

## **Remittances and Economic growth in Sub Sahara African countries: A Pool Mean Group Approach**

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### **Abstract**

*The study investigated the impact of remittances on the economic growth of 29 Sub-Saharan African countries with Pooled Mean Group and Mean Group estimators under Autoregressive Distributive Lag (ARDL) model. Hausman test was used to determine which estimator is the most appropriate. The result of the PMG showed that remittance has a positive and insignificant impact on growth in the long run, while the error correction equation indicates that remittance has a negative impact on growth in the short run, foreign direct investment and capital formation contributes positively to growth both in the long run and short run.*

**Key words:** Remittances, Pooled Mean Group, Economic Growth, capital formation, and Sub-Saharan Africa

**JEL:** A12, C35, C32, E31, E37

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### **1.1 Introduction**

The demand for additional resources to compliment the developmental strides of most developing nations of the world has result to increase in flow of financial resources from developed countries to that of the developing countries. Remittance has remained the most stable source of foreign capital inflow as against FDI and Aids. Over the years the level of poverty and hardship in most of these developing nations fuels the need for citizens to migrate to a more developed nation for greener pasture. This however, is to enable them improve the quality of their life and that of their relations at the home country. And so, to achieve this, migrants

working abroad will have to remit their earnings to home country thereby improving the life of those in the receiving country.

Many researchers in different continent of the world have tried to empirically investigate the impact of remittance on the growth of the receiving country but came up with conflicting results. Many believe that remittances positively affect economic growth but differ in term of the channels through which remittances affect economic growth. Barajas et al. (2009) argued that remittances can affect economic growth positively by accelerating the rate of capital accumulation in the receiving country. Similarly, Giuliano and Ruiz-Arranz (2009) opined that remittances positively impact economic growth by improving the financial sector development. Ramey and Ramey (1995) noted that since remittances exhibit lower volatility as against other foreign capital inflows like foreign direct investment and portfolio investments, it may result to a positive impact of remittances on economic growth as it will reduce volatility given changes in the economic realities. Bayar (2015) asserts that remittances may impact positively on the rate of economic growth by stimulating aggregate demand. He also noted that since this can result to increased importation, the net effect of the increase in the aggregate demand occasioned by remittances becomes vague.

There are others who argue that remittances negatively impact economic growth. Among those that believe that remittance impact negatively on economic growth is Lopez at al. (2007) who noted that exchange rate appreciation is one of the channels through which remittances impact negatively on economic growth. They argued that exchange rate appreciation may decrease the competitiveness of the domestic economy and thereby reducing export and increasing import. Nyamongo et al. (2012) opined that remittances affect economic growth negatively due to information asymmetry. This arises due to the fact that the remitter does not know where and how the recipient uses the remittances. And so, the recipient may not employ the remittance in productive investment activity, instead the recipients sees the remittances as an alternative to labour income and hence they increase their leisuretime and this affect economic activities negatively.

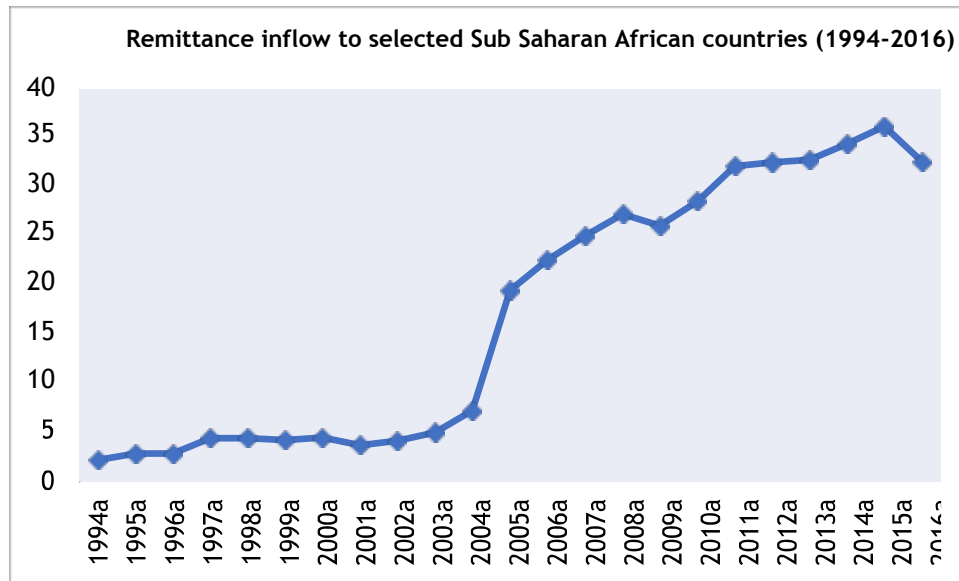
Various studies have tried to investigate the impact of foreign capital inflow on economic growth in Sub-Saharan African countries but relatively very few studies have looked at the impact of remittances alone on economic growth of Sub-Saharan African countries. It is against this

background that this study seeks to evaluate the impact of remittances on economic growth of the sampled countries in SSA during the period of 1994-2016 by employing PMG estimator under ARDL model. The rest of the study is organized as follows: the next section 2 introduces the trend of remittances in SSA countries with their main specifics. In Section 3 we introduce our dataset and variables. Section 4 discusses the applied methods in detail. In section 5 we test our hypothesis, summarize key findings and discuss further research opportunities. Finally, section 6 concludes the paper and states final remarks.

## 2. Theoretical Background

Across the world, the personal remittances received through official channel amounted to about 536.989 billion US dollars in the year 2016, while the amount of remittances that entered Sub-Saharan Africa (SSA) for the same period amounted to about 37.20006 billion US dollars and this however, represent a total of approximately 7% of the global remittance flows in 2016. The flow of remittances into SSA has followed an increasing trend over the last five decades, with Nigeria standing as one of the major recipient of remittances in SSA. Out of a total of 37.20006 billion US dollars that flowed into SSA, about 19.6 billion US dollars was received in Nigeria in 2016. This represents a total of about 52.78% of the total remittance inflow to SSA in 2016 and 3.67% in the entire globe thus making Nigeria one of the major recipients of remittances in the world.

Figure 1 Remittance inflow to selected Sub Saharan African countries (1994-2016)



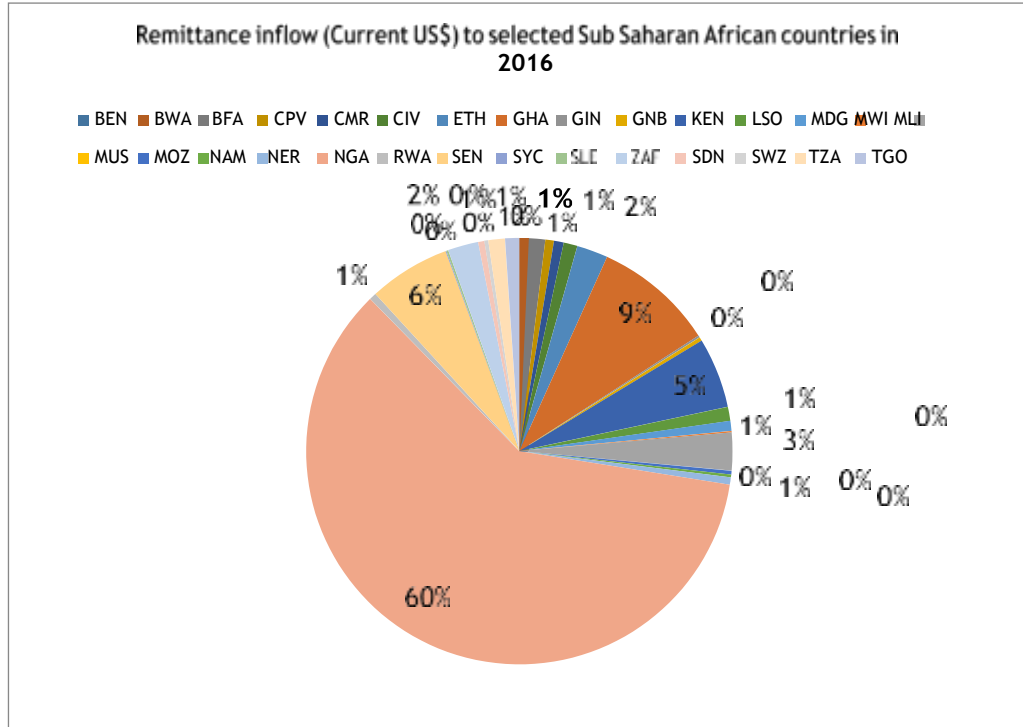
The volume of personal remittances that flowed to SSA countries has continued to witness an upward trend as shown in figure 1 above. From 1994 to 2004 the flow of personal remittances increased from 2.23274<sup>a</sup> billion US\$ to 7.262003<sup>b</sup> billion US\$ respectively and this represent a total of about 225.25% increase. The continent continued to receive significant inflow of remittances that from 2005 to 2015 a total of 19.56227 billion US\$ and 36.27182 billion US\$ respectively was received representing an increase of about 85.42% within a period of 11 years. The inflow of remittances in the continent declined in 2016 from 36.27182 billion US\$ in 2015 to 32.64738 billion US dollars. Even with decline the continent was considered to have received significant inflow of remittances and it still represented a total of 7% of the global flows of remittances.

**Table 1**

<b>Remittance inflow (Current US\$million) to selected Sub Saharan African countries in 2016</b>							
Benin	207.0751	Mauritius	1.294258	Guinea	52.17078	Sierra Leone	48.16369
Botswana	24.62251	Mozambique	93.37269	Guinea-Biss	93.27819	South Afri	755.434
Burkina Faso	405.6754	Namibia	66.47871	Kenya	1744.639	Sudan	153.4115
Cape Verde	212.0651	Niger	181.6368	Lesotho	343.6558	Swaziland	98.42104
Cameroon	241.6098	Nigeria	19635.57	Madagascar	250.4663	Tanzania	411.2264
Cote d'Ivoire	341.963	Rwanda	172.5188	Malawi	34.44282	Togo	351.2333
Ethiopia	772.2359	Senegal	2015.863	Mali	936.8297	Ghana	2979.934
Seychelles	22.08702						

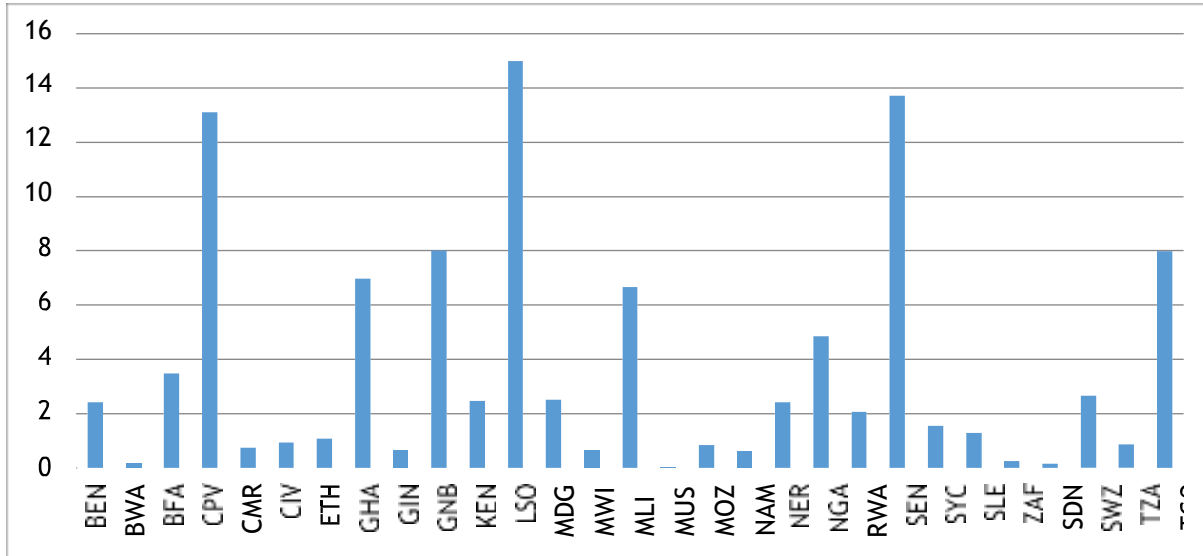
Source: World Bank Data Base

**Figure 2**



From figure 2 above 60% of the total remittances inflow to SSA were received in Nigeria, making the country the largest recipient of remittances in the continent for the year 2016 with a total of 19.64 billion US\$, this was followed by Ghana with a total of 2.98 billion US\$ representing a total of 9% of the aggregate inflow of remittances in the continent for 2016. Senegal is the third largest recipient of remittances in the year 2016 with a total of 2.02 billion US\$ amounting to 6% of the total remittance inflow among the selected countries in the continent. Apart from Mali, Ethiopia, and South Africa that received 3%, 2%, and 2% respectively for the year 2016, the rest of the selected countries in SSA received remittances inflow of 1% or less than one percent of the total inflow to the continent.

**Figure.3 Remittance inflow (as %GDP) to selected Sub Saharan African countries in 2016**



The inflow of remittances as a percentage of GDP as shown in figure 3 above indicates that Lesotho has the highest remittances inflow as a percentage of GDP with 14.998% of their GDP received as remittances in the year 2016. This was followed by Cape Verde and Senegal which received a total of 13.110% and 13.728% respectively of their GDP as remittances in the year 2016. Similarly, Ghana, Guinea-Bissau, and Togo also received an average of 6.98%, 8% and 7.98% respectively of their GDP as remittance inflow in the year 2016. Apart from Mali and Nigeria which also received up to 6.67% and 4.85% respectively of their GDP as remittances, the rest of the countries under review received remittances as a percentage of GDP that ranges between 3% to less than 1% in the year 2016.

## 2.1 Positive effect of Remittances on Economic Growth

Various researchers have investigated the effect of remittances on economic growth and ended with various conclusions. Among those that are of the opinion that remittances contribute positively to the growth of the economy are discussed below. Rehman and Ahmad (2016) investigated the impact of foreign capital inflow on economic growth of 21 developing countries for the period of 1990 to 2013 employing Pool Mean Group estimation technique and found that remittances and FDI have a positive and significant impact on economic growth in the long run among the countries under consideration. External debt and ODA was shown to have a negative and significant impact on economic growth. Yaseen (2012) in a study of Middle East and North African(MENA) countries for a period of 2000-2010 employing Fixed Effect model indicates that remittance inflows has a positive and significant impact on economic growth for the period

under consideration. Pradhan et al. (2008) employing a panel data of 39 developing countries for the period of 1980 to 2004 examined the impact of remittances on economic growth using panel regression found that remittance contributes positively to economic growth. Fayissa and Nsiah (2010) studied the impact of remittances on economic growth and development among 36 countries in Africa for a period of 1980-2004 using a panel regression analysis, the result indicates that remittances exert positive and significant effect on economic growth of the countries under study. Giuliano and Ruiz-Arranz (2009), looked at remittances, financial development and economic growth of 100 developing countries for the period of 1975-2002, using panel regression model they opined that remittances has a positive impact on the economic growth of the selected countries. Nyamongo et al. (2012) in a similar study also looked at remittances, financial development and economic growth among 36 African countries for the period of 1980-2009. Adopting panel regression model, they opined that remittances has a positive and significant impact on economic growth.

In a study of South Asian countries, Cooray (2012) investigated the impact of remittances on economic growth using panel data analysis, the result indicates that remittances has a positive and significant impact on economic growth. However, Ramirez (2013) investigated the role of financial and institutional variables in enhancing the impact of remittances on economic growth of Latin America and the Caribbean, adopting a panel cointegration and FMOLS method, the result indicates that there is a positive and significant impact between remittances and economic growth. Nsiah and Fayissa (2013) examined the impact of remittances on economic growth in Africa, Asia, and Latin American-Caribbean countries for a period of 1982-2007, employing a panel cointegration analysis and FMOLS on a sample of 64 countries and found that remittances contributed positively and significantly to economic growth among the countries under study. Nwaogu and Ryan (2015) in a similar study concluded that remittances positively and significantly impact on the economic growth of 54 African countries and 34 Latin American and Caribbean countries included in their study. Salahuddin (2013), Salahuddin and Gow (2015) in a separate study investigated the link between remittances and economic growth in Bangladesh, India, Pakistan and the Philippines employing panel cointegration test and pooled mean group (PMG) regression and concluded that remittances contributes positively to the economic growth of the selected countries. Senbeta (2013) investigated the effect of remittances and capital accumulation of 50 countries for a period of 1970-2004 using panel regression analysis, the

result indicates that there is a positive and significant impact between remittances and capital accumulation of the selected countries. Zizi (2014) and Imai et al (2014) in a separate study looked at the link between remittances and economic growth of Central and Eastern European countries, as well as 24 Asia and Pacific countries respectively and concluded that remittances contributes positively to economic growth of the selected countries.

Javid et al (2012) examined the impact of remittances on economic growth and poverty reduction of Pakistan economy for the period of 1973 to 2010 through the instrumentality of ARDL model and found that remittances has a positive and significant impact on economic growth. They also noted that remittances contribute significantly to poverty reduction in the economy. Hussain and Anjum (2014) for the same economy showed that remittances have a positive and significant impact on economic growth. Similarly, Kumar (2013) also adopted ARDL cointegration model to analyze the impact of remittances on the economic growth of Guyana economy for the period of 1982-2010 and opined that remittances has a positive and significant impact on economic growth. Meyer and Shera (2016) examined the impact of remittances on economic growth of six high remittances receiving countries, Albania, Bulgaria, Macedonia, Moldova, Romania and Bosnia Herzegovina during the period 1999–2013 using fixed and random effect model and the result indicates that remittances has positive significant impact on the economic growth.

## **2.2 Negative effect of Remittances on Economic Growth**

Shafiq et al (2012) in a study that examined the role of foreign remittances and economic growth in poverty alleviation in Pakistan adopted VECM so as to capture the long run and short run relationship, and found that remittances and economic growth has a negative impact on poverty alleviation in the long run. Karagoz (2009) investigated the impact of workers' remittances on economic growth of Turkey employing OLS regression model on a data range of 1970-2005 and found that remittances inflow has a negative and significant impact on economic growth of Turkey for the period under study. Barajas et al. (2009) investigated the effect of remittances on economic growth of 84 countries for a period of 1970-2004 adopting panel regression analysis and concluded that remittances negatively impact on economic growth of the countries under study. Nkoro and Furo (2012) investigated the relationship between foreign capital inflows and economic growth in Nigeria and found that remittance which is one of the components of capital inflow has a negative and significant impact on the economic growth in Nigeria. They also found



that FDI and Foreign aid has a positive impact on economic growth in Nigeria. External debt which was also included in their model as one of the component of foreign inflows was shown to have a negative effect on economic growth. Akpan et al (2014) using dataset from 1970-2012 examined the relationship between remittances and agricultural productivity indicators in Nigeria and the result showed that there is no significant relationship between remittances and agricultural GDP, agricultural productivity index and crop productivity index for the period under study. Iheonu et al. (2017) investigated the impact of capital inflow on economic growth of Sub Saharan African countries for a period of 1985-2015 employing Pooled Mean Group (PMG) estimation technique, the result showed that remittances and FDI which are components of capital inflow has negative and significant impact on economic growth, while foreign aid was shown to have a positive impact on economic growth. Tolcha and Rao (2016) examined the impact of remittances on economic growth of Ethiopia for the period of 1981-2012 through the instrumentality of ARDL model and found that in the long run remittances has a negative and significant impact on economic growth.

### **2.3 Causal Relationship between Remittances and Economic Growth**

Baryar (2015) examined the causal relationship between remittances and economic growth of transnational economies of the European Union for the period of 1996-2013, employing Dumitrescu and Hurlin (2012) causality test revealed that there is a unidirectional causality between remittances and growth with causation running from remittances to economic growth at one lag. The result also showed that there is a unidirectional causation between FDI and Economic growth with Growth running from FDI to economic growth at both two and three lags. Sami (2013) employed Vector Error Correction Model (VECM) and Toda Yamamoto (1995) Granger Non Causality test in examining the casual relationship between remittance, Banking Sector Development and economic growth in Fiji for the period of 1980-2010 and found that remittance inflow Granger causes banking sector development and not the other way round. The result also indicates that there is no causation between remittances and economic growth in Fiji for the period under study. Harsha (2014) opined that there is a positive direct and indirect relationship between workers remittances and economic growth in Sri Lanka economy in the long run. He also noted that in the short run, causation runs between remittances and economic growth either directly or indirectly. Different researchers in different continent of the world have

investigated the direction of causation between remittance and economic growth and came up with various conclusions. Siddique et al. (2012), Olubiyi (2014), Nyeadi and Atiga (2014), in their separate study concluded that there is a unidirectional causality between remittances and economic growth with causation running from remittances to economic growth. Meanwhile in an independent research work, Jouini (2015), Kumar and Stauvermann (2014), Kumar and Vu (2014) and Siddique et al. (2012) opined that there is bidirectional causality between remittances and economic growth with causation running to both directions. On the other hand Rao and Hassan (2011), Lim and Simmons (2015), and Ahamada and Coulibaly (2013) concluded that there is no directional causation between remittances and economic growth among the countries under study.

### 3. Dataset and Variables

The data used in this research comes exclusively from the World Bank Database. The dataset comprises of annual GDP growth rate, Personal Remittances, Foreign Direct Investment, Gross Fixed Capital Formation, and External Debt all as a percentage of GDP.

**Table 2 Variables descriptions**

Variables	Descriptions	Expected sign	Source
Growth	Annual GDP growth rate		World Bank (2017)
REMTG	Personal Remittances inflow as % of GDP	+	World Bank (2017)
FDIG	Foreign Direct Investment as % of GDP	+	World Bank (2017)
GFCFG	Gross Fixed Capital Formation as % of GDP	+	World Bank (2017)
EXDG	External Debt Stock as % of GDP	+	World Bank (2017)

Source: Authors' presentation

**Table 3 List of Countries in the Dataset**

Benin	Cote d'Ivoire	Namibia	Guinea	Malawi	Swaziland
Botswana	Ethiopia	Niger	Guinea-Biss	Mali	Tanzania
Burkina Faso	Seychelles	Nigeria	Kenya	Sierra Leone	Togo
Cape Verde	Mauritius	Rwanda	Lesotho	South Afri	Ghana
Cameroon	Mozambique	Senegal	Madagascar	Sudan	*

\*Other countries were left out because of non-availability of data on them.

### 4. Methodology

#### Test for Unit Roots



And so, the MG estimators for the entire countries in the panel will be given as:

$$I = \frac{1}{N} \sum_{i=1}^N K_i \dots \dots \dots (3)$$

$$N = \frac{1}{N} \sum_{i=1}^N K_i \dots \dots \dots (4)$$

The MG estimator which estimates separate regression for each of the individual countries in the group and also calculate the coefficient of the long run by taking the unweighted mean of the estimated coefficient of the individual countries in the group is represented in the above equation. And so, the MG estimator does not apply any restriction in the long run coefficient. It therefore allows for heterogeneity of the coefficient in both the long run and short run. Meanwhile it is important to note that large series dimension of the data is one of the necessary condition for the consistency and validity of the MG and PMG approach this is applied in this study which is met by large set of data generated for this study.

The next step is to estimate the PMG model which involves both pooling and averaging and allows for homogeneous long run coefficient and heterogeneous short long run coefficient. Following the ARDL model in equation 1 above, and assuming one as the optimal lag length, we restate the error correction form of the equation as follows:

$$\Delta Y_t = \alpha(Y_t - \beta X_t) + \sum_{i=1}^p \delta_i \Delta Y_{t-i} + \sum_{j=1}^q \gamma_j \Delta X_{t-j} + \epsilon_t$$

Where

Y= Growth,

X= Vector of Independent Variables (REMTG,FDIG,GFCFG,EXDG)

$\gamma$  and  $\delta$  = short run coefficient of the dependent and independent variables respectively.

$\beta$  = the long run coefficient

$\theta$  = the error correction coefficient (this parameter is expected to be significantly negative to alien with the assumption that the variables will return to long run equilibrium given any level of disequilibrium in the short run).

$i$  and  $t$  = country and time dimensions respectively.

$\mu$  =group specific effect.

Meanwhile, having estimated the PMG and MG model, Hausman test was employed to determine which of the two model is the most consistent and suitable model in establishing the impact of remittance on economic growth in SSA countries.

#### 4.1 Data presentation and Analysis of Result

The analysis of the data began with a test for stationarity in other to determine the order of integration of the variables which were included in the model. This is imperative due to the fact that it enable us meet the minimum necessary condition for running an ARDL model. To be able to apply the ARDL model the variables in the model must all be integrated of either order zero or one i.e.I(0) or I(1). Unlike other long run models which expect all the variables to be integrated of order one in other for the model to yield a consistent result, ARDL model produces a consistent result with I(0) and I(1) variable. The result of the panel unit root test is presented thus:

**Table 4: Panel Unit Root Test Result**

		Growth	REMTG	FDIG	GFCFG	EXDG
LLC	Level	-11.105*	-3.2703*	-6.0163*	-0.40128	0.68748
	1st Diff	-	-	-	-15.062*	-14.4036*
Order of integration		I(0)	I(0)	I(0)	I(1)	1(1)
IPS	Level	-13.969*	-3.5809*	-8.786*	-2.0445**	0.6798
	1st Diff	-	-	-	-	-12.6079*
Order of integration		I(0)	I(0)	I(0)	I(0)	1(1)
ADF-FCS	Level	270.50*	101.32*	184.37*	80.215**	44.5628
	1st Diff	-	-	-	-	226.984*
Order of integration		I(0)	I(0)	I(0)	I(0)	1(1)
PP-FCS	Level	560.95*	79.017*	176.91*	57.1606	33.1356
	1st Diff	-	-	-	342.303*	256.065*
Order of integration		I(0)	I(0)	I(0)	I(1)	1(1)
Breitung	Level	-8.3063*	-0.61736	-4.8077*	0.410511	1.07538
	1st Diff	-	-11.544*	-	-2.20146**	-10.6926*

Order of integration	I(0)	I(1)	I(0)	I(1)	I(1)
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Source: Authors computation, (Note: the above test was conducted under the assumption of intercept and trend. The values presented above are that of t-statistics. \*,\*\* denotes significant at 1% and 5% respectively).

The result of the panel unit root presented in table 4 above indicates that Growth and FDIG variables are I(0) in all the five different techniques employed. Four out of the five test indicates that REMTG variable is integrated of order zero with only Breitung test indication I(1). And so, based on the popularity of the result, we conclude that REMTG variable is I(0). The result also showed that GFCFG variable is I(1) among three of the five techniques while two of the techniques namely Augmented Dickey Fuller- Fisher Chi-square (ADF-FCS) and Philip Peron-Fisher Chi-square (PP-FCS) tests showed that the variable is I(0). We also relied on the popularity of the result to conclude that variable is I(1). The result of variable EXDG indicates that in all the method employed the variable is integrated of order one. This however, suggests that GFCFG and EXDG are I(1) while Growth, FDIG and REMTG are I(0). The result is consistent with the necessary condition for the application of ARDL model which allows for the inclusion of variables with I(0) and I(1) levels of integration in the long run model.

**Table 5: PMG and MG Result**

Dependent Variable:	PMG	MG
Growth		
Independent Variables	Long Run Coefficients	
REMTG	0.0104201 (0.30)	1.547172(2.28)**
FDIG	0.0224142 (0.79)	-0.0785185(0.48)
GFCFG	0.0410882(2.54)**	0.1232956(1.71)***
EXDG	-0.009353(-1.89)***	0.0379583(0.66)
	Short Run Coefficients	
ECT	-0.884859 (-17.04)*	-1.065982(-23.34)*
D(REMTG)	-1.202052(-2.05)**	-1.778775(-2.59)**
D(FDIG)	0.0614322(0.71)	0.1958635(1.34)
D(GFCFG)	0.0881899(1.21)	-0.0132496(-0.15)
D(EXDG)	-0.1578694(-2.44)**	-0.182009(-2.66)**
Cons	3.522541(10.48)*	2.153982(1.43)

Number of Observation	638
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Source: Authors' computation. Note: 1)\*,\*\*,and\*\*\* indicates significant at 1%, 5% and 10% respectively 2) the values in parenthesis are z-statistics,

The result of PMG and MG estimator presented in table 5 showed a variant result between the two estimators. The result of the PMG indicates that in the long run, remittances contribute positively to economic growth in SSA, though the effect is shown to be statistically insignificant judging by the value of the z-statistics. This result suggests that 1% increase in remittances will result to about 0.01% increase in growth. The MG estimator on the other hand, indicates that in the long run, remittances have a positive and statistical significant impact on the economic growth of SSA countries, suggesting that 1% increase in remittances will lead to about 1.55% increase in economic growth. The result of both the PMG and MG shows evidence of positive association between remittances and growth. The long run result produced by PMG also indicates that foreign direct investment has a positive but insignificant effect on the level of growth in SSA countries; this result ran contrary to the findings presented by the MG estimator which showed that in the long run, foreign direct investment has a negative and insignificant effect on the economic growth of SSA countries. The long run coefficient of capital formation for both the PMG and MG models indicates that capital formation have positive and significant impact on the economic growth of SSA countries. The result shows that External debt has a negative impact on economic growth in the long run using PMG estimator but under the MG estimator external debt was shown to have a positive impact on the economic growth of SSA countries.

The result of the short run dynamics indicates that the coefficient of error correction term is negative and statistically significant in both the PMG and MG estimation. This however suggests that any disequilibrium in the short run will be corrected in the long run. The result of PMG and MG also implies that 0.88% and 1.06% respectively of the disequilibrium in the short run will be corrected in the long run, meaning that the speed of adjustment is higher in that of MG model as against the PMG.

Contrary to the result of the long run in both PMG and MG the coefficient of remittances indicates that in the short run remittances has a positive and significant impact on the growth of SSA countries' economy. The PMG result indicate that foreign direct investment and capital formation in the short run has a positive and insignificant impact on economic growth, while external debt in the short run showed negative and statistically significant impact on economic

growth for both the PMG and MG model. The result of the MG estimation showed that foreign direct investment impact positively on growth in the short run while capital formation impacts negatively on economic growth.

The PMG techniques assume homogeneity of the long run coefficient and this assumption cannot be validated before estimation, and on these bases it becomes important to conduct a post estimation test. Meanwhile to test for the validity of this assumption, Hausman test was conducted and the rule is that if the long run homogeneity assumption holds then PMG is preferred over the MG model, but if the assumption cannot hold, then MG becomes the most appropriate model that will produce consistent result. The result of the Hausman test indicates that the assumption of long run homogeneity holds for the selected SSA countries and based on this we adopted PMG as the most consistent and appropriate model.

The inflow of remittance into SSA countries contributes positively to the economic growth of the region in the long run as shown in the PMG result presented above; suggesting that increase in remittances inflow into the region will accelerate economic growth. This result corroborated the findings of other researchers (Ramirez (2013), Nsiah and Fayissa (2013), Giuliano and Ruiz-Arranz (2009), Fayissa and Nsiah (2010)) who in separate studies of different continents concluded that remittances has a positive impact on economic growth using different panel data methodologies. On the other hand, the result is contrary to the findings Barajas et al. (2009), Karagoz (2009), Shafiq et al (2012), Tolcha and Rao (2016) who in their study opined that remittances contributes negatively to economic growth.

## **5 Conclusion**

Various researchers in the past have extensively examined the impact of remittance on economic growth but the result of their study are to some extent not reliable, owing to the short span of data employed or the issue of wrong specification of models and misapplication of techniques. To avoid this pit fall, this study employed significant large data span, adopted and effectively employed the panel ARDL model in evaluating the impact of remittances on economic growth Sub-Saharan African countries for the of 1994 to 2016. The analysis began with a unit root test in other to establish the order of integration among the variable, the result of the panel unit root



test showed that growth, remittances, and foreign direct investment are  $I(0)$ , while capital formation, and external debt are  $I(1)$ .

Furthermore, the study employed PMG and MG estimator under ARDL model and established that there is strong positive evidence between remittances and economic growth in Sub-Saharan African countries. We also applied Hausman test in determining the most consistent and valid estimator among the PMG and MG, and the result of the Hausman test indicates that PMG is the most appropriate model. Based on the result of the PMG model, we concluded that remittances contribute positively to economic growth of Sub-Saharan African countries, though the effect is shown to be statistically insignificant.

Meanwhile, the continent has been attracting significant inflow of remittances up until 2016; more than 60 percent of the inflow of remittance into the continent is concentrated in few countries like Nigeria, Ghana, Senegal and Kenya. And so, to enhance the effect of remittances in the region, policies that will lead to financial system development should be put in place by these countries to enhance free flow of remittances into their domestic economy, this is important because sound financial infrastructure are necessary to effectively channel the positive effect of remittances on growth in Sub-Saharan African countries. Although it has been argued that even spending cash remittances on consumption will still contribute positively to economic growth, we recommend that recipients should invest in productive sector of the economy if the effect of remittances is to be significant in improving economic growth.

Efforts should be made by various government of the continent to ensure that illegal migration from the continent to other parts of the world should be minimized so as to reduce the incidence of forced labour without commensurate compensation among most of the migrants from the continent. Effective exchange rate policies should be adopted by different countries to ensure stable exchange rate, as the effect of remittances on economic growth is affected significantly by the state of exchange rate. Lopez et al. (2007) opined that remittances may have negative effect on economic growth due to exchange rate appreciation.

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## APPENDIX

Figure 1 Remittance inflow to selected Sub Saharan African countries (1994-2016)

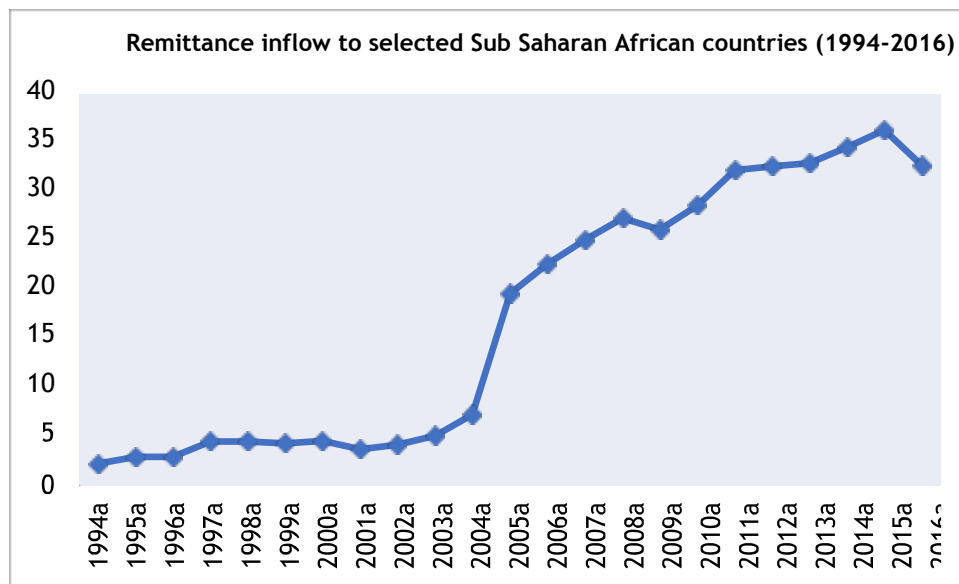


Figure 2

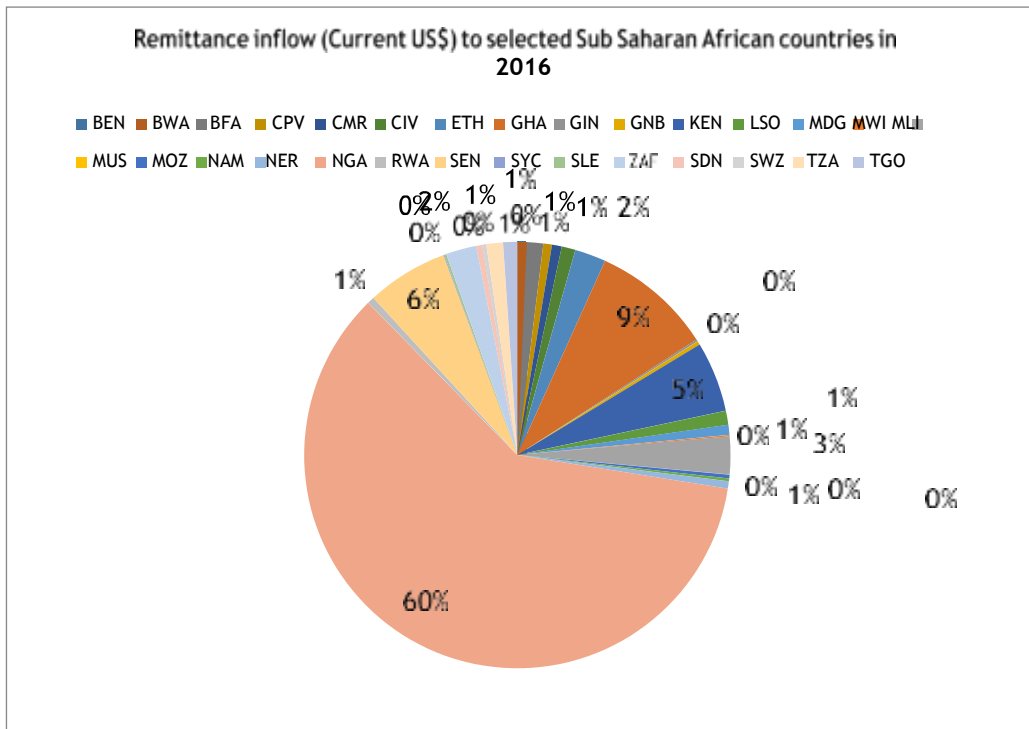
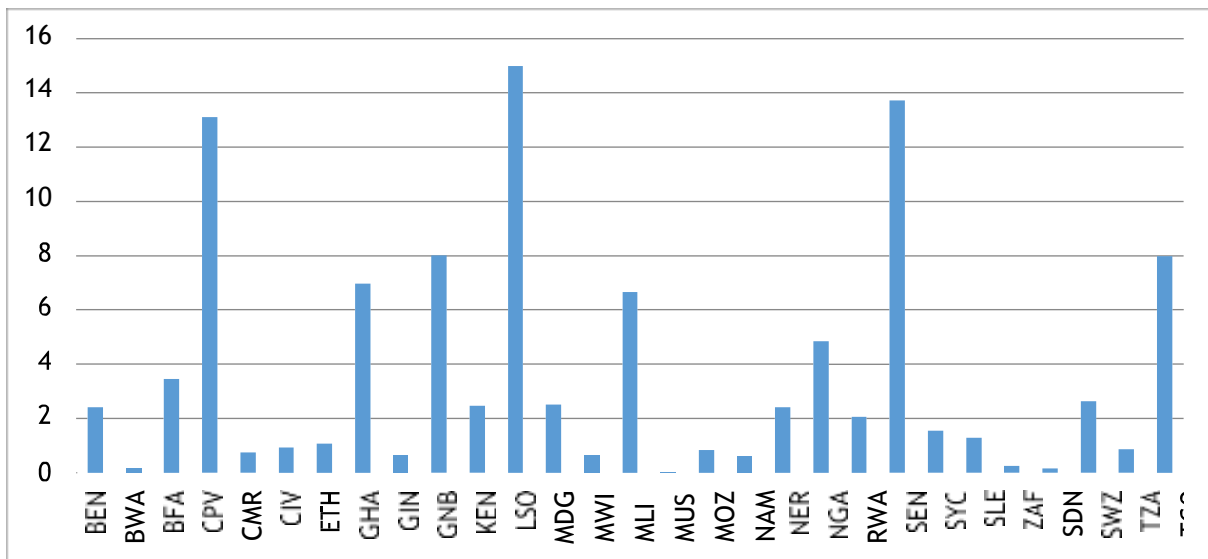


Figure 3 Remittance inflow (as %GDP) to selected Sub Saharan African countries in 2016



**Table 1**

Remittance inflow (Current US\$million) to selected Sub Saharan African countries in 2016							
Benin	207.0751	Mauritius	1.294258	Guinea	52.17078	Sierra Leone	48.16369
Botswana	24.62251	Mozambique	93.37269	Guinea-Biss	93.27819	South Afri	755.434
Burkina Faso	405.6754	Namibia	66.47871	Kenya	1744.639	Sudan	153.4115
Cape Verde	212.0651	Niger	181.6368	Lesotho	343.6558	Swaziland	98.42104
Cameroon	241.6098	Nigeria	19635.57	Madagascar	250.4663	Tanzania	411.2264
Cote d'Ivoire	341.963	Rwanda	172.5188	Malawi	34.44282	Togo	351.2333
Ethiopia	772.2359	Senegal	2015.863	Mali	936.8297	Ghana	2979.934
Seychelles	22.08702						

Source: World Bank Data Base

**Table 2 Variables descriptions**

Variables	Descriptions	Expected sign	Source
Growth	Annual GDP growth rate		World Bank (2017)
REMTG	Personal Remittances inflow as % of GDP	+	World Bank (2017)
FDIG	Foreign Direct Investment as % of GDP	+	World Bank (2017)
GFCFG	Gross Fixed Capital Formation as % of GDP	+	World Bank (2017)
EXDG	External Debt Stock as % of GDP	+	World Bank (2017)

Source: Authors' presentation

**Table 3 List of Countries in the Dataset**

Benin	Cote d'Ivoire	Namibia	Guinea	Malawi	Swaziland
Botswana	Ethiopia	Niger	Guinea-Biss	Mali	Tanzania
Burkina Faso	Seychelles	Nigeria	Kenya	Sierra Leone	Togo
Cape Verde	Mauritius	Rwanda	Lesotho	South Afri	Ghana
Cameroon	Mozambique	Senegal	Madagascar	Sudan	*

\*Other countries were left out because of non-availability of data on them.

**Table 4: Panel Unit Root Test Result**

		Growth	REMTG	FDIG	GFCFG	EXDG
LLC	Level	-11.105*	-3.2703*	-6.0163*	-0.40128	0.68748
	1st Diff	-	-	-	-15.062*	-14.4036*
Order of integration		I(0)	I(0)	I(0)	I(1)	I(1)

IPS	Level	-13.969*	-3.5809*	-8.786*	-2.0445**	0.6798
	1st Diff	-	-	-	-	-12.6079*
Order of integration		I(0)	I(0)	I(0)	I(0)	1(1)
ADF-FCS	Level	270.50*	101.32*	184.37*	80.215**	44.5628
	1st Diff	-	-	-	-	226.984*
Order of integration		I(0)	I(0)	I(0)	I(0)	1(1)
PP-FCS	Level	560.95*	79.017*	176.91*	57.1606	33.1356
	1st Diff	-	-	-	342.303*	256.065*
Order of integration		I(0)	I(0)	I(0)	I(1)	1(1)
Breitung	Level	-8.3063*	-0.61736	-4.8077*	0.410511	1.07538
	1st Diff	-	-11.544*	-	-2.20146**	-10.6926*
Order of integration		I(0)	I(1)	I(0)	I(1)	1(1)

Source: Authors computation, (Note: the above test was conducted under the assumption of intercept and trend. The values presented above are that of t-statistics. \*,\*\* denotes significant at 1% and 5% respectively).

**Table 5: PMG and MG Result**

Dependent Variable:	PMG	MG
Growth		
Independent Variables	Long Run Coefficients	
REMTG	0.0104201 (0.30)	1.547172(2.28)**
FDIG	0.0224142 (0.79)	-0.0785185(0.48)
GFCFG	0.0410882(2.54)**	0.1232956(1.71)***
EXDG	-0.009353(-1.89)***	0.0379583(0.66)
	Short Run Coefficients	
ECT	-0.884859 (-17.04)*	-1.065982(-23.34)*
D(REMTG)	-1.202052(-2.05)**	-1.778775(-2.59)**
D(FDIG)	0.0614322(0.71)	0.1958635(1.34)
D(GFCFG)	0.0881899(1.21)	-0.0132496(-0.15)
D(EXDG)	-0.1578694(-2.44)**	-0.182009(-2.66)**
Cons	3.522541(10.48)*	2.153982(1.43)
Number of Observation	638	

Source: Authors' computation. Note: 1)\*,\*\*,and\*\*\* indicates significant at 1%, 5% and 10% respectively 2) the values in parenthesis are z-statistics,