricultural productivity in Nigeria. Employing the ordinary least square (OLS) technique, the authors revealed that indicators such as agricultural to GDP ratio, Agricultural Productivity Index (API), remittances, and Crop Productivity Index (CPI) exhibited positive exponential growth rates, with remittances displaying a notably higher growth rate. Remittances were found to have a linear and symmetric relationship with both the agricultural productivity index and CPI. Xing (2018) concluded that remittances were utilized diversely by households in Fiji, highlighting their role as a catalyst for pro-poor agricultural production and diversification, thereby emphasizing their significance beyond simple sustenance.

A survey on the diaspora investment in agriculture (DIA) project was carried out by the International Fund for Agricultural Development (IFAD, 2021). According to their study, the worldwide diaspora statistically distributes over US$450 billion in remittances to their relatives in developing countries each year, and diaspora investment in agriculture is equivalent to four times the amount of global official development assistance (ODA) for agriculture. Using the Burkina Faso dataset from the 2014 Living Standards Measurement Study (LSMS), Dedewanou and Tossou (2021) investigated the causal relationship between

remittances and sorghum production. The findings demonstrated that the elements that greatly increased sorghum production in Burkina Faso were the area of the land, the number of workers, and the amount of herbicide utilized. They also discovered that a 1% increase in remittances caused a 0.938% decrease in sorghum yield. The study of Ali, Gniniguè, and Braly (2021) indicated a negative influence of emigration on agricultural growth, especially in the CEMAC region. However, emigration and human capital were found to have positive effects on agricultural growth in the WAEMU and CEMAC regions, respectively.

Veljanoska (2021) investigated the relationship between agricultural risk and remittances in Uganda. The study revealed that remittances did not significantly influence farmers' risk-related decisions concerning crop portfolio and diversification. However, there was some indication that households constrained by credit, which also received remittances, tended to specialize in specific crops. Onime and Ijeoma (2021) found a robust long run and short run relationship between remittances and food security in Nigeria. Uddin, Rahman, and Majumder (2022) found that remittance has a positive impact in the long run but a negative impact on GDP in the short run. Onyeisi and Odo (2018) conducted an empirical analysis examining the impact of international remittances on the domestic economy, using Nigeria as a case study from 1980 to 2015. The study employed co-integration, vector error correction mechanism, and Granger causality for model estimation. The results indicated a significant negative relationship between international remittance inflows and RGDP.

Dash (2020) investigated the impact of remittances on domestic investment in South Asia during the period 1991–2017. The findings indicated that remittances positively influenced domestic investment both in the short term and the long run within the South Asian context. This suggested that remittances were utilized not only for immediate consumption but also for investment purposes, including the development of human and physical capital. Aitymbetov (2020) employed a dynamic demand model to assess the macroeconomic and industrial sector implications of remittances in Kyrgyzstan. Approximately 10 percent of remittances were utilized as investments in the country, resulting in a positive impact on the economy. Griffith, Kagochi, Chen, and Pet (2020) conducted a study on the impact of remittances on the manufacturing sector investment in Barbados spanning from 1970 to

2018. They utilized the Dynamic Ordinary Least Squares model (DOLS) for their analysis. The research findings indicated a significant influence of remittances on investment in the manufacturing sector, both in the short-term and long run. Ratha (2022) posited that when remittances are invested, they contribute to output growth, and even if they are consumed, they still generate positive multiplier effects.

In a study conducted by Amakom and Iheoma (2019), they found a significant positive impact of remittances on the health and education outcomes of the selected countries. Adejo and Etowa (2019) explored the role of Information and Communication Technologies (ICTs) in connecting overseas migrant remittances with rural areas in Nigeria. They reviewed the relationship between migration, remittances, and ICTs, emphasizing Nigeria's investments in the ICT sector. The authors highlighted migrant remittances as effective strategies for alleviating rural poverty, surpassing traditional sources of finance. In the study conducted by Ilu (2019), the results consistently showed that remittances were positively and significantly related to the depreciation of the Naira, while FDI and oil prices were found to appreciate the currency's value. Akindele, Jogunola, and Aderemi (2019) explored the impact of globalization on real estate development in Nigeria. The research revealed that globalization, through increased remittance inflows, had positively influenced the development of the real estate sub-sector in Nigeria. Agu (2020) found significant leakages of remittance proceeds through imports, indicating a possible reason for the weak relationship between remittances and the domestic economy.

The study of Asongu and Odhiambo (2021) focused on enhancing remittances' relevance on value added across economic sectors in sub-Saharan Africa from 1980 to 2014. Utilizing the Generalised Method of Moments and data from 25 countries in SSA, they found no significant net effects of remittance on added value to the agricultural sector. Secondly, enhancing remittances had a positive net effect on added value to the manufacturing sector. Thirdly, there were negative net effects on added value to the service sector. Emmanuel and Omeje (2022) indicated that personal remittances had a Granger causality relationship with out-of-pocket health expenditure. Wanger and Aras (2022) highlighted that the amount of diaspora remittances received in Nigeria positively influenced the quality of the country's domestic human capital. Additionally, the research revealed that national savings

could negatively impact human capital development if not channeled effectively into the educational sector and skills acquisition.

The study of Chivundu, Suphian, and Kim (2020) indicated a positive and significant impact of diasporas' remittances on Malawi's economic growth. Ugherughe and Jisike (2019) incorporated remittance inflows and key macroeconomic variables like exchange rates and inflation rates as control factors affecting Nigeria's Gross Domestic Product (GDP). The causality tests indicated a one-way causal connection, with remittances from migrants influencing GDP, GDP affecting exchange rates, and exchange rates impacting migrant remittances. Saidu and Salisu (2020) delved into the long-term relationship between remittances and economic growth in selected Sub-Saharan African (SSA) countries, namely Nigeria, Ghana, Kenya, and Senegal. Their findings suggested that an increase in remittances, foreign direct investment, trade openness, and domestic investment positively correlated with economic growth in SSA countries.

One important gap observed in the empirical literature reviewed is that none of the previous studies had considered the impact of remittances on growth of the three sectors that make up Nigeria's gross domestic product in a single study. This research sees this as a gap and intends to model a remittance – sectorial growth indicators using econometric procedures. This study will not only contribute to the inconclusive debate on diaspora remittances and agricultural, industrial and services sectors' growth in Nigeria but will also address the methodological gap whereby the influence of remittances through critical drivers of the various sectors will be established while addressing various estimation concerns to avoid spurious estimates. Additionally, the disaggregation of remittances into workers remittances and migrant remittances and inclusion of exchange rate makes the model unique. In addition, the time scope is updated to the year 2023 to incorporate recent data trends of remittances.

Method

The research design employed in this research is the *ex-post facto* research design. The desire of the researcher to use secondary data to test the hypothesis formulated formed the basis for adoption of the *ex-post facto* design. The data to be used in the estimation are time

series data sourced from The Central Bank of Nigeria Statistical Bulletin (2023) edition and World Bank Development Indicator (WDI, 2023). The data were subjected to stationary/unit root test using the Augmented Dickey-Fuller (ADF) unit root test to ensure their stationarity at levels or at first differencing, to avoid spurious regression. Moreover, to confirm the existence of long-run relationship among the variables, Johansen co-integration (Johansen, 1988) test was carried out at 5 percent level of significance. Also to ensure that there is no autocorrelation in the error term, a test of autocorrelation was carried out using Durbin- Watson techniques and other diagnostic tests were carried out to ensure high quality results. Furthermore, the model was estimated using the error correction model (ECM) technique.

Model Specification

Having examined previous studies in the empirical literature review, the econometric model of Onyeisi and Odo (2018) comes closest to this study since the intention is to find the nexus between diaspora remittances and economic growth. Onyeisi and Odo (2018) specified as follows:

RGDP = f(IRI, BOT, INF, ODA) [i]

Where RGDP is real gross domestic product, IRI is international remittance inflows, BOT is balance of trade, INF is inflation and ODA is overseas development assistance.

However, by way of modification, we disaggregate remittances into worker and migrant remittances and specify a model in the functional form:

EG =f(DR) [ii]

Where EG economic growth is proxied with real gross domestic product and DR is diaspora remittances. By disaggregating diaspora remittances (DR) into its two major forms, we obtain the following specification:

RGDP = *f*(WREM, MREM) [iii]

Where:

WREM = Workers' remittances

MREM = Migrant remittances

To further modify the specification of Onyeisi and Odo (2018), we introduce exchange rate as an intervening variable sine it has been established by previous literature as a driver of remittance inflow. The model is re-specified thus:

RGDP = *f*(WREM, MREM, EXR) [iv]

One major addition in this study is the multi-sectorial approach to economic growth. This simply means that we recognize the fact that diaspora remittances go into several sectors of the economy and not only one sector. Therefore, recognizing this fact, we break economic growth down into the following sectorial growth as follows:

AOP = *f*(WREM, MREM, EXR) [v]

INDO = *f*(WREM, MREM, EXR) [vi]

SVC = *f*(WREM, MREM, EXR) [vii]

Where:

AOP = Agricultural sector's output per capita

INDO = Industrial sector's output per capita

SVC = Services sector's output per capita

The disaggregation of economic growth into a multi-sectorial growth is based on the Central Bank of Nigeria (CBN's) classification of the GDP in the Statistical Bulletin, where GDP comprises total output from the agricultural, industrial and services broad sectors. It is the intention of the researcher to determine the effect of diaspora remittances on disaggregated growth in the economy. Transforming the functional equations into linear econometric forms, we include the coefficients and the time variant while the three models becomes:

Model One:

$$AOP_t = \alpha_0 + \alpha_1 WREM_t + \alpha_2 MREM_t + \alpha_3 EXR_t + \varepsilon_{1t} \quad \text{[viii]}$$

Model Two:

$INDO_t = \beta_0 + \beta_1 WREM_t + \beta_2 MREM_t + \beta_3 EXR_t + \varepsilon_{2t}$ [ix]

Model Three:

$SVC_t = \lambda_0 + \lambda_1 WREM_t + \lambda_2 MREM_t + \lambda_3 EXR_t + \varepsilon_{3t}$ [x]

Where;

α_1-α_3, β_1-β_3, and λ_1-λ_3 are the unknown parameters of the models to be estimated

α_0, β_0, and λ_0 = Constants or intercepts of the models

ε = Stochastic disturbance or error term and

"t" = time 1990-2023

Economic a-priori expectation

The diaspora remittances variables are expected to have positive and significant effects on sectorial growth of Nigeria. The a-priori expectation of the model can be stated mathematically as: $\alpha_1, \beta_1, \lambda_1 > 0$; $\alpha_2, \beta_2, \lambda_2 > 0$; $\alpha_3, \beta_3, \lambda_3 > 0$. That is to say that the coefficients of workers remittances (WREM), migrant remittances (MREM) and exchange rate (EXR) are expected to have positive, direct and significant effect on the sectorial growth indicators following theoretical postulations.

Results and Discussion

Due to the time series nature of the variables, we first carried out a test of stationarity using the Augmented Dickey Fuller unit root test. This is followed by the Johansen cointegration test and the model estimation.

Table 1: Summary of Unit Root Test Result

	ADF Test statistics			
Variables	**At Level**	**1st Difference**	**Decision**	**Order of Integration**
Agricultural Output (AOP)	-1.7919	-4.3391	Stationary at	I(1)
	[0.6843]	[0.0091]	1st difference	
Industrial Output (INDO)	-2.3802	-4.4065	Stationary at	I(1)
	[0.3819]	[0.0077]	1st difference	

Services Sector Output (SVC)	0.1865 0.9968]	-5.1566 [0.0013]	Stationary at 1st difference	I(1)
Workers' Remittances (WREM)	-2.7951 [0.2098]	-4.6218 [0.0046]	Stationary at 1st difference	I(1)
Migrant Remittances (MREM)	-0.7022 [0.9618]	-4.8669 [0.0413]	Stationary at 1st difference	I(1)
Exchange Rate (EXR)	-2.2891 [0.4272]	-5.2519 [0.0010]	Stationary at 1st difference	I(1)

Critical value at 5% Level = *-3.5629*

Critical value at 5% 1st difference = *-3.5683*

Source: *Researchers' Computation using E-Views 9.0 **p-values in parenthesis*

The unit root test above reveals that the data on agricultural sector output (AOP), industrial sector output (INDO), services sector output (SVC), migrant remittances (MREM), workers remittances (WREM) and exchange rate (EXCR) are all stationary at first difference and are said to be integrated of order one, I(1). In other words, none of the data achieved stationarity at level but only after first differencing. This implies that the data have statistical properties that did not vary over the time of study i.e. 1990-2023. Based on this result, we test for the existence of a long-run relationship or cointegration amongst the variables in the three models formulated.

Table 2: Summary of the Engle-Granger Cointegration Tests

	Tau statistic		**z-statistic**	
Model 1	***Tau stat.***	***p-value***	***z-stat***	***p-value***
AOP	-5.806552	(0.0035)**	1288.011	(0.0000)**
	-2.811799	(0.5430)	-18.36811	(0.2046)
	-11.72142	(0.0261)**	23.54847	(0.0000)**
	-2.199295	(0.8087)	-8.612736	(0.8177)
Model II				
INDO	-3.193885	(0.0362)**	-14.92195	(0.0360)**
	-3.522951	(0.0402)**	-17.04600	(0.0232)**
	-1.666676	(0.9399)	-5.877165	(0.9387)

	-2.231306	(0.7973)	-8.726028	(0.8112)
Model III				
SVC	-4.691329	(0.0402)**	21.98205	(0.0000)**
	-4.325025	(0.0455)**	-20.19113	(0.0108)**
	-2.074896	(0.8494)	-8.677106	(0.8123)
	-2.247942	(0.7912)	-8.818250	(0.8059)

Note: ** indicates that the test statistics are significant at the 5 per cent level.

Source: *Researchers' Computation using E-view 9*

Table above 2 summarizes the Engle-Granger cointegration test using the Tau statistics for the three models. In the model one where agricultural output was the dependent variable, looking at the Tau test, there are only two significant p-values of 0.0035 and 0.0261 at 5 per cent level which implies two cointegrating equations. In the second model where industrial output was the dependent, two significant p-values i.e. 0.0362 and 0.0402 is seen for the Tau stat. which implies the existence of two cointegrating equations. For the third model where services sector output is dependent, the Tau stat indicates one significant p-value at 5 per cent 0.0402 and 0.0455. Since the Tau statistics show two cointegrating equations for the three models, we conclude that there is long run relationship between workers remittances, migrant remittances and outputs of the agricultural, industrial and services sectors in Nigeria.

Table 3: Error Correction Model Result

	Error correction model estimates			
Model 1 (AOP)	**Coefficient**	***Std. Error***	**t-stat**	***p-value***
C	3.600185	4.944261	0.728154	0.4736
WREM	0.583365	0.211797	2.754357	0.0110**
MREM	0.299961	0.082163	3.650791	0.0013**
EXR	0.233288	0.223152	1.045423	0.3062
ECM(-1)	-0.064937	0.011677	-5.561103	0.0269**

R-squared = 0.9432; F-stat = 99.76 (p=0.000); DW = 1.346

Model II (INDO)				
C	-1.933884	4.824023	-0.400886	0.6921
WREM	0.828868	0.206647	4.011044	0.0005**
MREM	0.289360	0.080165	3.609542	0.0014**
EXR	0.007766	0.217725	0.035669	0.9718
ECM(-1)	-0.085824	0.020693	-4.147475	0.0333**
R-squared = 0.9431; F-stat = 99.46 (p=0.000); DW = 1.254				

Model III (SVC)				
C	-1.363761	4.760500	-0.286474	0.7770
WREM	0.698374	0.203925	3.424652	0.0022**
MREM	0.432619	0.079110	5.468608	0.0000**
EXR	-0.034506	0.214858	-0.160600	0.8738
ECM(-1)	-0.087397	0.023489	-3.720763	0.0258**
R-squared = 0.9582; F-stat = 137.45 (p=0.000); DW = 1.235				

Note: * indicates that the p-value of the F-statistic is significant at the 5% level

Source: Researchers' Computation using E-view 9

Table 3 above reveals that firstly, workers remittances and migrant remittances including exchange rate increased agricultural output by 0.5834, 0.2999 and 0.2333 units respectively. These represent positive and direct relationships between the three diaspora remittances variables and growth of the agricultural sector. The probability values of workers and migrant remittances (*p-values* = 0.0110 and 0.0013) means that the increase in agricultural output occasioned by workers and migrant remittances was significant. Exchange rate with p-value of 0.3062 did not significantly affect diaspora remittances in the first model.

Secondly, the industrial output model showed similar results as in the first model with both migrant and workers' remittances increasing industrial output by 0.8289 and 0.2894 units respectively while exchange rate intervened and exerted 0.0078 increase on industrial

output. While workers and migrant remittances increased industrial output significantly with *p-values* of 0.0005 and 0.0014, exchange rate did not significantly affect remittances-industrial output model with p-value of 0.9718 (Table 3).

In the third model, workers remittances and migrant remittances increased services sector output significantly by 0.6984 (*p-value*=0.0022) and 0.4326 units (*p-value*=0.0000) respectively. Conversely, exchange rate decreased output of the services sector by 0.0345 units though not significantly since the p-value was 0.8738. Thus, the intervening effect of exchange rate was negative for the services sector but positive for the agricultural and industrial sectors. The negative effect of exchange rate on the services sector is a pointer to the fact that Nigeria's exchange rate policy has not favored diaspora remittances into the services sector However, the existing exchange rate policy for the period under study favored workers and migrant remittances into the agricultural and industrial sector because these remittances increased when exchanged for the local currency.

The error correction coefficient was estimated at -0.0659, -0.0858 and -0.0874 for the agricultural, industrial and services sectors respectively. This means that the diaspora remittances – sectorial growth models corrects their previous period's disequilibrium at an estimated speed of 6.59 per cent, 8.58 per cent and 8.74 per cent annually. What this implies is that given a steady state of increase in diaspora remittances by less than 10% annually, the outputs of the agricultural, industrial and services sectors will experience positive growth and attain equilibrium in the long run.

Table 4: Diagnostic Tests

	Diagnostic test statistics				
	F-statistic	**Durbin Watson Stat.**	**R-squared**	**BG Heteroskedasticity F-test**	**CUSUM Test**
Model I	99.76 (*p=0.000*)*	1.346	0.9432	8.175345 (*p-value = 0.0003*)*	Model is stable
Conclusion	There is joint effect	No autocorrelation	High (94.32%)	residuals are not distributed with	

		in the model		equal variance	
Model II	99.46 (*p=0.000*)*	1.254	0.9431	7.665859 (*p-value = 0.0004*)*	Model is stable
Conclusion	There is joint effect	No autocorrelation in the model	High (94.31%)	residuals are not distributed with equal variance	
Model III	137.45 (*p=0.000*)*	1.235	0.9582	7.053645 (*p-value = 0.0007*)*	Model is stable
Conclusion	There is joint effect on services sector	No autocorrelation in the model (DW value tends to 2)	High model fitness	residuals are not distributed with equal variance	

Note: * indicates that the p-value of is significant at the 5% level

Source: Researchers' Computation using E-view 9

The post-estimation tests summarized in Table 4 above shows that the error terms of the model are not serially correlated given that the *Durbin Watson statistic* are all closer to 2 than to 0. This is bas3d on the rule of thumb. The Breusch Pagan Godfrey Heteroskedasticity test indicates that the variance or error terms of the three models are the same over the sample period, as indicated by the *p-value*. Hence we concluded that the residuals or error terms are not distributed with equal variance. However, the joint test showed that the diaspora remittances variables (workers remittances, migrant remittances and exchange rate) have joint significant effect on output of the agricultural, industrial and services sectors' outputs based on their respective *p-values*.

The cumulative sum (CUSUM) test affirm that the models achieved stability throughout the period studied since the CUSUM lines are inside the upper and lower bounds 5 per cent critical value lines (See Appendix). What this implies is that both migrant and workers remittances exhibited stable effect on the growth of the agricultural, industrial and services

sectors. The R-squared values implies that workers remittances, migrant remittances and exchange rate explain up to 94.32 per cent, 94.31 per cent and 95.82 per cent of the changes witnessed in outputs of the agricultural, industrial and services sectors respectively in Nigeria.

Objective 1 – Determine the effect of migrant remittances on the growth of agricultural, industrial and services sectors in Nigeria.

The first objective of the study sought to find out the effect of migrant remittances on the growth of the various sectors that make up the Nigerian economy. We found that migrant remittances with the intervening effect of exchange rate increased agricultural output significantly for the period studied. This means that there is a direct relationship between migrant remittances, exchange rate and agricultural sector output in Nigeria. In other words, there is significant increase in agricultural output occasioned by workers and migrant remittances. What this implies is that the desire of Nigerian workers abroad to support their families, friends and or to investment in their home country have been mostly channeled into the agricultural sector to yield returns. Similar positive effects of migrant remittances on industrial and services sectors output in Nigeria were also found.

Veljanoska (2021) concluded that remittances and expenditure on the rural non-farm sector have positive correlation. Therefore, the positive effect of remittances on farming and agricultural sector in Nigeria adds to the findings that upholds the positive utilization of remittances for productive purposes. A study by the International Fund for Agricultural Development (IFAD, 2021) found that diaspora investment in agriculture represents four times global official development assistance (ODA) to agriculture; this aligns with our present finding. Other studies like Akpan, Okon, and Udoka (2018), Onime and Ijeoma (2021), Xing (2018), Agu (2020), etc. found positive relationship between remittance and farming practices as well as on purchase of food, non-food and durable goods.

The implication of this finding is that the amount of money Nigerians abroad send home for investment have increased output of the agricultural, industrial and services sectors. This buttresses the earlier finding of Chivundu, Suphian and Kim (2020) and Saidu and Salisu (2020) that the enterprising nature of Africans has led to the channeling of remittances to

productive sectors of the economy through increased consumption expenditure in Sub-Saharan African countries. Also, Ugherughe and Jisike (2019) found long run equilibrium relationship between remittance inflows from the Diasporas and growth of investment in Nigeria.

Objective 2 – Extent to which workers remittances affect the agricultural, industrial and services sectors output in Nigeria.

The relationship between workers remittances and output of the agricultural, industrial and services sectors in Nigeria was the focus of the second objective. The result showed that workers remittances grew the agricultural, industrial and services sectors in Nigeria. However, the intervening effect of exchange rate proved to be a diminishing factor as it decreased the workers remittances-services sector output model. The implication of this is that while workers remittances continues to flow into the services sector, exchange rate serves as a stumbling block as Nigeria witnesses continued fluctuations in exchange rate, sub-sectors like the education, health, transportation, etc. experiences inflow of remittances. The value of workers remittances is diminished by exchange rate scarcity and this discourages further remittances. Asongu and Odhiambo (2021) rightly found that there were negative net effects of remittances on added value to the service sector. Thus, the services sector gains more from workers remittances as against less from migrant remittances and it also suffers more from exchange rate fluctuations.

The long run relationship between remittances and the sectorial growth indicators was confirmed in the Johansen cointegration test. The test showed at least one cointegrating equation at 5% level which confirms the long run relationship. The implication of this long run relationship is that the effect remittances exert on the agricultural, industrial and services sectors' output varies and is very dynamic over the long run period. In corroboration of the work of Ugherughe and Jisike (2019), the long run equilibrium relationship between remittance inflows of the Diaspora Nigerians and economic growth of Nigeria was upheld.

Similarly, Dash (2020) found that remittances increases domestic investment in every sector of the Nigerian economy both in the short and long run. The long run effect of

remittances on various sectors of the Nigerian economy can also be said to propel the government towards the formulation of long run policies that will guide the formalization of remittances. The National Diaspora Policy of 2021 identified Nigerians as the country with highly educated skilled labour worldwide and occupies important positions of authority and influence in multinational corporations, industries, and organizations worldwide. This means that Nigerians in the Diaspora constitute an important constituency that contribute their wealth of experience, exposure, vast human network, etc. to the socio-economic development of the country hence the need to leverage on the Diaspora remittances to ensure long term sustained growth in all sectors of the economy.

Conclusion and Policy Recommendations

This study analyzed the effect of diaspora remittances on growth of the Nigerian economy from a sectorial perspective. The conclusion emanating from the findings is that both migrant and workers remittances have had direct positive and significant effect on growth of the agricultural, industrial and services sectors of the Nigerian economy. This serves as a boost to the Nigerian economy because through these remittances, households and individuals are able to invest in the agricultural, industrial and services sectors thus augmenting government efforts in sustaining output from these key sectors. However, the positive effect of diaspora remittances on output of the services sector was being hampered by increasing exchange rate which depreciates the value of the local currency and makes Nigerians to pay more for foreign services. Interestingly, based on the value of the model coefficients, the quantum of workers remittances inflow was found to be high for the industrial sector followed by the services sector and then agricultural sector, while that of migrant remittances was high for the services sector. Agricultural sector grew even with the absence of remittances but the industrial and services sectors were hugely reliant on inflow of remittances. In line with findings made in this research, the study recommends as follows:

1. The positive effects of the diaspora remittances inflow into the agricultural, industrial and services sectors should propel the government to advance immediate monetary control by way of sterilizing the financial inflows to guard against potential harmful effect of remittance inflows on the economy.

2. With knowledge of increased inflow of workers remittances to the industrial sector, policies that will sustain industries in Nigeria should be advanced to encourage these private investments that will boost growth of the real sector.
3. One vital aspect of the findings made in this research work is the intervening effect of exchange rate on the remittances – growth model. The Central Bank of Nigeria should strengthen the foreign exchange policies because exchange rate encourages remittances into the agricultural and industrial sectors but not the services sector. Thus, there is bound to be misrepresentation of the usage of these remittances at the point of transmission which would now be utilized for other purposes which was not rightly stated. Unifying exchange rates will limit remittances through informal channels.

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Appendix: Cumulative Sum (CUSUM) Test Plots