ASYMMETRIC EFFECTS OF OIL PRICES ON REMITTANCES: EVIDENCE FROM SUB-SAHARAN AFRICA

AKINLO ANTHONY ENISAN[a] AND AKINLO TAIWO [b]

[a] *Obafemi Awolowo University, Nigeria*
[b] *Adeyemi Federal University of Education, Nigeria*

Exploring the nexus between oil prices and remittances is critical to both remitting and recipient countries. Employing non-linear panel autoregressive distributed lag (NARDL) approach, we examine the relationship for 32 sub-Sahara African countries over the period 1986-2019. The results reveal that: (1) changes in oil prices and remittance inflows are asymmetrically associated only in the short run for the entire sample; (2) when the sample is divided into middle and low-income subgroups, asymmetric effect is confirmed for former subgroup only in the long run, while it is confirmed for latter subgroup only in the short run, (3) in the long run, positive movement in oil prices reduces remittances for the sample and in the middle income subgroup, whereas it increases remittances in the low-income subgroup, (4) Negative oil price movement reduces remittances for the entire sample and the two subgroups; (5) in the short run, a reduction in oil prices increases remittance inflows only for the entire sample and for the low-income subgroup. These results suggest that policymakers in SSA should implement policies that will reduce oil price risks on remittance inflows especially in the long run.

1. INTRODUCTION

Extensive literature has examined the impact of oil prices on macroeconomic variables like output growth, inflation, stock prices, interest rates, unemployment, and income inequality (Hamilton, 1983, 2003; Akinsola and Odhiambo, 2020; Nussair, 2016, 2020; Rafiu et al., 2020; Akinlo, 2023). However, the effect of oil price shocks on remittances have not received much attention especially in Sub-Sahara African countries. The World Bank (2020b) noted that oil price shock is one of the primary variables affecting remittance inflows.

Theoretically, few studies have argued that oil price and remittance inflows are related (Snuddeen, 2018; Asatryan et al., 2017; Akcay and Karasoy, 2019a; Zahrah, 2023). From the perspective of oil-rich host countries, increased oil prices boost revenues, investment, and economic growth. Consequently, aggregate demand and the demand for migrant workers might increase thereby enhancing increased remittance inflows into the migrants' home countries (Sasikumar and Martin, 2017; John, 2018; Akcay and Karasoy, 2019a). For another, from the perspective of migrant sending oil-importing countries, oil is a critical input in production. Hence, an increase in the prices of oil will lead to high cost of living working through increased production cost and rising price level. Consequently, more remittances might flow into the migrants' home countries particularly where the migrants are altruistic (Makhlouf and Kasmaoui, 2018; Akcay and Karasoy, 2019a).

It is noteworthy that empirical studies are evolving on the nexus between oil price shocks and remittance inflows. These studies include Lueth and Ruiz-Arranz (2007), Mallick (2017), Naufal and Termos (2009), Ratha et al. (2015), Al-Mashat and Billmeier (2012), Singh (2012), ILO (2013), Makhlouf and Kasmaoui (2018), Gupta (2006), Umair and Waheed (2017) However, the aforementioned studies assumed symmetry in the relationship between oil price and remittance inflows. Interestingly, a school of thought has emerged contesting the assumption of symmetric relationship between oil price shocks and remittance inflows. It is argued that that oil prices and remittances are asymmetrically linked to one another (Neftci, 1984; Falk, 1986; Herrera et al., 2015; Shin et al., 2014; Sek, 2017). Firstly, Shin et al. (2014) contended that as a result of financial shocks, regional and global imbalances and structural reforms, most macroeconomic variables often experience significant shift, leading to asymmetries in their relationships. Secondly, Naftci (1984) and Falk (1986) argue that many macroeconomic variables display nonlinear characteristics as a result of business cycles. Akcay (2019) opines that oil price shocks can asymmetrically impact macroeconomic fundamentals in the host countries as a result of inertia, thus workers' remittances. Following this observation, there is the need to ascertain whether oil price shocks and remittances are asymmetrically related.

Aside the issue of symmetry and asymmetry, there is the question of the role of income level in the oil price – remittances nexus. Most existing studies have focused on oil export and oil import dichotomy. This may not be a major issue in the case of Sub-Sahara African countries. This is because most oil exporting sub-Saharan African countries are highly import dependent and oil constitutes a major input in the production process. This development informs the suggestion in the literature that the level of income should be a major consideration in the analysis of the oil price - remittances nexus in SSA. The argument is that low-income countries are likely to have more migrants and rely more on remittance inflows than middle and or high-income countries. Moreover, changes in oil prices are likely to have much more impact on remittances in low-income countries than the middle and or high-income countries.

From the discussion above, four questions are pertinent. One, why do oil prices

matter to remittances in SSA? Two, is there long run relationship between oil price shocks and remittances in SSA? Three, is the relationship between oil price shocks and remittances linear (symmetric) or nonlinear (asymmetric) in SSA? Four, does income levels matter in the oil price – remittances nexus in SSA? Sub-Saharan Africa presents a unique context to answer these questions due to its high dependence on oil imports and exports, coupled with significant remittance inflows that support household incomes. Understanding the asymmetric impact of oil price shocks on remittances is crucial for policy formulation in this region.

The need to answer these questions constitutes the main objective of this paper. Therefore, this paper addresses the gap in existing research by examining the asymmetric effects of oil price shocks on remittances in SSA. Specifically, it aims to determine if the relationship between oil prices and remittances is nonlinear and how income levels influence this relationship

The paper contributes to the literature on oil price shocks – remittances in many ways. Firstly, we build our theoretical argument on the fact that SSA are highly import dependent either oil exporting or oil-importing. Moreover, most SSA depend largely on oil for domestic production and are migrants' senders. Hence, changes in the prices of oil affect remittance inflows through its effect on both oil exporting or importing migrant hosting countries. Secondly, using the Pedroni cointegration test, we establish a long-run relationship between oil prices shocks and remittance inflows to SSA. Thirdly, employing Panel nonlinear ARDL, we confirmed asymmetric effect of oil price shocks on remittances in the short run but not in the long run. On the assumption that results might be driven by income level, we divide the sample into middle- income and low-income categories. The results show asymmetric effect in the long run for middle-income countries. The reverse is the case for the low-income group.

The remainder of the paper is organized as follows: Section 2 provides an overview and literature review. Section 3 details the data and methodology. Section 4 presents the results. Section 5 discusses the findings, and Section 6 concludes the paper.

2. OVERVIEW AND LITERATURE REVIEW

2.1. Overview of Remittance in Sub-Saharan Africa

In recent years, there has been a rise in remittances to sub-Saharan Africa. In fact, remittances to developing countries have surpassed export earnings, FDI, and foreign aid in 2019 (Giuliano and Ruiz-Arranz, 2005; Kadozi, 2019; Olayungbo and Quadri, 2019). Figure 1 depicts the growth of remittances in absolute terms from 1986 to 2019. Total remittances to sub-Saharan Africa were quite small and increased slowly between 1986 and 1999 in absolute terms. From the year 2000, remittances gradually increased until 2004, when they increased dramatically. Remittances climbed steadily from 2004 to

2015, reaching a high point in 2015. Following 2015, remittances declined in the following year, 2016, before beginning to grow again from 2017 to 2019. The World Bank (2017) ascribed the fall in remittance inflows in 2016 to low oil prices and weak economic growth in the Gulf Cooperation Council (GCC) nations and the Russian Federation.
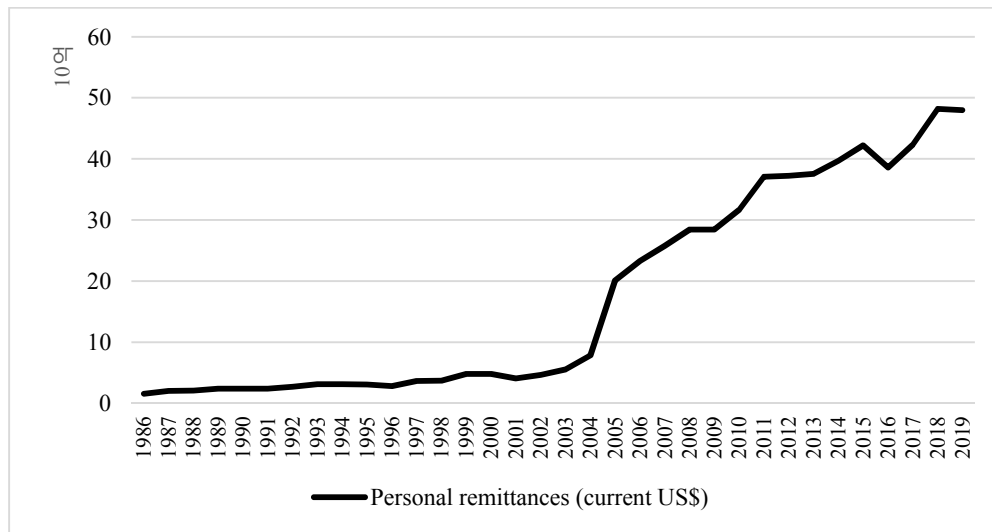

Notes: The figure depicts the growth of remittances in absolute terms from 1986 to 2019

Figure 1. Personal Remittance (Current US$), 1986-2019

Remittances from foreign sub-Saharan African migrants totalled nearly $29 billion in 2009, according to the World Bank (2011), accounting for 2.6 percent of Africa's gross domestic product (GDP). According to the World Bank (2020a), remittance inflows climbed from $29 billion in 2009 to $48 billion in 2019. Figure 2 shows the percentage contribution of remittances to GDP in sub-Saharan Africa, which has risen from 0.6 percent in 1986 to 2.7 percent in 2019. Since 1986 to 2002, the percentage contribution of remittance to GDP in sub-Saharan Africa has been higher than in other regions (see Figure 2). Between 2002 and 2004, the remittance contribution as a proportion of GDP fell below that of Latin America and the Caribbean. However, since 2005, remittances have contributed more to GDP than other regions.

The rise in remittances as a percentage of GDP in sub-Saharan Africa could be connected to an increase in the number of international migrants over the years. According to the World Bank (2019), there were 266 million international migrants and refugees in 2018, with 240 million (90 percent) of them being economic migrants.

Around 46% of migrants from low-income nations ended up in high-income ones. According to Pew Research Center (2018), international migration from sub-Saharan African countries to Europe and the United States has surged dramatically over the last decade. According to the study, since 2010, the region has seen an increase in the number of sub-Saharan African asylum seekers in Europe and lawful permanent residents and refugees in the United States. Some studies like Schoumaker et al. (2015) and Sander and Maimbo (2003) indicated that African Migration is not towards Europe alone, but towards other African countries while Bakewell and De Haas (2007) stated that some are moving towards the Gulf countries and the Americas.
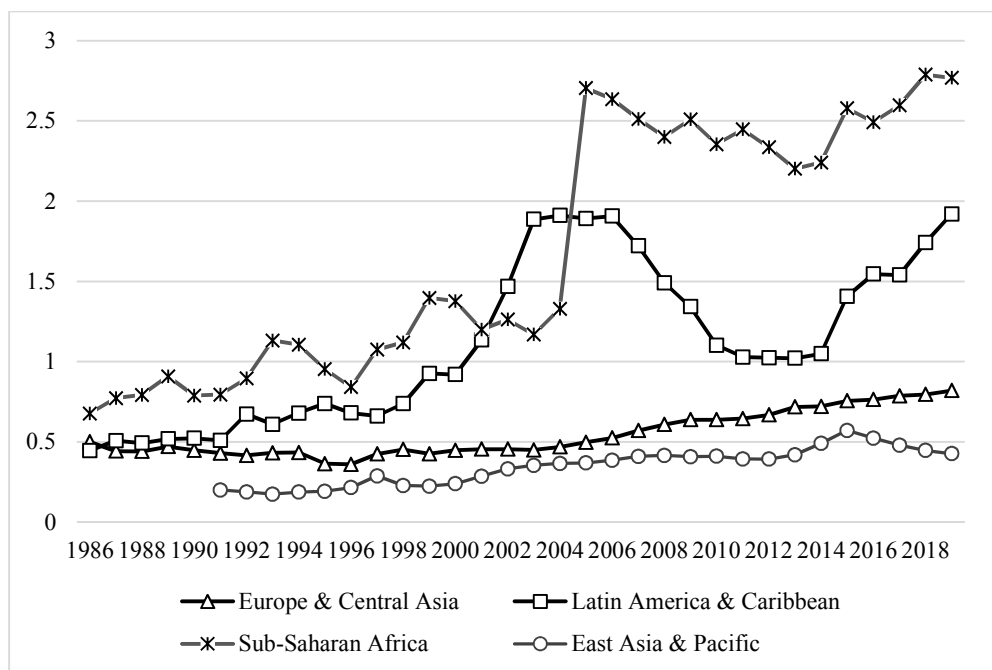

Notes: The figure shows the percentage contribution of remittances to GDP from 1986 to 2019. Each graph represents the region's contribution to GDP

Figure 2. Percentage Contribution of Remittance to GDP among the Regions (1986-2019)

According to the World Bank (2020a), Nigeria, which has a significant diaspora worldwide, was by far the greatest receiver of remittance flows in 2019, receiving $23.8 billion. In 2019, Nigeria received approximately half of all remittances transferred to sub-Saharan Africa, with Ghana ($4.0 billion) and Kenya ($2.8 billion) following closely behind. Kenya, Senegal, Congo, Democratic Republic of Congo, Zimbabwe,

Uganda, South Sudan, Mali, and South Africa are among the other major remittance recipients in Sub-Saharan Africa, in order of importance. Figure 3 depicts sub-Saharan Africa's top ten remittance recipients, with Nigeria at the top.
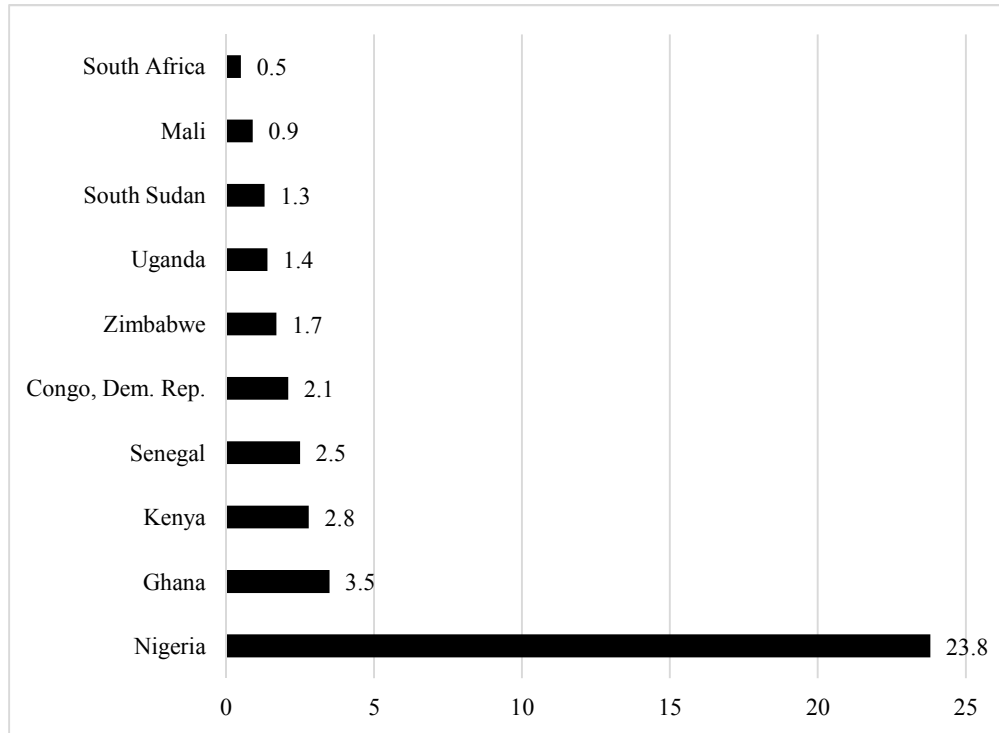
Note: The graph shows, in absolute terms, the first ten countries in sub-Saharan Africa that received the highest remittances in 2019.

Figure 3. Highest Recipient of Remittance Inflow in Sub-Saharan Africa, 2019

In 2019, remittance inflows (as a percentage of GDP) in Sub-Saharan Africa are shown in Figure 4. South Sudan outperformed other countries in the region when the size of the economy is taken into account, as remittances of $1.3 billion accounted for 34% of GDP, the most in the region. Lesotho is the next country, with total remittances accounting for 21.3 percent of GDP. The Gambia (15.5 percent of GDP), Zimbabwe (13.5 percent of GDP), Cabo Verde (11.7 percent of GDP), Comoros (11.5 percent of GDP), Senegal (10.5 percent of GDP), Liberia (9.5 percent of GDP), Guinea-Bissau (9.5 percent of GDP), and Togo are the next top countries in that order (8.3 percent of GDP). Smaller, poorer, and more vulnerable countries' economies appear to be more reliant on remittances from the region than larger economies.
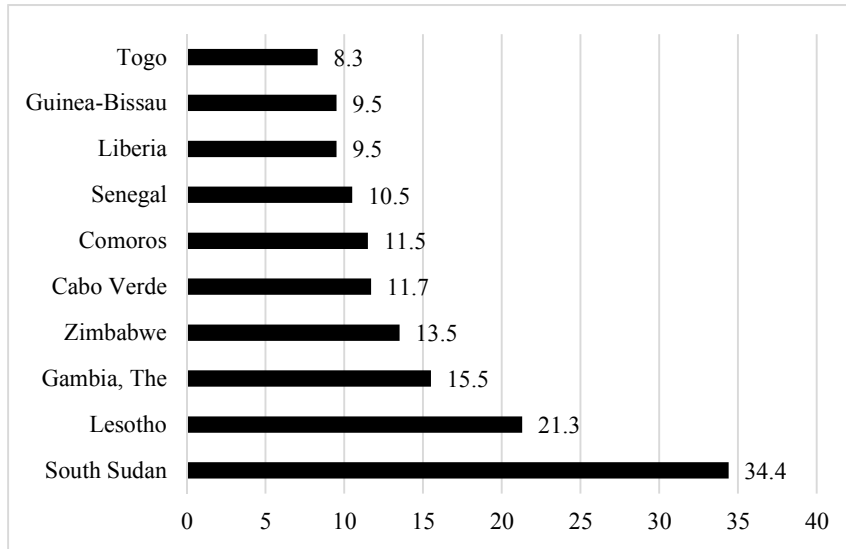
Note: This figure shows the first ten countries whose remittances contribution to GDP was highest in Sub-Saharan Africa in 2019.

Figure 4. Highest Recipient of Remittance Inflow in Sub-Saharan Africa, 2019
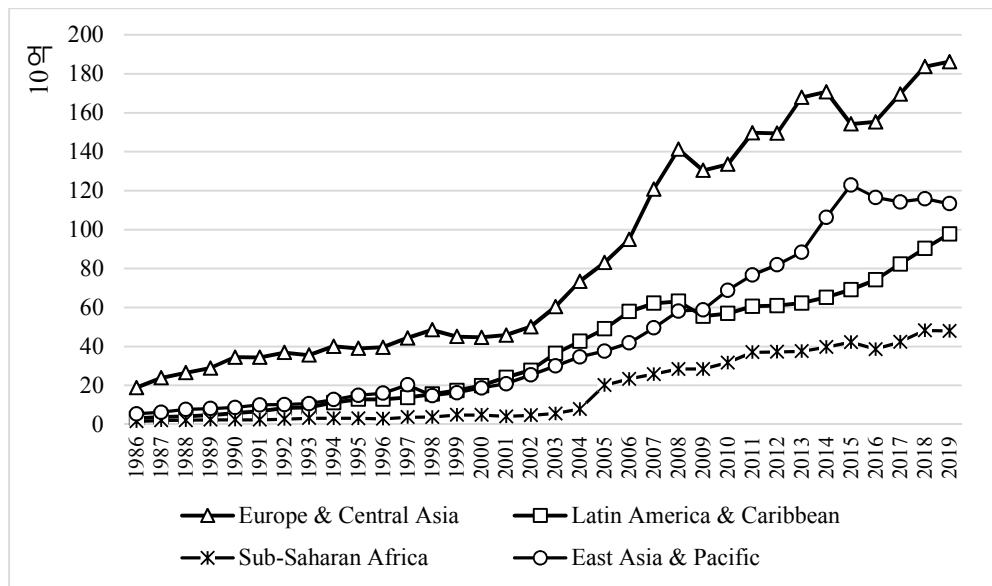
Note: The figure shows the inflow of remittances among the regions of the world from 1986 to 2019. Each graph represents a particular region.

Figure 5. Remittance Inflow among Regions (1986-2019)

Figure 5 presents the inflow of remittance among the regions of the world. From the figure, and central Asia is leading other regions. There is fierce competition between Latin America and the Caribbean and East Asia and the Pacific until 2009 when East Asian and Pacific remittance inflows surpass those of Latin America and the Caribbean. Sub-Saharan Africa ranks last among all regions. The inflow of remittances to sub-Saharan Africa and other regions did not differ significantly between 1986 and 1993. However, whereas remittances increased substantially in other countries from 1994 to 2003, there was minimal growth in large inflows to sub-Saharan Africa. In sub-Saharan Africa, the continuous increase in remittances started in 2004.

2.2. Literature Review

In this sub section, we provide a summary of theoretical and empirical literature on the link between oil price changes and remittances. In the first part, the theoretical underpinning for remittance inflows is provided. The second part reviews the few empirical literature on oil price-remittance nexus.

2.2.1. Theoretical Issues

There are few studies on the determinants of remittances. Some of these studies focus on microeconomic variables determining remittances, while few others look at the macroeconomic variables. At the micro level, the identified drivers of remittances include reasons for migration, number of migrants, their market earnings and the strength of their bond to the home country (Niimi et al., 2009; Canas et al., 2007; Hagen-Zanker and Siegel, 2007). Few other studies have equally identified socio-economic characteristics of migrants including gender, age, number of children, spouse's location level of education among others as micro determinants of remittances (McCoy et al., 2007). At the macro level, studies have identified economic condition at the home and host countries, domestic output, exchange rate, interest rate, institutional quality, inflation rate, level of financial development, political rights and age dependency ratio (Singh et al., 2009).

There are two broad perspectives on the oil price-remittances nexus. The first perspective argues that an increase oil price might boost oil revenues especially in the oil-exporting hosting countries. This development will spur increased economic activities thereby increasing aggregate demand for migrant workers and thus higher remittance outflows (Naufal and Termos, 2009, Akcay and Karasoy, 2019a; Abbas 2020). However, the situation may not be the same for oil- and migrant importing countries. Increased oil prices may lead to higher inflation rates thereby increasing the cost of living and the amounts migrant could transfer. In case of unexpected drop in oil prices, revenue in the oil exporting-migrant hosting countries are likely to be adversely affected thereby hurting investment and economic growth and the demand for migrants and migrants' outflows. For oil-importing migrants' hosting countries, lower oil price

may boost investment and output leading to increase demand for migrants. As a result, more remittances may flow into the migrants' sending countries.

With respect to oil-exporting migrants' sending countries, higher oil prices could lead to higher revenues, increased government spending and reduction in taxes to boost consumers' disposable income. However, increased government spending without appropriate monetary policy action by the Central bank may trigger inflation which in turn affects economic activities and welfare. In the circumstance, altruistically motivated remittances to the migrants sending countries may increase. However, from the perspective of oil-importing migrants' sending countries, higher oil prices may precipitate higher inflation rates leading to higher cost of living of the migrants' families and relatives at home. Consequently, altruistically motivated remittances to the country of origin may increase (John, 2018; Vacaflores, 2018; Makhlouf and Kasmaoui, 2018).
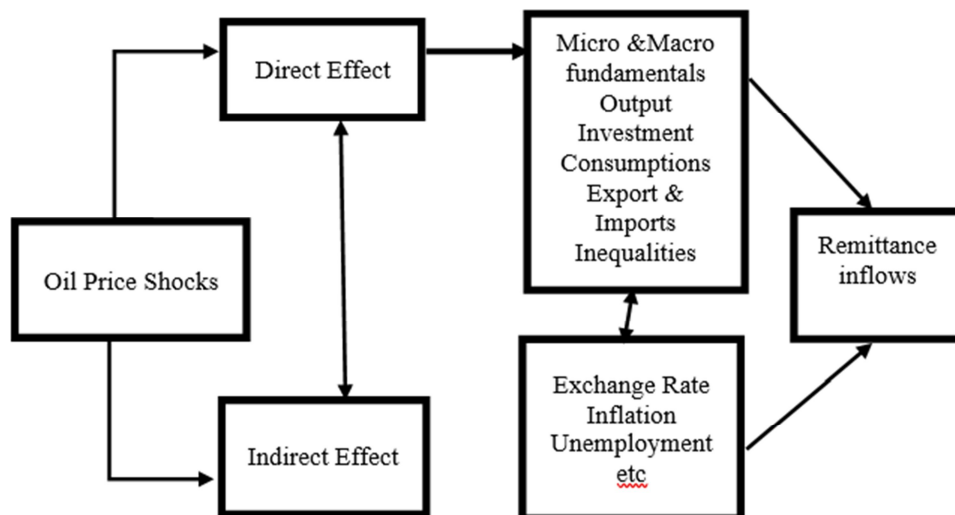
Source: Adapted from Zahran (2019)

Figure 6. Links between Oil Price Shocks and Remittances

As shown in Figure 6, oil price shocks transmit into remittance inflows through two main channels direct and indirect. Oil price shocks affects micro and macro fundamentals such as output, investment, consumption income inequality amongst others. These fundamentals in turn impact remittance inflows. Also, oil price shocks work through inflation, exchange rate unemployment, etc to impact remittance inflows. However as shown in the Figure 1, there is interconnectivity between micro and macro fundamentals and such factor as inflation, exchange rate and unemployment among others.

It is pertinent to note that most countries in SSA (oil exporting or importing) are

migrant senders. Moreover, they are highly import dependent and oil constitutes an important input in production. The main implication of this development is that changing oil prices will affect remittance inflows through its impact on cost of production, higher inflation and domestic cost of living. The altruistic theory posits that more remittances will flow to the country of origin.

Generally, the extent to which changing oil prices affect remittance inflows depends on the former's effect on macroeconomic fundamentals such as output, economic growth, investment, revenues, unemployment, inflation and consumption in the host and home countries. Moreover, the effects of oil price shocks on remittance inflows especially in mostly migrants' sub-Sahara African countries could be a function of income level. This is conjecture that is verified in our study.

2.2.2. Empirical Literature

There is a need to provide an overview of the studies in the literature that examined the oil price-remittances nexus in this section to provide a definite direction to the goal and an understanding of the contribution of this study. Most of the previous studies that examined oil prices and remittances focused on oil-exporting countries, while a few focused on oil-importing countries and both oil-importing and exporting countries. However, to capture these studies, we divide this review into three categories based on the targeted country. These include (a) oil-exporting countries, (b) oil-importing countries, and (c) oil-importing and oil-exporting countries. As a result, we examine past studies that are both country-specific and cross-country.

a. Studies on Oil-Exporting Countries

Several studies have found a positive relationship between oil prices and remittances, including Morshed and Pitafi (2008), Mohaddes and Raissi (2013), Makhlouf and Kasmaoui (2018), Akcay and Karasoy (2019a), Abbas (2020), Akçay (2021), Akinlo and Ojo (2021), Shah and Rehman (2022), Parvin (2022), and Zahran (2023). Though these studies used different models and focused on different economies, their findings suggest that higher oil prices lead to increased remittance inflows due to boosted economic activities in oil-exporting countries.

Contrary to those studies that found a positive link between oil prices and remittances, a few studies, e.g., Khodeir (2015), El-Sharabassy (2008), and Shir (2022), found a negative link in oil exporting countries. These studies established that remittances increase when oil prices decline.

b. Studies on Oil-Importing Countries

Among the few studies that focused on oil-importing countries are Lueth and Ruiz-Arranz (2006) and Morshed and Pitafi's (2008). Lueth and Ruiz-Arranz (2006) found a

positive link between remittances and oil price increases in Sri Lanka, while Morshed and Pitafi's (2008) similarly found a positive link between oil prices and remittances in oil-importing countries.

c. Studies on Oil-Exporting and Oil-Importing Countries

The studies that focus on both oil-exporting and oil-importing countries are scarce. The only known study is by Dada and Akinlo (2023), who explored the asymmetric effects of oil prices on remittances in sub-Saharan African (SSA) countries that import and export oil. The nonlinear autoregressive distributed lag (NARDL) approach was used. According to the study, increased oil prices led to increased remittance inflows in oil importing countries, whereas decreased oil prices reduced remittances. For oil-exporting countries, the long-run impact of a positive oil price shock on remittances depends on the oil price used (Brent and West Texas Intermediate). However, adverse oil price shocks increase the inflow of remittances into oil-exporting countries while decreasing the inflow of remittances into oil-importing nations in the short-run.

Based on the literature review, the debate on the asymmetric impact of oil prices on remittances is still ongoing. We observed from the literature that most of the existing studies that examined the asymmetric effect of oil prices on remittances have adopted single-country analyses. Also, among the studies that are cross-country studies, only a few of them focused on sub-Saharan Africa. Similarly, we discovered that previous studies employed econometric models such as VAR, ARDL, VECM, OLS, and NARDL to analyse the relationship between oil prices and remittances, which have produced different outcomes. These gaps underscore the importance of this study in sub-Saharan Africa, which is one of the top remittance-receiving regions in the world. This study aims to fill the gaps in the literature by providing a comprehensive analysis of the asymmetric effects of oil prices on remittances in SSA, using a cross-country approach and considering both oil-exporting and oil-importing countries.

3. DATA, MODEL AND METHODOLOGY

3.1. Data

We examined the asymmetry impact of oil prices on remittances in sub-Saharan Africa and among the income groups in the region in the period from 1986 to 2019. The income classification is based on the World Bank classification where all the countries in the region are classified into four groups. These include High-income countries, upper-middle-income countries, lower-middle-income countries and low-income countries. However, in this study, we combined upper-middle-income countries and lower-middle-income countries to become middle-income countries. Due to the fact that

only one country belongs to the high-income group in the region, the high-income group is not considered in this study. The study makes use of annual data from the World Development Indicator and US Energy Information Administration (EIA). The dependent variable in this study is personal remittances as (% GDP). Personal remittances consist of personal transfers and compensation of employees. All current monetary or in-kind transfers made or received by resident households to or from non-resident households are classified as personal transfers. Employee compensation refers to the earnings of the border, seasonal, and other short-term workers engaged in a non-resident economy, as well as residents employed by non-resident organisations. Our variable of concern is the oil price. The oil price used in this study is the Brent crude oil price. We choose it being the major benchmark in the global international market. Domestic data for oil prices for the countries is not available as data is a major issue in developing countries. However, Brent crude oil price best represents oil price as a uniform substitute. We use GDP per capita (constant 2010 US$) and financial development as control variables. Financial development is measured by domestic credit to private sector. Data on remittances, GDP per capita and financial development are from the World Bank Development indicator while data on the oil price is from US Energy Information Administration (EIA) 2020. The descriptive of the variables are presented in Table 1 while the list of countries are presented in Appendix.

Table 1. Summary Statistics of the Variables

Variable	Obs.	Mean	Sta. Dev	Min	Max
REM	1,040	4.450	17.236	0.0004	235.924
OIL INCREASE	1,056	28.907	34.618	17.02	111.63
OIL DECREASE	1,088	16.853	28.285	12.76	108.56
OIL	1,056	46.270	31.765	12.76	111.63
FD	1,041	18.935	23.406	0.403	160.125
GDP	1,086	2085.964	2731.51	164.337	15048.75

3.2. Model

Oil is one of the normal goods and its consumption depends on the level of price and income. In this study, we investigate that remittances depend on the oil price and some control variables. We modified Behmiri and Manso (2013) who investigated the effect of oil consumption and oil price on economic growth. Our model, therefore, investigates the asymmetry impact of oil price on remittances, conditioned on control variables which include real GDP per capita and financial development.

$$REM = f(oil\ price, GDP\ per\ capita, Financial\ development). \tag{1}$$

By expressing Equation (1) in functional panel form it becomes:

$$REM_{it} = \alpha_{it} + \beta_1 OPR_{it} + \beta_2 GDP_{it} + \beta_3 FD_{it} + \varepsilon_{it}, \tag{2}$$

where REM represents remittances, OPR stands for the oil price, GDP is the real GDP per capita and FD signifies financial development.

3.3. Methodology

Shin et al. (2014) developed a NARDL model. This model has some advantages. For instance, it is a model which we can be used to examine both the long-run and short-run asymmetric effects of oil price on remittances. Also, NARDL is appropriate for variables with different integration orders, irrespective of whether they are I(0) or I(1), or combining the I(0) and I(1). Similarly, the model also has the advantage of capturing the dynamic in heterogeneous panel data set and is appropriate for the long period (T). Three methods are normally used to estimate a dynamic heterogeneous panel data model. These are pooled mean group (PMG), mean group (MG) and dynamic fixed estimator (DFE). The two most popular among the three methods are pooled mean group (PMG) and mean group (MG) methodologies according to Salisu and Isah (2017). The PMG is an estimator which constrains long-run coefficients to be identical but allows short-run coefficients and error variances to differ across groups.

We divided the real oil price for all countries into increases and decreases in this model, which we used for all cross-sections. The NARDL breaks down changes in oil prices into negative and positive components. The real oil price was deconstructed since it is thought that the flow of remittances can react to variations in oil prices in a variety of ways.

$$\Delta REM_{it} = \varphi_i(REM_{it-1} + OPR_{it-1}^+ + OPR_{it-1}^- + \gamma_i' X_{it}) + \omega_{ij} \sum_{j=1}^{P-1} \Delta REM_{it-j}$$

$$+ \sigma_{ij} \sum_{j=1}^{q-1} \Delta OPR_{it-j}^+ + \theta_{ij} \sum_{j=1}^{p-1} \Delta OPR_{it-j}^- + \pi_i \sum_{j=1}^{q-1} \Delta X_{it-J}$$

$$+ \eta_{it} + \varepsilon_{it}. \tag{3}$$

In Equation (3), we decomposed oil price into OPR^+ and OPR^- which represents positive oil price and negative oil price, respectively. X stands for control variables. All other variables remain as defined earlier. ω, σ, θ and π are the short-run coefficients. η_i and ε_{it} are the unobserved country-specific effect and error term respectively. Equation 3 will be estimated for the full sample of 32 sub-Saharan African countries, the middle-income countries which consist of 14 countries and low-income countries which consist of 17 countries. The theoretical definition of the decomposed oil prices is presented as follows:

$$OPR_{it}^+ = \sum_{j=1}^{t} \Delta OPR_{i,j}^+ + \sum_{j=1} \max(\Delta OPR_{i,j}^+, 0), \tag{4}$$

$$OPR_{it}^- = \sum_{j=1}^{t} \Delta OPR_{i,j}^- + \sum_{j=1} \min(\Delta OPR_{i,j}^-, 0). \tag{5}$$

4. EMPIRICAL INVESTIGATIONS

4.1. Panel Unit Root

Table 2. The Result of Unit Root Test

	Method	At level		At first difference	
		Intercept	Trend	Intercept	Trend
REM	Levin, et al.	-6.755***	-2.352***	-12.222***	-8.930***
	Im et al.	-1.93391**	-1.492*	-18.163***	-16.244***
	ADF-Fisher	102.684***	78.154*	418.388***	353.969***
	PP-Fisher	90.4174**	104.337***	804.370***	2413.09***
OIL INCREASE	Levin, et al.	-10.788***	-9.149***	-20.104***	-17.773***
	Im et al.	-9.123***	-6.614***	-23.321***	-19.882***
	ADF-Fisher	192.361***	139.549***	571.041***	425.902***
	PP-Fisher	221.427***	169.167***	1135.25***	2299.04***
OIL DECREASE	Levin, et al.	-13.488***	-16.245***	-19.402***	-16.364***
	Im et al.	-10.818***	-11.738***	-21.897***	-18.186***
	ADF-Fisher	230.909***	241.459***	517.075***	387.886***
	PP-Fisher	223.970***	178.651***	1160.14***	2402.46***
OIL	Levin, et al.	-4.998***	-2.793***	-23.886***	-24.139***
	Im et al.	-3.340***	-1.323***	-22.552***	-22.476***
	ADF-Fisher	103.061***	118.228***	448.049***	498.964***
	PP-Fisher	109.597***	118.041***	450.417***	981.012***
FD	Levin, et al.	-1.445	-2.419***	-11.231***	-9.316***
	Im et al.	0.323	0.758	-13.302***	-11.438***
	ADF-Fisher	69.906	63.864	297.420***	244.442***
	PP-Fisher	59.042	65.243	550.545***	624.467***
GDP	Levin, et al.	7.582	-1.127	-7.004***	-7.330***
	Im et al.	9.305	2.733	-9.932***	-10.929***
	ADF-Fisher	21.793	50.339	225.747***	239.955***
	PP-Fisher	26.885	47.750	449.967***	960.172***

Note: ***, **and * indicate 1%, 5% and 10% levels of significance. REM is the remittances, oil represents oil price, FD stands for financial development and GDP stands for the GDP per capita.

4.4. Panel Cointegration

In this study, we check for cointegration among the variables by using panel cointegration tests proposed by Pedroni (1999, 2004). According to Bidirici and Bohur (2015), Pedroni cointegration is the most popular panel cointegration test. Seven statistics are involved in the Pedroni cointegration test. Table 3 which shows the results of the cointegration test indicates that four of the seven test statistics rejected the null hypothesis of no cointegration, whereas the other tests accepted it. We concluded that there is cointegration among the variables because the number of tests that rejected the null hypothesis of no cointegration was greater than those that accepted it, and because four significant tests are those that produce the best performance according to Karaman-Orsal (2008), while panel ADF and group ADF among the significant tests are regarded as most reliable statistics by (Pedroni, 2004; Asongu et al., 2016).

Table 3. Panel Cointegration Result

Test	Statistics	Prob.	Weighted Statistics	Prob.
Within Dimension				
Panel-v	0.884	0.188	1.035	0.150
Panel-rho	-1.185	0.118	-0.649	0.258
Panel-pp	-3.808***	0.000	-2.453***	0.007
Panel-Adf	-2.201**	0.014	-1.156	0.124
Between-Dimension				
Group-rho	1.090	0.862		
Group-pp	-2.161**	0.015		
Group-Adf	-1.498*	0.067		

Note: ***, **and * indicate 1%, 5% and 10% levels of significance.

4.3. Model Estimation

As we indicated earlier, the asymmetric effect is capable of decomposing the oil price into periods of decrease and increase in oil price. We present the full sample results consisting of 32 sub-Saharan Africa countries in Table 4. The Table contains PMG model results. The long-run result is presented in the panel I of the Table while the short-run result is presented in panel II of the Table. The result of the Hausman test which is usually used to select the most efficient and consistent estimator between PMG and MG is presented also in the Table. In the long run, the PMG model indicates that the oil price increase (positive) has a negative and significant effect on remittances in sub-Saharan Africa. This suggests that as the oil price increases, the remittances inflow is reducing. This finding is consistent with Akinlo and Ojo (2021) but contradicts the findings of ILO (2013), Mallick (2017) and Akcay (2019). The coefficient of oil price

decrease is positive and significant at 1% in the PMG model. The findings indicate that the decrease in the oil price decreases the inflow of remittances. The possible reason for these findings is that the economies of the major source of remittance to the sub-Saharan African region are depending on the oil price. If the emigrant hosts are oil importers, any increase in the oil price will affect economic growth and investment which will affect the employment of emigrants and hence remittances and vice-versa. For instance, Akinsola and Odhiambo (2020) found that an oil price increase (positive) reduces the real GDP per capita of oil-importing countries. Based on these findings, there is a possibility that the major source of remittances to sub-Saharan Africa may likely be oil-importing countries. On the control variables, GDP per capita significantly enhances remittances inflow in the PMG model in a linear manner. This finding shows that investment theory holds in the long-run in sub-Saharan Africa. The coefficient of financial development is positive and significant in the PMG model. This implies that financial development promotes remittances in the long-run. Financial development can enhance remittances by facilitating the easy inflow of remittances. An efficient financial sector can as well reduce the cost of transferring remittances by serving as a formal channel for the inflow of remittances.

Table 4. The Full Sample Results

Pooled Mean Group (PMG)			
Variables	Coef	Std. Error	Prob.
Panel I: Long-run coefficient			
Oil price increase	-0.005***	0.354	0.000
Oil price decrease	0.06***	0.002	0.003
GDP	0.001*	0.0001	0.079
FD	0.014*	0.008	0.082
Panel II: Short-run Coefficient			
ΔOil price increase	-0.004	0.003	0.216
ΔOil price decrease	-0.008*	0.004	0.064
ΔGDP	-0.004	0.002	0.844
ΔFD	0.018	0.304	0.543
ECM(-1)	-0.216***	0.033	0.000
Constant	0.317***	0.122	0.009
Country	32		
Observation	943		
Hausman test			
Ward$_{LR}$	0.01		

Note: ***, **and * indicate 1%, 5% and 10% levels of significance

In the short-run results, the oil price increase has no effect on remittances in the PMG model in short-run. However, the oil price decrease produces a negative significant effect on remittances. This implies that as oil price decreases, remittances increases. This finding possibly implies that when there is a slump in the oil price, the expenditure of the migrant-hosting countries on oil will decrease which will increase the level of investment and aggregate demand as well as economic growth. This might eventually lead to an increase in demand for migrant workers and thus higher remittances inflows. Another possibility for this result according to Akcay (2019) is that if most migrant workers are not employed in the oil sectors but rather in the agriculture, construction and services sectors, a fall in oil prices will not affect remittances inflows. As evidence, De et al. (2019) found a positive connection between non-oil GDP and remittances. Financial development and GDP per capita have no effect on remittances in the PMG model in short-run. The insignificant effect of financial development on remittances in the short-run might be due to the small size of the financial sector in the region. The Hausman test shows that PMG results are more efficient and consistent compared to MG estimation. The Wald test was used to investigate if there were any short- and long-run asymmetric impacts of oil prices on remittances. In the PMG model, the results reveal that oil price asymmetrically influences remittances only in the short run, whereas the Wald test shows a symmetric effect for the full sample in the long run.

To test whether income level is playing a major role in the asymmetry relationship between remittances and oil prices, we re-estimate the models for the middle-income group and low-income group in the region. The results of the middle-income group are presented in Table 5. In the long-run, the coefficient of oil price increase has no effect on remittances in the PMG model as its coefficient is insignificant. The oil price decrease has a positive and significant effect on remittances in the long-run. This suggests that as oil price decreases, the inflow of remittances decreases. This finding is the same as what we obtained in the full sample when the oil price decreases. The coefficient of the GDP per capita is negative and significant at 10% in a linear manner contrary to what we obtained in the full sample. This suggests that as GDP per capita is increasing, the inflow of remittances is reducing in middle-income countries. This finding confirms that altruism theory holds in the middle-income countries in sub-Saharan Africa, suggesting countercyclicality of remittances to middle-income countries. This finding supports the findings of Azizi (2017, 2019), Vacaflores (2018), Akcay and Karasoy (2019a). Financial development produces a positive significant effect on remittances like in the full sample.

In the short-run, the coefficients of the oil price increase and oil price decrease are insignificant. Likewise, the coefficients of GDP per capita and financial development are insignificant. This suggests that we cannot conclude on the short-run results in the middle-income countries. The Hausman test indicates that the PMG model is more efficient than MG. In both the long and short runs, the Wald tests are performed to see if the effect is symmetric or asymmetric. In the long run, the Wald test favours an asymmetric effect for the middle-income group, whereas in the short run, it favours

symmetry.

In Table 6, we present both PMG and MG models because the Hausman test chooses MG as the most efficient model. In both the PMG and MG models, the oil price increase enhances remittances in the long-run in the low-income group. This finding supports the findings of Singh (2012), Al-Mashat and Billmeier (2012), ILO (2013), Makhlouf and Kasmaoui (2018) and Mallick (2017). Akcay and Karasoy (2019a) asserted that oil price increase can enhance oil revenues, thereby increasing investments and economic growth. The increase in investment and economic growth will stimulate aggregate demand and demand for migrant workers, thereby increasing the outflow of remittance to emigrants' countries. The coefficient of oil price decrease has a positive and significant effect on remittances in both PMG and MG models. This implies that a decrease in oil price reduces the inflow of remittances into low-income countries. These findings suggest that low-income countries are more vulnerable to oil price variations, implying that the asymmetric relationship between oil price and remittances is influenced by income. The possible explanation for this is that low-income countries rely more on remittances inflow which makes their economies to be more sensitive and vulnerable. The coefficient of GDP per capita is negative and significant in the PMG model but insignificant in the MG model. Financial development contributes to the inflow of remittances in the long-run.

Table 5. The Middle-Income Results

Variables	Coef	Std. Error	Prob.
Pooled Mean Group (PMG)			
Panel I: Long-run coefficient			
Oil price increase	-4.830	0.003	0.990
Oil price decrease	0.001***	0.004	0.002
GDP	-0.002*	0.0001	0.078
FD	0.011***	0.003	0.000
Panel II: Short-run Coefficient			
ΔOil price increase	-0.007	0.007	0.284
ΔOil price decrease	-0.012	0.009	0.162
ΔGDP	0.003	0.003	0.302
ΔFD	0.070	0.631	0.543
ECM(-1)	-0.279***	0.076	0.000
Constant	0.403**	0.175	0.021
Country	14		
Observation	424		
Hausman test			
$Ward_{LR}$	8.97***		

Note: ***, **and * indicate 1%, 5% and 10% levels of significance

In the short-run, the coefficients of all the variables in the PMG model are insignificant. In the MG model, the oil price increase has no effect on remittances. However, oil price decrease has a negative and significant effect on remittances which shows that a decrease in oil price leads to an increase in remittances inflow in the low-income countries. GDP per capita also fails to enhance remittances inflow in the low-income countries. The coefficient of financial development is insignificant negative in the low-income group. However, in the MG model, the coefficient of financial development is insignificant. Hausman shows that the MG model is preferable to the PMG model. The Wald test indicates the absence of asymmetry effect in the long-run in both PMG and MG models. However, the Wald test indicates that the asymmetry effect is existing in the long-run in the MG model.

Table 6. The Low-Income Results

Variables	Pooled Mean Group (PMG)			Mean Group (MG)		
	Coef	Std. Error	Prob.	Coef	Std. Error	Prob.
Panel I: Long-run coefficient						
Oil price increase	0.015***	0.004	0.000	0.042***	0.014	0.004
Oil price decrease	0.020***	0.005	0.000	0.049***	0.009	0.000
GDP	-0.002**	0.001	0.020	0.004	0.004	0.330
FD	0.016**	0.008	0.042	-0.075	0.070	0.284
Panel II: Short-run Coefficient						
ΔOil price increase	-0.002	0.006	0.251	-0.008	0.006	0.156
ΔOil price decrease	-0.006	0.004	0.139	-0.014*	0.008	0.073
ΔGDP	-0.002	0.002	0.254	-0.004*	0.002	0.098
ΔFD	-0.020	0.021	0.368	-0.064	0.047	0.168
ECM(-1)	-0.250***	0.062	0.000	-0.375***	0.059	0.000
Constant	0.720***	0.241	0.003	0.661	0.513	0.197
Country	17			17		
Observation	489			489		
Hausman test				9.31*		0.054
Ward$_{LR}$	0.14			0.37		

Note: ***, **and * indicate 1%, 5% and 10% levels of significance

4.4. Discussion of Findings

In the long-run, the study found that oil price increases reduce remittances inflow to sub-Saharan Africa in the full sample, while middle-income countries do not respond to oil price increases. However, the increase in the increase in oil prices promotes the inflow of remittances to low- and middle-income countries. This shows that income

level plays a major role in the asymmetry between remittances and oil prices in sub-Saharan Africa. The increase in remittance inflow to low-income countries when oil prices rise might mean that the bulk of the remittances are coming from oil-exporting countries.

The study found that oil price decreases are harmful to the inflow of remittances in the full sample of middle- and low-income countries in the long-run. This suggests that a decrease in oil prices is detrimental to the inflow of remittances in sub-Saharan Africa. This might have to do with the negative impact of the decline in oil prices on African host migrants. When the economies of the major sources of remittance to the sub-Saharan African region and others are reliant on the price of oil, a fall in the oil price will negatively affect economic activities, including foreign worker employment and remittances outflow to the sub-Saharan African region. Take the Gulf Cooperation Council (GCC) countries, which have been using oil earnings to support economic growth and invest in numerous areas since the discovery of oil and gas resources, as an example. Most GCC nations have amassed wealth and are among those with the highest GDP (PPP) per person (Hashimoto et al., 2004; Alsamara et al., 2020). However, the GCC region lacks the labour force necessary to complete its development projects, which has resulted in a long-term heavy reliance on foreign labour, which has grown to be a significant source of remittances to other nations. In a similar vein, GCC nations rank among the top immigrant remittance-sending nations in the world (Alsamara and Mrabet, 2023). Therefore, a decline in oil prices in those countries will result in low remittances inflowing to sub-Saharan Africa.

The study found that a decline in oil prices enhances remittances in the full sample and low-income countries in the short-run. This suggests that most of the remittances to the sub-Saharan African region during a decline in the oil price might be coming from oil-importing immigrant host nations that benefit from the fall in the oil price. A fall in oil prices reduces the cost of production in oil-importing nations. A reduction in the cost of production will positively enhance output, increase profit margins, and increase investment and employment. Aside from this, according to Dada and Akinlo (2023), a decline in oil prices will enhance the balance of payment accounts by lowering production costs and strengthening the value of the oil-importing countries' national currencies. More employment will follow from this, particularly for migrant workers, thus, increasing the volume of remittances that may be sent home to support the family economy.

GDP enhances the inflow of remittances in the full sample while decreasing remittances in middle- and low-income countries in the long-run. This is the investment-related remittances motive in the full sample versus the altruistic remittances motive in the middle- and low-income countries. For the full sample, it implies that investment theory holds in the long-run in sub-Saharan Africa. This is a situation where the migrant makes an investment in his home country and asks a family member to look after the investment project on his behalf. In middle- and low-income countries, the migrants are just sending money to support their family members. This relationship is altruistic in the

sense that the migrant cares about his family and makes his utility dependent on the family member's utility, not because of economic growth, according to Le (2011). This finding supports Ratha et al., (2020), who stated that the economies of smaller, poorer, and more fragile countries are more dependent on remittances. For instance, when economic size was taken into account, South Sudan (35% of GDP), Lesotho (21% of GDP), and The Gambia (15% of GDP) were the top recipient nations in the area in 2019.

Financial development contributes to the inflow of remittances in the full sample and in the middle-income countries but has no effect on remittances in the low-income countries. Aggarwal et al. (2011) stated that the financial sector facilitates the pooling of remittances into sizeable deposits that can be used towards profitable investments. Guiliano and Ruiz-Arranz, (2005) also noted that the financial sector promotes the inflow of remittances by lowering the cost of sending remittances and allocating them to initiatives that yield the highest returns. Additionally, it facilitates the flow of remittances by serving as an intermediary between the migrants and recipients (Nyamongo and Misati, 2011; Levine, 2005). The insignificant effect of financial development on remittances in low-income countries might be due to the level of development and the small size of the financial sector.

4.5. Robust Check

To robust check the NARDL estimates presented in Tables 4, 5 and 6, a Panel Vector Error Correction Model (PVECM) framework is employed. A PVECM is a restricted VAR designed for use with non-stationary series that are known to be cointegrated. In line with Barro (1990) and Worlu and Emeka (2012), the PVECM is presented as follows:

$$\Delta REM_{it} = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta REM_{it-j} + \sum_{i=1}^{n} \beta_{2i} \Delta OPR_{it-j}^{+} + \sum_{i=1}^{n} \beta_{3i} \Delta OPR_{it-j}^{-}$$
$$+ \sum_{i=1}^{n} \beta_{4i} \Delta X_{it-j} + \gamma ECT_{t-1} + \varepsilon_{it}, \tag{6}$$

where ECT_{t-1} is the error correction term and ε_{it} is the mutually uncorrelated white noise residual. All other variables are as earlier defined. The coefficient of the ECT variable contains information about whether the past values of variables affect the current values of the variables under study. The size and statistical significance of the coefficient of the error correction term in each ECM model measure the tendencies of each variable to return to equilibrium. A significant coefficient implies that past equilibrium errors play roles in determining the current outcomes. The short-run dynamics are captured through the individual coefficients of the difference terms.

The PVECM results are presented in Table 7. The table contains the results for the full sample, middle-income countries and low-income countries. Regarding the full sample, the coefficients of the oil price increase lagged one-period and the oil price

increase lagged two-period are insignificant. This suggests that the lagged oil price increase has no impact on remittances in sub-Saharan Africa. Oil price decrease lagged one-period has a negative and significant effect on remittances, while oil price decrease lagged two-period has no effect on remittances. In middle-income countries, the oil price increase and the oil price decrease are insignificant. This finding is consistent with the NARDL results in Table 5. In low-income countries, an oil price increase lagged one-period enhances the inflow of remittances as its coefficient is positive and significant at 5%. Oil price decrease lagged by one has a positive and significant effect on remittances.

Regarding the control variable, none of the control variables are significant both in the full sample, middle-income countries and low-income countries which is the same with NARDL estimates. The coefficients of the $ECT(-1)$ in the full sample, middle-and low-income countries have a negative sign as expected but are not significant. This suggests that we cannot conclude on the speed of the adjustment.

Table 7. Panel Vector Error Correction Model Results

	Full Sample			Middle-Income countries		
	Coef	Std. Error	Prob.	Coef	Std. Error	Prob.
ΔREM_{-1}	0.254***	0.003	0.000	-0.358***	0.046	0.000
$\Delta Oil\ price\ increase_{-1}$	0.011	0.007	0.105	0.006	0.013	0.608
$\Delta Oil\ price\ increase_{-2}$	-0.006	0.006	0.368	-0.004	0.011	-0.319
$\Delta Oil\ price\ decrease_{-1}$	0.014***	0.005	0.008	0.006	0.010	0.559
$\Delta Oil\ price\ decrease_{-2}$	-0.006	0.006	0.321	-0.001	0.010	0.918
ΔGDP_{-1}	-0.004	0.004	0.320	-0.001	0.001	0.880
ΔGDP_{-2}	0.003	0.004	0.431	0.003	0.001	0.645
ΔFD_{-1}	-0.004	0.014	0.775	-0.019	0.029	0.502
ΔFD_{-2}	-0.003	0.014	0.856	-0.002	0.029	0.951
$ECT(-1)$	-0.0002	0.002	0.269	-8.750	0.001	0.643
R^2	0.32			0.32		
Country	32			14		
	Low-Income countries					
	Coef	Std. Error	Prob.			
ΔREM_{-1}	-0.380***	0.047	0.000			
$\Delta Oil\ price\ increase_{-1}$	0.012**	0.006	0.035			
$\Delta Oil\ price\ increase_{-2}$	5.350	0.005	0.992			
$\Delta Oil\ price\ decrease_{-1}$	0.015***	0.004	0.000			
$\Delta Oil\ price\ decrease_{-2}$	-0.001	0.005	0.919			
ΔGDP_{-1}	-0.002	0.001	0.141			
ΔGDP_{-2}	-0.001	0.002	0.503			
ΔFD_{-1}	0.007	0.012	0.580			
ΔFD_{-2}	-0.001	0.011	0.899			
$ECT(-1)$	-0.004	0.003	0.184			
R^2	0.17					
Country	17					

5. CONCLUSION

Sub-Saharan Africa countries have a large emigrant spread across the world. This has allowed the region to be one the highest receiver of remittances in recent times. However, the economy of the emigrant host countries can be affected by the shock in the oil price thereby affecting the inflow of remittances. This study, therefore, investigates the asymmetry effect of oil price on remittances in sub-Saharan African during the period 1986 to 2019.

To achieve the objective of this study, NARDL model is employed which is capable of estimating both the short-run and long-run asymmetry effect of oil price on remittances by decomposing the oil price into oil price increase and oil price decrease. Based on this method, we find some interesting results. Specifically, we found that oil price increase reduces remittances inflow in sub-Saharan Africa while its effect differs among the income groups in the long-run. However, the effect of an oil price decrease on remittances is the same in sub-Saharan African as well as among the income groups. In the short-run, oil price increase produces no effect on the remittances in the region and among the income groups within the region while oil price decrease is almost similar in the region. The effect of GDP per capita is mixed in the long-run while its effect in the short-run is only significant in the low-income group. Financial development is a major determinant of remittances inflow in the long-run but has no effect in the short-run.

Based on these findings, we can draw some conclusions. First, persistence shock in oil price can affect the inflow of remittances to sub-Saharan Africa depending on whether emigrant host countries are oil-importing or exporting. For instance, if the emigrant host countries are oil importing countries, an increase in oil price will reduce investment and employment and remittances inflow to the region. However, if the emigrant host countries are oil-exporting countries, there will be an increase in investment and employment and an increase in remittances inflow to the region. Since we found that oil price increase harms remittances inflow in the region, therefore, there is a need for policies that can reduce the impact of oil price shock. A policy that can facilitate easy migration to desired countries might be good. Second, there is a need for the sub-Saharan African countries to diversify their sources of income to avoid the overreliance on remittances inflow and thereby avoiding the instability or crisis that might occur as a result of oil price surge.

APPENDIX

Table A1. List of Countries

Full Sample		Middle-income countries	Low-income countries
Benin	Mali	Botswana	Benin
Botswana	Mauritania	Gabon	Burkina Faso
Burkina Faso	Mauritius	Mauritius	Comoros
Cameroon	Mozambique	South Africa	Ethiopia
Comoros	Niger	Cameroon	Guinea
Congo Rep	Nigeria	Congo Rep	Guinea Bissau
Coite d voire	Rwanda	Coite d voire	Madagascar
Estiwani	Senegal	Estiwani	Malawi
Ethiopia	Seychelles	Ghana	Mali
Gabon	Sierra Lone	Kenya	Mozambique
Ghana	South Africa	Lesotho	Niger
Guinea	Sudan	Mauritania	Rwanda
Guinea Bissau	Tanzania	Nigeria	Senegal
Kenya	Togo	Sudan	Sierra Lone
Lesotho	Zimbabwe		Tanzania
Madagascar			Togo
Malawi			Zimbabwe

REFERENCES

Abbas, S. (2020), "Impact of Oil Prices on Remittances to Pakistan from GCC Countries: Evidence from Panel Asymmetric Analysis," *OPEC Energy Review*, 44(2), 205-223.

Aggarwal R., A. Demirgüç-Kunt and M.S. Pería (2011), "Do Workers Remittances Promote Financial Development?" *Journal of Development Economics*, 96, 255-264.

Akcay S. (2019), "Does Oil Price Asymmetrically Impact Remittance Outflows? The Case of Oman," *Review of Middle East Economic Finance*, 15(2), 1-9.

Akçay S. (2021), "Are Oil Prices and Remittance Outflows Asymmetric? Evidence from Saudi Arabia," *Energy Research Letters*, 2(1), 1-5.

Akcay A and A. Karasoy (2019a), "Asymmetric Impact of Oil Prices on Remittances: Evidence from India," *OPEC Energy Review*, 43(3), 362-382.

Akcay S. and A. Karasoy (2019b), "Determinants of Remittances in Egypt: Do Macroeconomic Instability and Oil Price Matter?" *International Migration*, 57(5), 142-160.

Akinlo A.E. (2023), "Oil Price Shocks and Income Inequality in Nigeria: Evidence from Nonlinear ARDL Approach," *African Journal of Economic Review,* 12(1), 1-24.

Akinlo A.E. and M.S. Ojo (2021) "Examining the Asymmetric Effects of Oil Price Shocks on Remittances Inflows: Evidence from Nigeria," *SN Business and Economics,* 1, 137.

Akinsola M.O. and N.M. Odhiambo (2020), "Asymmetric Effect of Oil Price on Economic Growth: Panel Analysis of Low-Income Oil-Importing Countries," *Energy Reports*, 6, 1057-1066

Al-Mashat R. and A. Billmeier (2012), "Push or Pull? The Determinants of Remittances to Egypt," *Review of Middle East Economics and Finance*, 8(2), 1-27.

Alsamara M. And Z. Mrabet (2023), "Investigating the Impact of Remittance Outflows and Oil Price on Economic Growth in Gulf Cooperation Council Countries," *Resources Policy*, 82, 103557.

Alsamara M., Z. Mrabet and J. Hatemi-J (2020), "Pass-through of Import Cost into Consumer Prices and Inflation in GCC Countries: Evidence from A Nonlinear Autoregressive Distributed Lags Model," *International Review of Economics and Finance*, 70, 89-101.

Asatryan Z., B. Bittschi and P. Doerrenberg (2017), "Remittances and Public Finances: Evidence from Oil-Price Shocks," *Journal of Public Finance,* 8(2), 1-27.

Asongu S., G. El Montasser and H. Toumi (2016), "Testing the Relationships between Energy Consumption, CO2 Emissions, and Economic Growth in 24 African Countries: A Panel ARDL Approach," *Environmental Science Pollution Research,* 23(7), 6563-6573.

Azizi, S. (2017), "Altruism: Primary Motivation of Remittances," *Applied Economics Letters,* 24(17), 1218-1221.

Azizi, S., (2019), "Why Do Migrants' Remit?" *World Economy*, 42(2), 429-452.

Bakewell, O. and H. de Haas (2007). "African Migrations: Continuities, Discontinuities and Recent Transformations," in Chabal, P., U. Engel and L. de Haan (Eds.), *African Alternatives*, Leiden: Brill, pp.95-118.

Barro, R.J. (1990), "Government Spending in a Simple Model of Endogenous Growth," *Journal of Political Economy,* 98,103-125.

Behmiri, N.B. and J.R.P. Manso (2013), "How Crude Oil Consumption Impacts on Economic Growth of Sub-Saharan Africa?" *Energy*, 54, 74-83.

Bidirici, M and E. Bohur (2015), "Design and Economic Growth: Panel Cointegration and Causality Analysis," *Procedia-Social and Behavioural Sciences,* 210, 193- 202.

Canas, J., R. Coronado and P.M. Orrenius (2007), "Explaining the Increase in Remittances to Mexico," *Southwest Economy*, 4, Federal Reserve Bank of Dallas.

Dada, J.T. and T. Akinlo (2023), "Asymmetric Relationship between Oil Prices and Remittances in Oil-Importing and -Exporting Countries: Evidence from Sub-Saharan

Africa," *OPEC Energy Review*, 47(2), 118-133.

De, S., S. Quayyum, K. Schuettler, and S.R. Yousefi (2019), "Oil Prices, Growth, and Remittance Outflows from the Gulf Cooperation Council," *Economic Notes*, 1-17.

El-Sharabassy, A. (2008). "Oil and Remittances in the Middle East", PhD Dissertation, International Studies, Old Dominion University.

Falk, B. (1986), "Further Evidence on the Asymmetric Behavior of Economic Time Series Over the Business Cycle," *Journal of Political Economy*, 94(5), 1096-1109.

Giuliano, P. and M. Ruiz-Arranz (2005), "Remittances, Financial Development and Growth," IMF Working Paper WP/05/234.

Gupta, P. (2006), "Macroeconomic Determinants of Remittances: Evidence from India," *Economic and Political Weekly,* 41(26), 2769-2775.

Hagen-Zanker, J. and M. Siegel (2007), "The Determinants of Remittances: A Review of the Literature," Working Paper No.3, MGSoG.

Hamilton, J.D. (1983), "Oil and the Macroeconomy since World War II," *Journal of Political Economy,* 91(2), 228-248.

Hamilton, J.D. (2003). "What is An Oil Shock?" *Journal of Econometrics*, 113(2), 363-398.

Hashimoto, K., J. Elass, and S. Eller (2004), "Eller Liquified Natural Gas from Qatar. The Qatar gas Project," Geopolitics of Gas Working Paper Series, the Program on Energy and Sustainable Development at Stanford University and the James A. Baker III Institute for Public Policy of Rice University.

Herrera, A.M., L.G. Lagalo and T. Wada (2015), "Asymmetries in the Response of Economic Activity to Oil Price Increases and Decreases?" *Journal of International Money and Finance* 50, 108-133.

ILO (2013), *Studies on Growth with Equity: Bangladesh: Seeking Better Employment Conditions for Better Socioeconomic Outcomes*, International Labour Organisation and International Institute for Labour Studies.

Im, K.S., M.H. Pesaran and Y. Shin (2003), "Testing for Unit Roots in Heterogeneous Panels," *Journal of Econometrics*, 115(1), 53-74.

John, R. (2018), "Oil-Price Migration Nexus in India," *South Asia Research,* 38(1), 75-91.

Kadozi, E. (2019). "Remittance Inflows and Economic Growth in Rwanda," *Research in Globalization,* 1, 1-15.

Karaman-Orsal, D.D (2008), "Comparison of Panel Cointegration Tests," *Economic Bulletin,* 3(6), 1-20.

Khodeir, A.N. (2015), "Migration Remittances Inflows and Macroeconomic Shocks: The Case of Egypt," *International Journal of Economics and Financial Issues,* 5(4), 1001-1010.

Le, T. (2011), "Remittances for Economic Development: The Investment Perspective," *Economic Modelling*, 28(6), 2409-2415.

Levin, A., C.F. Lin and C.S. Chu (2002), "Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties," *Journal of Econometrics*, 108(1), 1-24.

Levine, R (2005), "Finance and Growth: Theory and Evidence," in P. Aghion and S. Durlauf (Eds.), *Handbook of Economic Growth,* Amsterdam: Elsevier Science.

Lueth, E. and M. Ruiz-Arranz (2006). "A Gravity Model of Workers' Remittances," Working Paper 06/290, International Monetary Fund.

Maddala, G.S. and S. Wu (1999), "A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test," *Oxford Bulletin of Economics and Statistics*, 61(1), 631-652.

Makhlouf, F. and K. Kasmaoui (2018), "The Impact of Oil Price on Remittances: The Case of Morocco," *Journal of Energy and Development*, 43(1/2), 293-310.

Mallick, H. (2017). "Determinants of Workers' Remittances: An Empirical Investigation for a Panel of Eleven Developing Asian Economies," *World Economy*, 40(12), 2875-2900.

McCoy, A., M. Nziramasanga and J. Yoder (2007), "An Empirical Examination of the Factors Affecting Remittance by Mexican Migrants in the United States," American Agricultural Economics Association Annual Meeting, Portland, OR, 29.

Mohaddes, K. and M. Raissi (2013), "Oil Prices, External Income, and Growth: Lessons from Jordan," *Review of Middle East Economics and Finance*, 9(2), 99-131.

Morshed, A.K.M. and B.A. Pitafi (2008), "Oil Prices and Remittances: Impacts of Oil Price Shocks on the Macroeconomy of A Small, Oil Importing, and Labor Exporting Country," (2008), Discussion Papers No.59, Southern Illinois University Carbondale.

Naufal, G.S. and A. Termos (2009), "The Responsiveness of Remittances to Price of Oil: The Case of the GCC," *OPEC Energy Review,* 33(3-4), 184-197.

Neftci, S., (1984). "Are Economic Time Series Asymmetric Over the Business Cycle?" *Journal of Political Economy,* 92(2), 307-328.

Niimi, Y., T.H. Pham and B. Reily (2009), "Determinants of Remittances: Recent Evidence Using Data on Internal Migrants in Vietnam," *Asian Economic Journal*, 23(1), 19-39.

Nusair, S.A. (2020), "The Asymmetric Effects of Oil Price Changes on Unemployment: Evidence from Canada and the U.S.," *Journal of Economic Asymmetries,* 21, 200153, 1-13.

Nusair, S.A., (2016), "The Effects of Oil Price Shocks on the Economies of the Gulf Co-Operation Council Countries: Nonlinear Analysis," *Energy Policy*, 91, 256-267.

Nyamongo, E.M. and R.N. Misati (2011), "Remittances and Banking Sector Development in Sub-Saharan Africa," Paper presented at the Global Development Forum, Dubai, United Arab Emirates, November.

Nyamongo, E.M., R.N. Misati., L. Kipyegon and L. Ndirangu (2012), "Remittances, financial Development and Economic Growth in Africa," *Journal of Economics and Business*, 64(3), 240-260.

Parvin, R, (2022), "Does a Nonlinear Nexus between Crude Oil Prices, Exchange Rates, Inflation, and Bangladesh's Performance of Remittances?" *AIP Conference*, 26(1).

Olayungbo, D.O. and A. Quadri (2019), "Remittances, Financial Development and Economic Growth in Sub-Saharan African Countries: Evidence from PMG-ARDL

Approach," *Financial Innovation,* 5(9), 2-25.

Pedroni, P., (1999), "Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors," *Oxford Bulletin of Economics and Statistics,* 61(1), 653-670.

_____ (2004), "Panel Cointegration: Asymptotic and Finite Sample Properties of Pooled Time Series Tests with an Application to the PPP Hypothesis," *Econometric Theory*, 20(3), 597-625.

Pew Research Center (2018), *At Least a Million Sub-Saharan Africans Moved to Europe Since 2010.*

Rafiu, I.A., A. Aminu and A.O. Folawewo (2020), "Investigating the Relationship between Changes in Oil Prices and Unemployment Rate in Nigeria: Linear and Nonlinear Autoregressive Distributed Lag Approaches," *Future Business Journal,* 6(1), 1-18.

Ratha, D., K. Schuettler and S.R. Yousefi (2015), "Falling Oil Prices and Remittances from GCC Countries," in Devarajan, S. and Mottaghi, L. (Eds.), *Middle East and North Africa Quarterly Economic Brief, January 2015: Plunging Oil Prices,* World Bank, Washington, DC, p.26-28.

Ratha, S.D., E.J. Kim, S. Plaza,G. Seshan and N.D. Yameogo (2020), **"Phase II: COVID-19 Crisis through a Migration Lens,"** *Migration and Development Brief,* 33, World Bank.

Salisu, A.A. and K.O. Isah (2017), "Revisiting the Oil Price and Stock Market Nexus: A Nonlinear Panel ARDL Approach," *Economic Modelling*, 66(C), 258-271.

Sander, C. and S.M. Maimbo (2003), "Migrant Labor Remittances in Africa: Reducing Obstacles to Developmental Contributions," Africa Region Working Paper Series, Washington DC: World Bank.

Sasikumar, S.K. and P. Martin (2017), "New Era in India - Gulf Labour Migration," *Labor and Development,* 24(1), 1-13.

Schoumaker, B., M.L. Flahaux, D. Schans, C. Beauchemin, V. Mazzucato and P. Sakho (2015), "Changing Patterns of African Migration: A Comparative Analysis," in Beauchemin, C. (Eds.), *Migration between Africa and Europe: Trends, Factors and Effects*, New-York: Springer-Verlag and INED Population Studies Series.

Sek, S.K., (2017), "Impact of Oil Price Changes on Domestic Price Inflation at Disaggregated Levels: Evidence from Linear and Nonlinear ARDL Modelling," *Energy,* 130(C), 204-217.

Shah, M.M. S.Z. and H.A. Rehman (2022), "Impact of Oil Price on Remittances from GCC to Pakistan," *CEMJP*, 30(4), 1427-1414.

Shin, Y., B. Yu and M. Greenwood-Nimmo (2014), "Modelling Asymmetric Cointegration and Dynamic Multipliers in A Nonlinear ARDL Framework," in Horrace, W. and R. Sickles (Eds.), *Festschrift in Honor of Peter Schmidt*, 44, 281-314, Springer New York, New York, NY.

Shir, L (2022), "Asymmetric Effect of Fluctuating Oil Prices on Remittance Inflows to the Philippines," *Capitol Economics Review*, 2(1), 46-60.

Singh, B. (2012), "Shocks Affecting the Flow and Stability of Workers' Remittances to India," in Sirkeci, I., J.H. Cohen and R. Dilip, (Eds.), *Migration and Remittances During the Global Financial Crisis and Beyond*, p.107-120, World Bank, Washington, DC.

Singh, R.J., K. Lee and M. Haacker (2009), "Determinants of Macroeconomic Impact of Remittances in Sub-Saharan Africa," IMF Working Paper 09/216.

Snudden, S. (2018), "International Remittances, Migration, and Primary Commodities," *World Economy,* 41(11), 2934-2953.

Umair, M. and A. Waheed (2017), "What Drives Remittances from Saudi Arabia to Pakistan? Home Versus Host Country's Economic Conditions," *International Migration*, 55(4), 141-153.

Vacaflores, D.E (2018), "Beyond Altruism and Self-Interest: The Growing Importance of External Factors in the Determination of Remittances Flowing to Latin America," *International Economic Journal,* 32(2), 235-255.

Vargas Silva, C. (2006), "Portfolio Reasons for Homeownership: The Case of Immigrants," *Ecos de Economia*, 10(23), 74-86.

World Bank (2011), *Remittance Markets in Africa*, World Bank, Washington, DC.

_____ (2017), "Migration and Development Brief 27", Migration and Remittances: Recent Developments and Outlook Brief.

_____ (2019), *Leveraging Economic Migration for Development: A briefing for the World Bank Board*, World Bank, Washington, DC.

_____ (2020b), "Migration and Development Brief 33: COVID-19 Crisis Through a Migration Lens - October, 2020", World Bank, Washington, DC.

_____ (2020a), "Migration and Development Brief 32: COVID-19 Crisis Through a Migration Lens - April 2020," World Bank, Washington, DC.

Worlu, C.N. and N. Emeka (2012), "Tax Revenue and Economic Development in Nigeria: A Macroeconometric Approach," *Academic Journal of Interdisciplinary Studies*, 1(2), 211-23.

Zahran, M.S.A. (2023), "The Response of Remittances Inflows to Asymmetric Oil Price Shocks in Egypt," *Review of Economics and Political Science*, 8(6), 520-539.

Mailing Address: Akinlo Anthony Enisan, Department of Economics, Obafemi Awolowo University, Ile-Ife, Nigeria, E-mail: aakinlo@oauife.edu.ng