

THE IMPACT OF INTERNATIONAL REMITTANCES ON THE NIGERIAN ECONOMY

ABSTRACT

The study investigated the impact of international remittances on the Nigerian economy. The recent global surge in remittance flows and the twin consequences of migration and remittances on economic development have become contemporary topical issues. Thus the need to obtain evidence based information to drive policy formulation on the impact of remittances on the Nigerian economy. Following the behavioural pattern of the variables, we adopted Autoregressive Distributed Lagged model (ARDL) due to Pesaran and Shin (1999) in the study. The result of the Auto Regressive Distributed Lagged (ARDL) model showed that international remittance inflow has positive and significant impact on the Nigerian economy. It further showed that there is a long run relationship between international remittances and the Nigerian economy. The ADP test suggested that the series in the model are random walk processes in their level form. The CUSUM and CUSUMSQ tests showed evidence of long run stability of the parameters of the model.

Keywords: International Remittances, Economic growth, ARDL.

1.0 Introduction

Financial flows in most economies have complemented earnings from trade especially exports of goods and services, to finance economic development. These flows include foreign aid, foreign direct investment, foreign portfolio investments, overseas development assistance and workers' remittances. In the last three decades, developing economies witnessed massive migrant flows of both skilled and unskilled persons into developed economies, an aftermath of harsh economic reforms embarked upon by most depressed economies aimed at addressing the global recession of the early 1980s. These migrants have become the main source of huge worker's remittances into developing countries. According to the World Bank, in 2004 the flow of international remittances to developing countries surpassed 125 billion US dollars, and are growing at rates higher than 10% and in 2008 remittances sent to developing countries reached 300 billion US dollars. These have become the major source of income for many developing countries. Nigeria receives the highest amount of remittance in Africa (World Bank, 2004). The country receives about 65% of officially recorded remittance flow to the region and about 2% of global remittance flows (Orozco, 2003). Remittances inflows into the country has outpaced foreign direct investment (FDI), official development assistance (ODA) and other flows into the country and currently rank second to oil receipts as a foreign exchange earners (CBN, 2007).

Remittances are both financial and non-financial resources freely sent to migrant's households in the home countries. They have contributed immensely in financing domestic investments as well as providing home-keep funds for dependent relatives, thereby alleviating poverty in developing economies (CBN, 2008). According to the International Monetary Fund (IMF) Balance of Payment Manual 5 (BPM5), remittances is defined as that portion of international migrant workers' earnings sent home from the country of employment to the country of origin.

A growing academic literature has therefore been devoted to analyze the microeconomic and macroeconomic effects of remittances in developing countries across various dimensions (see Schiff and Ozden, 2006, 2007; Shahbaz et al, 2007). The effects of remittances on receiving countries seem enormous. At a microeconomic level, remittances have been found to boost investment in human capital and educational attainments, thereby reducing poverty in many developing countries. Furthermore, there is significant evidence that remittances increase not only consumption but tend also to raise health levels and to increase investment in public infrastructure. At a macroeconomic level, the existence of a positive relationship between remittances and

growth is more controversial. While remittances tend to favour the accumulation of important production factors such as physical capital and education, they also exert detrimental effects in terms of incentive. They also create 'Dutch disease' effects through the appreciation of domestic currencies, leading to further deindustrialization in the receiving country.

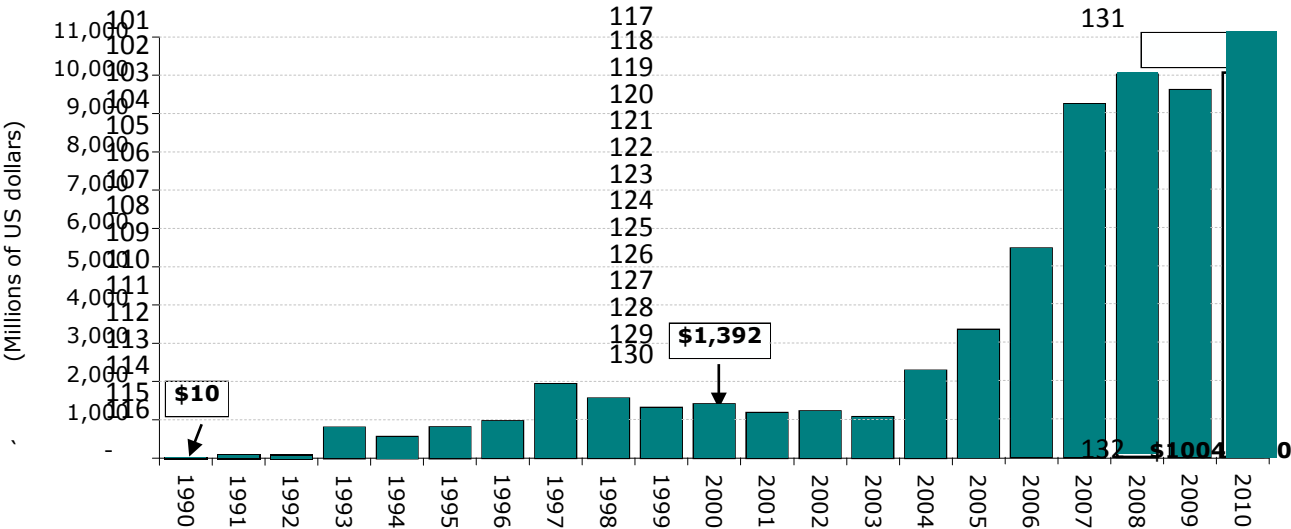
There is no general consensus on the impact of remittances on economic development as it appears somewhat ambiguous (Shahbaz et al, 2007). Hinojosa-Ojeda, (2003) argues that banking remittances recipients will help in multiplying the developmental impact of remittance flow (see also Terry and Wilson, (2005); and World Bank, (2006)). Two different studies by Guiliano and Ruiz-Arranz (2005) and Mundaca (2005) show that the impact of remittances on growth depends on the level of financial sector development in a country. However, these studies reached different conclusions. Guiliano and Ruiz-Arranz (2005) show that remittances help to promote growth in less financially developed countries, arguing that agents compensate for the lack of development of local financial markets using remittances to ease liquidity constraints and to channel resources towards productive uses that enhance economic growth. On the hand, Mundaca (2005) concludes that financial development leads to better use of remittances, thus boosting growth.

On one hand, well functioning financial markets having lower costs of transactions may help direct remittances yield the highest returns and therefore enhance financial sector development. On the other hand, remittances can also compensate for a bad financial system; by loosening liquidity constraints, potential entrepreneurs could use remittances whenever the financial system does not help them and start productive due to lack of collateral or because of high lending costs. This problem is mostly seen in developing countries where informal channels are more often efficient and cheaper than the formal sectors.

The diagram below shows formal remittances inflows to Nigeria between 1990 and 2010. It is very obvious that from 2003 to 2010, remittance inflows increased while from 1990 to 2002 there had been fluctuations in the flow of remittances to Nigeria. The volume of remittances into Nigeria has been on the increase for about a decade now. From a meagre \$1.8 billion in 1999, remittances inflow to the country increased to \$9.98 billion in 2008. This is second to oil receipts as the country's prime foreign exchange and in 2010 it increased by 4.2% (CBN, 2008; WDI, 2010). Remittances as a ratio of GDP out performed foreign direct investments, non-oil exports receipts and portfolio investments from 2004 to 2005 and in 2007. It grew from 5.8 in 2005 to 10.7 in 2007.

FIG 1 Formal Remittances Inflows: Nigerian Profile.

Source: World Development Indicators, World Bank, 2011.



The recent global surge in remittance flows and the twin consequences of migration and remittances on economic development have become contemporary topical issues. Against this backdrop, it becomes relevant to investigate the impact of international remittances on economic development using ARDL framework for Nigeria. The paper is organized as follows: section 2 reviews related literature, section 3 specifies the model, section 4 presents the empirical result and discussion, and section 5 is the conclusion and policy recommendations.

2.0 Literature Reviews

Giuliano and Ruiz-Arranz (2007) used a newly constructed cross-country data series for remittances covering a large number of developing countries over the period 1975-2002 and found that remittances have promoted growth in less financially developed countries. This finding controls for the endogeneity of remittances and financial development using SGMM approach and does not depend on the particular measure of financial sector development used, and is robust to a number of robustness tests. Their results suggested that remittances help alleviate credit constraints on the poor, substituting for the lack of financial development, improving the allocation of capital, and therefore accelerating economic growth. Their result further shows that there is an investment channel through which remittances can promote growth where the financial sector does not meet the credit needs of the population.

Demirgüç-Kunt *et al* (2010) use municipality-level data for Mexico for 2000, in one of the very few empirical studies on the relationship between remittances and financial development to show that remittances are strongly associated with greater banking breadth (measured by number of branches and deposit accounts per capita) and depth (measured by the volume of deposits and credit to GDP). These effects are found to be statistically significant and robust to the potential endogeneity of remittances.

Cooray (undated) investigating the influence of migrant remittances on two dimensions of the financial sector, namely, size and efficiency interest. In his study, migrant remittances have a positive significant impact on deposit money bank assets, private credit and liquid assets to GDP in the low government bank ownership group. Remittances also have a positive significant impact on deposit money bank assets and private credit in the high government bank ownership group.

The study of Shahbax, Qureshi and Aamir (2007) investigates the query whether remittances promote the financial sector development both in short run as well as in long run. They employed two techniques (ARDL and Johansen Co-integration approaches) and unrestricted Error correction model (UECM) to test the robustness of long run relationships among the concerned variables. The results indicate that remittances promote the financial sector in long run and financial sector's development also improves by the policies in previous periods significantly. Rise in inflation deters the performance of financial sector through its detrimental channels. In addition their result shows that increase in real GNP per capita and rise in exports lead to promote the efficiency of financial institutions.

Ahmed, Zaman and Shah (2011) in trying to estimate the impact of remittances, exports, money supply on economic growth for Pakistan, used time series data from 1976-2009 and

employed Bounds testing approach. Their result suggested that remittances have both the long and short-run relationship with economic growth of Pakistan.

Ezra and Nwosu (2008) in his study of impacts of remittances on growth for Nigeria estimated growth, investment, human and private capital using data for the period 1990-2007. They employed the simultaneous equation system based on a two –stage Least Squares Instrumental Variable [2SLSIV] approach to control for endogeneity problem that arises from utilization of lag independent variables. One important finding from their paper is that remittances have a positive impact on economic growth in Nigeria through investment in private and human capital, with a pass-through effect on private consumption. Even though the ratio of remittances to private capital investment is small compared with consumption, a combination of the two could cause a reduction in poverty through the multiplier effect. Another key policy reference from their work is that remittances should not be seen as a substitute for other source of growth but a complement.

Adam and Page (2003) using data from 74 low and middle-income developing countries found that international migration has a strong statistical impact on reducing poverty; on average, a 10% increase in the share of international migrants in a country's population will lead to a 1.9% decline in the share of people living in poverty. Thus, international remittances strongly affect poverty and they tend to minimize the negative effects of economic shocks in an economy.

Jongwanich (2007) examined the impact of workers' remittances on growth and poverty reduction in developing Asia-Pacific countries using panel data over the period 1993–2003. The result showed that, while remittances do have a significant impact on poverty reduction through increasing income, smoothing consumption and easing capital constraints of the poor, they have only a marginal impact on growth operating through domestic investment and human capital development.

Ziesemer (2006) examines the role of remittances on economic growth, by using two different open economy models. He used a general method of moments with pooled data for four remittances countries receiving. He finds that the countries that benefit the most from remittances are those with per capita income below \$1,200. For these countries, remittances contribute about 2 percent to steady state level of GDP per capita while the effect of remittances on growth in richer countries is found to be much smaller.

Glytsos (2005) uses a Keynesian model to estimate short and long run multipliers of remittances, and then determines the impact of remittances on growth in five Mediterranean countries. He maintains that remittances can have a positive impact on growth, not only if they are directed towards investment, but also through the increased consumption and imports. He considers only the demand impact of remittances, but finds great fluctuations across time and countries for the effect of remittances on growth.

3.0 Definition of Model Variables and Methodology

Annual series data were used for this analysis and were sourced from Central Bank of Nigeria statistical bulletin (2011) and World Development Indicators (2011). The study covered the period 1981 to 2011

Following the adaptive expectation hypothesis which posits that investors form their expectations based on past market information, the Autoregressive Distributed Lag (ARDL)

model due to Pesaran and Shin (1999) is employed to capture the effect of the previous state of the economy. The rationale for this model is predicated on the fact that the present state of the economy is also enhanced by the policies and programmes in the country in the previous period. The functional form is stated as:

$$GDP = f(GDP(-1), INR, RER, RIR, ...) \quad (1)$$

where GDP(-1) = previous state of the economy, INR = international remittances to the country, RIR = real interest rate, RER = real exchange rate of the Nigerian naira vis-a-vis the US dollar. RER and RIR are used as control variables to avoid the problem of omitted variable bias in the model. In order to estimate equation 1, we specify it in econometric form as:

$$GDP = \beta_0 + \beta_1 GDP(-1) + \beta_2 INR + \beta_3 RER + \beta_4 RIR + \mu \dots (2)$$

Where β_0 = intercept, β_i (where $i = 1, 2, \dots, 4$) = parameters to be estimated, μ = iid stochastic error term.

Following Cameron (1994) and Ehrlich (1996) that suggested that a log-linear form is more likely to find evidence of a deterrent effect than a linear form, we therefore log-linearized equation 2 as:

$$\ln GDP = \beta_0 + \beta_1 \ln GDP(-1) + \beta_2 \ln INR + \beta_3 \ln RER + \beta_4 \ln RIR + \mu \dots (3)$$

ln = natural log of their respective variables.

To fully explore the data generating process, we first examined the time series properties of model variables using the Augmented Dickey-Fuller test.

The ADF test regression equations with constant are:

$$\Delta Y_T = \alpha_0 + \alpha_1 Y_{T-1} + \sum_{j=1}^k a_j \Delta Y_{T-1} + \varepsilon_T \dots (4)$$

where Δ is the first difference operator ε_T is random error term that is iid k = no of lagged differences Y = the variable. The unit root test is then carried out under the null hypothesis $\alpha = 0$ against the alternative hypothesis of $\alpha < 0$. Once a value for the test statistics

$$ADF_\tau = \frac{\hat{\alpha}}{SE(\alpha)} \dots \dots \dots (5)$$

is computed we shall compare it with the relevant critical value for the Dickey-Fuller Test. If the test statistic is greater (in absolute value) than the critical value at 5% or 1% level of significance, then the null hypothesis of $\alpha = 0$ is rejected and no unit root is present. If the variables are non-stationary at level form and integrated of the same order, this implies evidence of co-integration in the model. The co-integration equation is stated in equation 6 as:

Co integrated equation

$$\left[\eta_m \log FSD_t = \alpha_1 + \sum_{i=2}^p \alpha_i \eta_m Z_t - \left[\eta_m \log FSD_t - \sum_{i=1}^n \beta X_{t-i} + v_{2t} \right] \right] \dots \dots \dots (6)$$

$$\left[\eta_m \log FSD_t - \sum_{i=1}^n \beta X_{t-i} \right]$$

is the linear combination of the non co integrated vectors,

X is a vector of the non co integration variables. The individual influence of the co integrated variables can only be separated with an error correction mechanism through an error

correction model as shown below. **The Error Correction Model**

$$Equation \left[\eta_m \log FSD_t = \alpha_1 + \sum_{i=2}^p \alpha_i \eta_m Z_t - (\lambda ECM_{t-i} + v_{4t}) \right] \dots \dots \dots (7)$$

Where $-\lambda_{ecm}$ is the error correction mechanism, $-\lambda$ is the magnitude of error corrected each period specified in its a priori form so as to restore $\eta_m \log IRM_t$ to equilibrium

4.0 Result and Discussions

Unit Root Test Result

Arising from the above discussion, we started the modeling by running the Augmented Dickey – Fuller (ADF) unit root test of stationarity on the levels of the variables and at their difference form. The result is shown in Table 1 below:

Table 1: ADF Unit Root Test Result

Variable	DGDP	DINR	DRER	DRIR
I ~ (d)	1	1	1	1
Lag length	1	1	1	1
Level form	-0.611192	-1.232924	-1.568349	-2.18624
t – adf				
Ist diff.	-3.57946*	-4.24983**	-4.3166**	-5.65424**
t – adf				
Critical @ 5% & 1% values	-3.6852	-3.6752	-3.675	-3.685
	-2.9705	-2.9665	-2.967	-2.971

NB ** indicates significance at both 5% and 1% critical value

* indicates significance at 5%

D= number of differencing

As shown in Table 1; all the variables examined were stationary (significant) at first differenced; that is, it was integrated of order one (I ~ (1)). In effects, the order of integration as shown by the unit root clearly left us with the suspicion of evidence of co-integration from the variables. And for this reason, we conduct co-integration test using Engle-Granger procedure. The result is shown in table 2 below:

Results from Co-Integration Test

Given the unit root properties of the variables, we proceed to implement the Engle-Granger co-integration procedure. All the variables have the same order (I ~ (1)) of integration; we estimate their linear combination at their level form with the intercept term and obtain their residual which is then subjected to co integration test as shown in Table 2

Table 2: Co-Integration Tests

Model	Variable	t-adf	Lag	5%Critical val	1% Critical val
1	Residual	-3.859060	1	-2.9665	-3.6752

From the table above, the residual t-adf of -3.859060 at lag length 1 is greater than 5% critical value of 2.9665 it means that the residual is stationary at level form and hence there is long-run linear relationship or co-integration among the variables. Consequently, we estimated long run relationship among the variables.

To check the robustness in the long run relationship among the variables, we turn to ARDL model. The result of the ARDL is shown in table below:

Table 3: ARDL Test Result

Dependent variable: GDP				
Variables	Coefficient	Std. Error	t-stat	Prob.
Constant	2.641***	0.742	3.56	0.008
Log (INR)	0.1183***	0.019	6.23	0.004
Log (RER)	0.033*	0.019	1.75	0.095
Log (RIR)	-0.3262***	0.12	-2.7	0.014
GDP(-1)	0.321**	0.139	2.3	0.042
ECM (-1)	-0.275**	0.104	-2.6	0.041
F- Stat.	8.86***			0.0001
R ² = 0.878 Adj. R ² = 0.822	Durbin Watson = 1.684			

***[**] (*) denotes significant of variable at 1% [5%] (10%) significance level respectively.

The estimated model can be shown as:

$$GDP = 2.641 + 0.1183 + 0.033RER - 0.326RIR + 0.321GDP (-1)...(8)$$

From the results in model 1, international remittance has a positive and significant impact on the Nigerian economy proxied by GDP. Specifically, a dollar increase in remittances inflows into the country will increase Nigeria's GDP by 0.1 billion naira through

household consumption and private investment. The implication of this finding is that if there is proper utilization of remittances inflows into the country, it will enhance the growth of the Nigerian economy. This can be done by diversification of proceed into productive purposes.

This is consistent with theoretical postulates implying that increase in international remittance inflow will enhance economic growth through private investment. This result corroborates the findings of Ziesemer (2006) for four different countries and Ezra and Nwosu (2008) for Nigeria.

Interestingly, previous state of the economy has both positive and significant impact on its present state implying that previous year's programmes and policies of the government will have a positive impact on present state of the Nigerian economy.

As expected, exchange rate has positive and significant impact on the Nigerian economy. This is in line with "a priori" expectation validating the Mundell-Flemming rule which says that depreciation in exchange rate increases export, and hence increase in output and income of the nation. This result corroborates the findings of Adam and Tweneboah (2008) and Okpara and Odionye (2012).

Interest rate has negative but significant impact on financial sector development implying that a rise in interest will increase investment and hence increase in output.

The results show that the error correction term (ECM) for the estimated equation is statistically significant and negative. Thus, it will rightly act to correct any deviations from long-run equilibrium. Specifically, if actual equilibrium value is too high, the ECM will reduce it, while if it is too low, the ECM will raise it. The coefficient of -0.275 denotes that 27.5% of any past deviation will be corrected in the current period. Thus, it will take about three years and six months for any disequilibrium caused remittances to be corrected.

The coefficient of determination and its adjusted are 0.875 and 0.822 respectively implying that there exists goodness of fit in the model. This means that about 87.5% of the deviations in GDP is accounted for by variation in the exogenous variables. The overall regression is significant at 1% level of significance implying that the joint effects of all the included variables were significant.

The Durbin Watson statistic shows evidence of no first order serial autocorrelation in the model given that it is approximately 2.

Short and Long run Diagnostic Test

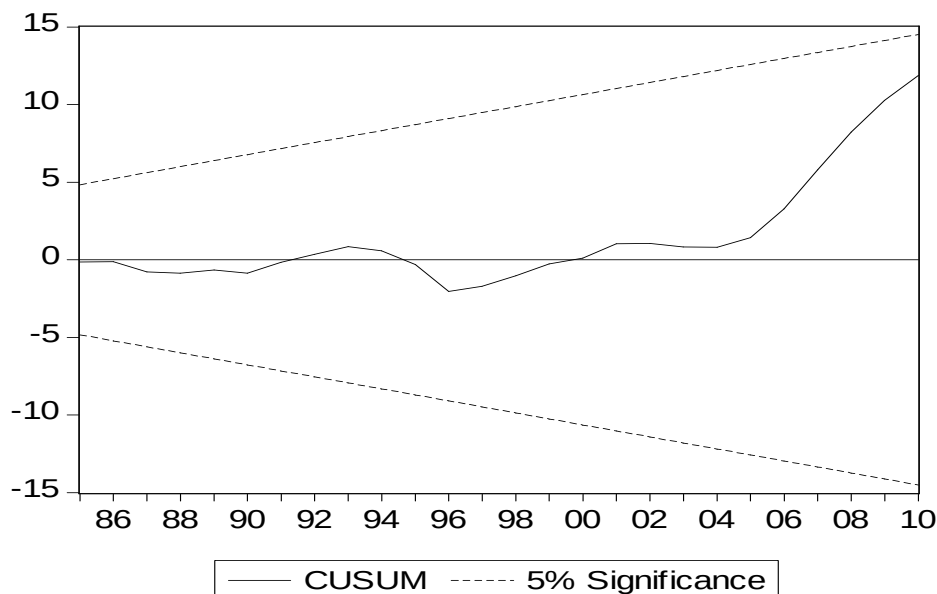
Short and long run diagnostic test were also carried out to know the validity of these results. The summary of the result is presented in table 6 below:

Heteroskedasticity Test = 2.03422 (0.141412)
Jarque- Bera = 2.015688 (0.364674)

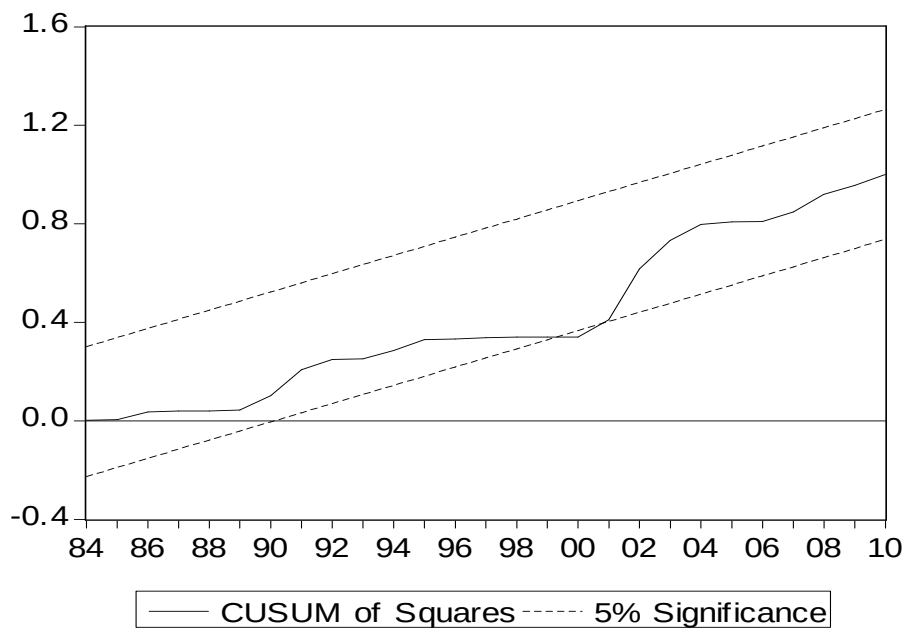
Heteroskedasticity test result showed no evidence of heteroskedasticity in the model implying that the conditional variances of the error terms are equal. The Jarque – Bera statistic showed that the error term is normally distributed since the Jarque-bera statistic is not significant at 5% level.

Finally, we examine the stability of the long run parameter of the model. Thus we rely on Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) test proposed by Borenstein et al (1995). The same has been used by Pesaran and Pesaran (1997) and Mohsen et al (2002) to test the stability of the long run. The results are presented in figures below:

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363 As observed in the figures, the plot of CUSUM and CUSUMSQ statistics stay within the
364 critical 5% bound for the period.

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366 5.0 Conclusion and Policy Recommendations

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368 The study has investigated the impact of international remittances on the Nigerian
369 economy. Following the behavioural pattern of the variables, we adopted Autoregressive
370 Distributed Lagged model (ARDL) in the study.

The result of the Auto Regressive Distributed Lagged (ARDL) model showed that international remittance inflow has positive and significant impact on the Nigerian economy. The result of cointegration suggested is long run relationship between international remittances and economic growth in Nigeria.

In the light of the findings of this study, the following recommendations are considered necessary for short and long term implementations.

Since international remittance has positive and significant impact on Nigerian economy, policies that will enhance international remittance should be pursued. To achieve this, policy should focus on:

- ❖ Improve access to remittance services as it will improve rural access to remittance services and thereby discourages migrants from remitting through informal sector and hence foster economic growth.
- ❖ Increase competition to reduce remittance service cost in the financial sector. According to Agu (2010), the financial sector charges more than 10% of the total amount sent by migrant. This includes increasing the number of remittance service provider.
- ❖ Unnecessary administrative bottleneck in the financial sector should be eliminated to enhance remittance inflow through the right channel.
- ❖ Government should improve on the operational environment and regulation of remittance service, particularly as they relate to improving competition, reducing charges, improving access and enhancing the use of remittance proceeds in order to deepen the financial sector development and sustain momentum for growth.

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A growing academic literature has therefore been devoted to analyze the microeconomic and macroeconomic effects of remittances in developing countries across various dimensions (see Schiff and Ozden, 2006, 2007; Shahbaz et al, 2007). The effects of remittances on receiving countries seem enormous. At a microeconomic level, remittances have been found to boost investment in human capital and educational attainments, thereby reducing poverty in many developing countries. Furthermore, there is significant evidence that remittances increase not only consumption but tend also to raise health levels and to increase investment in public infrastructure. At a macroeconomic level, the existence of a positive relationship between remittances and

growth is more controversial. While remittances tend to favour the accumulation of important production factors such as physical capital and education, they also exert detrimental effects in terms of incentive. They also create 'Dutch disease' effects through the appreciation of domestic currencies, leading to further deindustrialization in the receiving country.

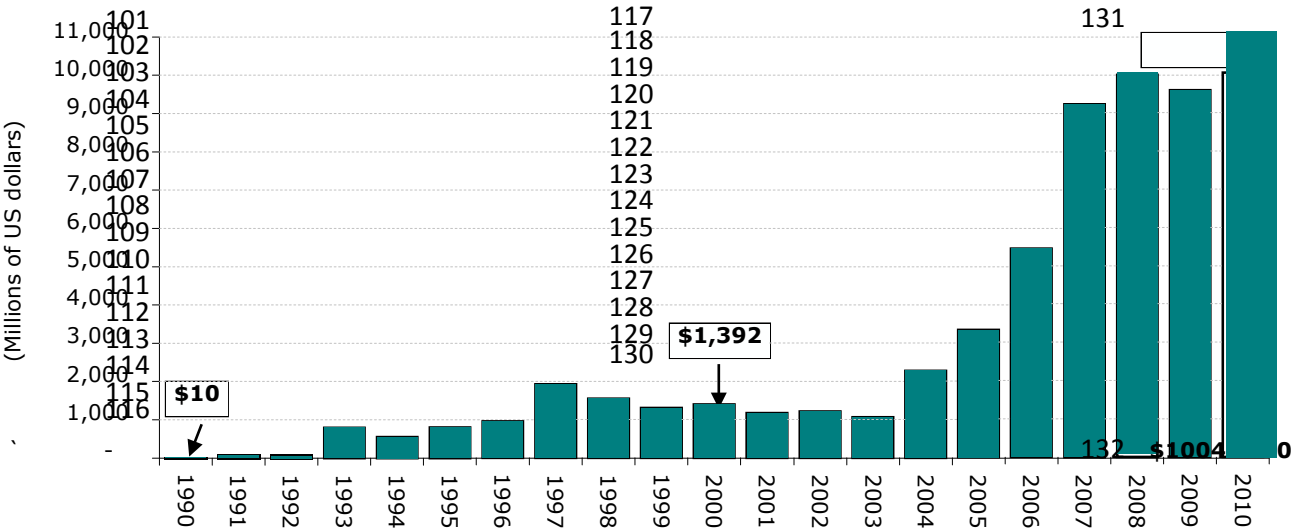
There is no general consensus on the impact of remittances on economic development as it appears somewhat ambiguous (Shahbaz et al, 2007). Hinojosa-Ojeda, (2003) argues that banking remittances recipients will help in multiplying the developmental impact of remittance flow (see also Terry and Wilson, (2005); and World Bank, (2006)). Two different studies by Guiliano and Ruiz-Arranz (2005) and Mundaca (2005) show that the impact of remittances on growth depends on the level of financial sector development in a country. However, these studies reached different conclusions. Guiliano and Ruiz-Arranz (2005) show that remittances help to promote growth in less financially developed countries, arguing that agents compensate for the lack of development of local financial markets using remittances to ease liquidity constraints and to channel resources towards productive uses that enhance economic growth. On the hand, Mundaca (2005) concludes that financial development leads to better use of remittances, thus boosting growth.

On one hand, well functioning financial markets having lower costs of transactions may help direct remittances yield the highest returns and therefore enhance financial sector development. On the other hand, remittances can also compensate for a bad financial system; by loosening liquidity constraints, potential entrepreneurs could use remittances whenever the financial system does not help them and start productive due to lack of collateral or because of high lending costs. This problem is mostly seen in developing countries where informal channels are more often efficient and cheaper than the formal sectors.

The diagram below shows formal remittances inflows to Nigeria between 1990 and 2010. It is very obvious that from 2003 to 2010, remittance inflows increased while from 1990 to 2002 there had been fluctuations in the flow of remittances to Nigeria. The volume of remittances into Nigeria has been on the increase for about a decade now. From a meagre \$1.8 billion in 1999, remittances inflow to the country increased to \$9.98 billion in 2008. This is second to oil receipts as the country's prime foreign exchange and in 2010 it increased by 4.2% (CBN, 2008; WDI, 2010). Remittances as a ratio of GDP out performed foreign direct investments, non-oil exports receipts and portfolio investments from 2004 to 2005 and in 2007. It grew from 5.8 in 2005 to 10.7 in 2007.

FIG 1 Formal Remittances Inflows: Nigerian Profile.

Source: World Development Indicators, World Bank, 2011.



The recent global surge in remittance flows and the twin consequences of migration and remittances on economic development have become contemporary topical issues. Against this backdrop, it becomes relevant to investigate the impact of international remittances on economic development using ARDL framework for Nigeria. The paper is organized as follows: section 2 reviews related literature, section 3 specifies the model, section 4 presents the empirical result and discussion, and section 5 is the conclusion and policy recommendations.

2.0 Literature Reviews

Giuliano and Ruiz-Arranz (2007) used a newly constructed cross-country data series for remittances covering a large number of developing countries over the period 1975-2002 and found that remittances have promoted growth in less financially developed countries. This finding controls for the endogeneity of remittances and financial development using SGMM approach and does not depend on the particular measure of financial sector development used, and is robust to a number of robustness tests. Their results suggested that remittances help alleviate credit constraints on the poor, substituting for the lack of financial development, improving the allocation of capital, and therefore accelerating economic growth. Their result further shows that there is an investment channel through which remittances can promote growth where the financial sector does not meet the credit needs of the population.

Demirgüç-Kunt *et al* (2010) use municipality-level data for Mexico for 2000, in one of the very few empirical studies on the relationship between remittances and financial development to show that remittances are strongly associated with greater banking breadth (measured by number of branches and deposit accounts per capita) and depth (measured by the volume of deposits and credit to GDP). These effects are found to be statistically significant and robust to the potential endogeneity of remittances.

Cooray (undated) investigating the influence of migrant remittances on two dimensions of the financial sector, namely, size and efficiency interest. In his study, migrant remittances have a positive significant impact on deposit money bank assets, private credit and liquid assets to GDP in the low government bank ownership group. Remittances also have a positive significant impact on deposit money bank assets and private credit in the high government bank ownership group.

The study of Shahbax, Qureshi and Aamir (2007) investigates the query whether remittances promote the financial sector development both in short run as well as in long run. They employed two techniques (ARDL and Johansen Co-integration approaches) and unrestricted Error correction model (UECM) to test the robustness of long run relationships among the concerned variables. The results indicate that remittances promote the financial sector in long run and financial sector's development also improves by the policies in previous periods significantly. Rise in inflation deters the performance of financial sector through its detrimental channels. In addition their result shows that increase in real GNP per capita and rise in exports lead to promote the efficiency of financial institutions.

Ahmed, Zaman and Shah (2011) in trying to estimate the impact of remittances, exports, money supply on economic growth for Pakistan, used time series data from 1976-2009 and

employed Bounds testing approach. Their result suggested that remittances have both the long and short-run relationship with economic growth of Pakistan.

Ezra and Nwosu (2008) in his study of impacts of remittances on growth for Nigeria estimated growth, investment, human and private capital using data for the period 1990-2007. They employed the simultaneous equation system based on a two –stage Least Squares Instrumental Variable [2SLSIV] approach to control for endogeneity problem that arises from utilization of lag independent variables. One important finding from their paper is that remittances have a positive impact on economic growth in Nigeria through investment in private and human capital, with a pass-through effect on private consumption. Even though the ratio of remittances to private capital investment is small compared with consumption, a combination of the two could cause a reduction in poverty through the multiplier effect. Another key policy reference from their work is that remittances should not be seen as a substitute for other source of growth but a complement.

Adam and Page (2003) using data from 74 low and middle-income developing countries found that international migration has a strong statistical impact on reducing poverty; on average, a 10% increase in the share of international migrants in a country's population will lead to a 1.9% decline in the share of people living in poverty. Thus, international remittances strongly affect poverty and they tend to minimize the negative effects of economic shocks in an economy.

Jongwanich (2007) examined the impact of workers' remittances on growth and poverty reduction in developing Asia-Pacific countries using panel data over the period 1993–2003. The result showed that, while remittances do have a significant impact on poverty reduction through increasing income, smoothing consumption and easing capital constraints of the poor, they have only a marginal impact on growth operating through domestic investment and human capital development.

Ziesemer (2006) examines the role of remittances on economic growth, by using two different open economy models. He used a general method of moments with pooled data for four remittances countries receiving. He finds that the countries that benefit the most from remittances are those with per capita income below \$1,200. For these countries, remittances contribute about 2 percent to steady state level of GDP per capita while the effect of remittances on growth in richer countries is found to be much smaller.

Glytsos (2005) uses a Keynesian model to estimate short and long run multipliers of remittances, and then determines the impact of remittances on growth in five Mediterranean countries. He maintains that remittances can have a positive impact on growth, not only if they are directed towards investment, but also through the increased consumption and imports. He considers only the demand impact of remittances, but finds great fluctuations across time and countries for the effect of remittances on growth.

3.0 Definition of Model Variables and Methodology

Annual series data were used for this analysis and were sourced from Central Bank of Nigeria statistical bulletin (2011) and World Development Indicators (2011). The study covered the period 1981 to 2011

Following the adaptive expectation hypothesis which posits that investors form their expectations based on past market information, the Autoregressive Distributed Lag (ARDL)

model due to Pesaran and Shin (1999) is employed to capture the effect of the previous state of the economy. The rationale for this model is predicated on the fact that the present state of the economy is also enhanced by the policies and programmes in the country in the previous period. The functional form is stated as:

$$GDP = f(GDP(-1), INR, RER, RIR, ...) \quad (1)$$

where GDP(-1) = previous state of the economy, INR = international remittances to the country, RIR = real interest rate, RER = real exchange rate of the Nigerian naira vis-a-vis the US dollar. RER and RIR are used as control variables to avoid the problem of omitted variable bias in the model. In order to estimate equation 1, we specify it in econometric form as:

$$GDP = \beta_0 + \beta_1 GDP(-1) + \beta_2 INR + \beta_3 RER + \beta_4 RIR + \mu \dots (2)$$

Where β_0 = intercept, β_i (where $i = 1, 2, \dots, 4$) = parameters to be estimated, μ = iid stochastic error term.

Following Cameron (1994) and Ehrlich (1996) that suggested that a log-linear form is more likely to find evidence of a deterrent effect than a linear form, we therefore log-linearized equation 2 as:

$$\ln GDP = \beta_0 + \beta_1 \ln GDP(-1) + \beta_2 \ln INR + \beta_3 \ln RER + \beta_4 \ln RIR + \mu \dots (3)$$

ln = natural log of their respective variables.

To fully explore the data generating process, we first examined the time series properties of model variables using the Augmented Dickey-Fuller test.

The ADF test regression equations with constant are:

$$\Delta Y_T = \alpha_0 + \alpha_1 Y_{T-1} + \sum_{j=1}^k a_j \Delta Y_{T-1} + \varepsilon_T \dots (4)$$

where Δ is the first difference operator ε_T is random error term that is iid k = no of lagged differences Y = the variable. The unit root test is then carried out under the null hypothesis $\alpha = 0$ against the alternative hypothesis of $\alpha < 0$. Once a value for the test statistics

$$ADF_\tau = \frac{\hat{\alpha}}{SE(\alpha)} \dots \dots \dots (5)$$

is computed we shall compare it with the relevant critical value for the Dickey-Fuller Test. If the test statistic is greater (in absolute value) than the critical value at 5% or 1% level of significance, then the null hypothesis of $\alpha = 0$ is rejected and no unit root is present. If the variables are non-stationary at level form and integrated of the same order, this implies evidence of co-integration in the model. The co-integration equation is stated in equation 6 as:

Co integrated equation

$$\left[\eta_m \log FSD_t = \alpha_1 + \sum_{i=2}^p \alpha_i \eta_m Z_t - \left[\eta_m \log FSD_t - \sum_{i=1}^n \beta X_{t-i} + v_{2t} \right] \right] \dots \dots \dots (6)$$

$$\left[\eta_m \log FSD_t - \sum_{i=1}^n \beta X_{t-i} \right]$$

is the linear combination of the non co integrated vectors,

X is a vector of the non co integration variables. The individual influence of the co integrated variables can only be separated with an error correction mechanism through an error

correction model as shown below. **The Error Correction Model**

$$Equation \left[\eta_m \log FSD_t = \alpha_1 + \sum_{i=2}^p \alpha_i \eta_m Z_t - (\lambda ECM_{t-i} + v_{4t}) \right] \dots \dots \dots (7)$$

Where $-\lambda_{ecm}$ is the error correction mechanism, $-\lambda$ is the magnitude of error corrected each period specified in its a priori form so as to restore $\eta_m \log IRM_t$ to equilibrium

4.0 Result and Discussions

Unit Root Test Result

Arising from the above discussion, we started the modeling by running the Augmented Dickey – Fuller (ADF) unit root test of stationarity on the levels of the variables and at their difference form. The result is shown in Table 1 below:

Table 1: ADF Unit Root Test Result

Variable	DGDP	DINR	DRER	DRIR
I ~ (d)	1	1	1	1
Lag length	1	1	1	1
Level form	-0.611192	-1.232924	-1.568349	-2.18624
t – adf				
Ist diff.	-3.57946*	-4.24983**	-4.3166**	-5.65424**
t – adf				
Critical @ 5% & 1% values	-3.6852	-3.6752	-3.675	-3.685
	-2.9705	-2.9665	-2.967	-2.971

NB ** indicates significance at both 5% and 1% critical value

* indicates significance at 5%

D= number of differencing

As shown in Table 1; all the variables examined were stationary (significant) at first differenced; that is, it was integrated of order one (I ~ (1)). In effects, the order of integration as shown by the unit root clearly left us with the suspicion of evidence of co-integration from the variables. And for this reason, we conduct co-integration test using Engle-Granger procedure. The result is shown in table 2 below:

Results from Co-Integration Test

Given the unit root properties of the variables, we proceed to implement the Engle-Granger co-integration procedure. All the variables have the same order (I ~ (1)) of integration; we estimate their linear combination at their level form with the intercept term and obtain their residual which is then subjected to co integration test as shown in Table 2

Table 2: Co-Integration Tests

Model	Variable	t-adf	Lag	5%Critical val	1% Critical val
1	Residual	-3.859060	1	-2.9665	-3.6752

From the table above, the residual t-adf of -3.859060 at lag length 1 is greater than 5% critical value of 2.9665 it means that the residual is stationary at level form and hence there is long-run linear relationship or co-integration among the variables. Consequently, we estimated long run relationship among the variables.

To check the robustness in the long run relationship among the variables, we turn to ARDL model. The result of the ARDL is shown in table below:

Table 3: ARDL Test Result

Dependent variable: GDP				
Variables	Coefficient	Std. Error	t-stat	Prob.
Constant	2.641***	0.742	3.56	0.008
Log (INR)	0.1183***	0.019	6.23	0.004
Log (RER)	0.033*	0.019	1.75	0.095
Log (RIR)	-0.3262***	0.12	-2.7	0.014
GDP(-1)	0.321**	0.139	2.3	0.042
ECM (-1)	-0.275**	0.104	-2.6	0.041
F- Stat.	8.86***			0.0001
R ² = 0.878 Adj. R ² = 0.822	Durbin Watson = 1.684			

***[**] (*) denotes significant of variable at 1% [5%] (10%) significance level respectively.

The estimated model can be shown as:

$$GDP = 2.641 + 0.1183 + 0.033RER - 0.326RIR + 0.321GDP (-1)...(8)$$

From the results in model 1, international remittance has a positive and significant impact on the Nigerian economy proxied by GDP. Specifically, a dollar increase in remittances inflows into the country will increase Nigeria's GDP by 0.1 billion naira through

household consumption and private investment. The implication of this finding is that if there is proper utilization of remittances inflows into the country, it will enhance the growth of the Nigerian economy. This can be done by diversification of proceed into productive purposes.

This is consistent with theoretical postulates implying that increase in international remittance inflow will enhance economic growth through private investment. This result corroborates the findings of Ziesemer (2006) for four different countries and Ezra and Nwosu (2008) for Nigeria.

Interestingly, previous state of the economy has both positive and significant impact on its present state implying that previous year's programmes and policies of the government will have a positive impact on present state of the Nigerian economy.

As expected, exchange rate has positive and significant impact on the Nigerian economy. This is in line with "a priori" expectation validating the Mundell-Flemming rule which says that depreciation in exchange rate increases export, and hence increase in output and income of the nation. This result corroborates the findings of Adam and Tweneboah (2008) and Okpara and Odionye (2012).

Interest rate has negative but significant impact on financial sector development implying that a rise in interest will increase investment and hence increase in output.

The results show that the error correction term (ECM) for the estimated equation is statistically significant and negative. Thus, it will rightly act to correct any deviations from long-run equilibrium. Specifically, if actual equilibrium value is too high, the ECM will reduce it, while if it is too low, the ECM will raise it. The coefficient of -0.275 denotes that 27.5% of any past deviation will be corrected in the current period. Thus, it will take about three years and six months for any disequilibrium caused remittances to be corrected.

The coefficient of determination and its adjusted are 0.875 and 0.822 respectively implying that there exists goodness of fit in the model. This means that about 87.5% of the deviations in GDP is accounted for by variation in the exogenous variables. The overall regression is significant at 1% level of significance implying that the joint effects of all the included variables were significant.

The Durbin Watson statistic shows evidence of no first order serial autocorrelation in the model given that it is approximately 2.

Short and Long run Diagnostic Test

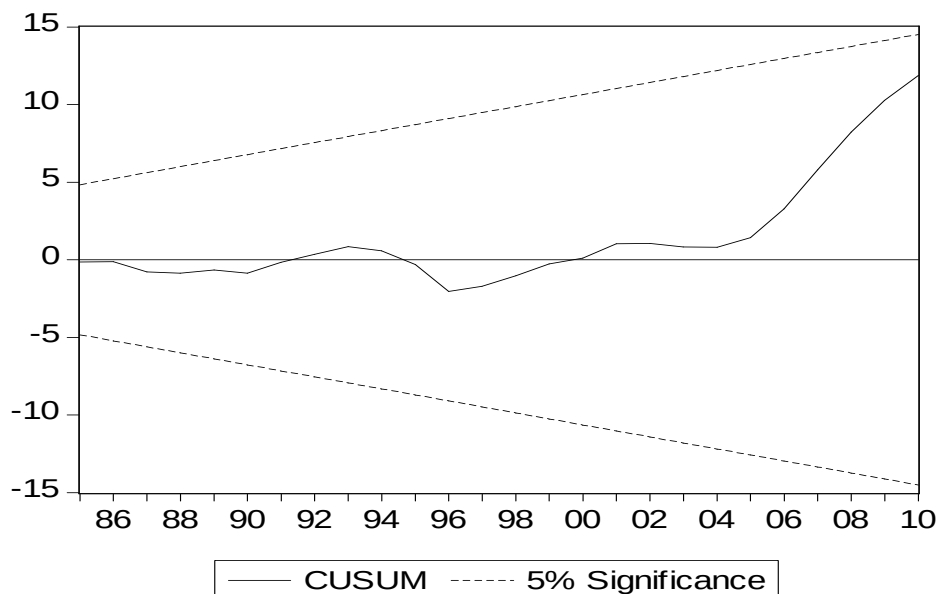
Short and long run diagnostic test were also carried out to know the validity of these results. The summary of the result is presented in table 6 below:

Heteroskedasticity Test = 2.03422 (0.141412)
Jarque- Bera = 2.015688 (0.364674)

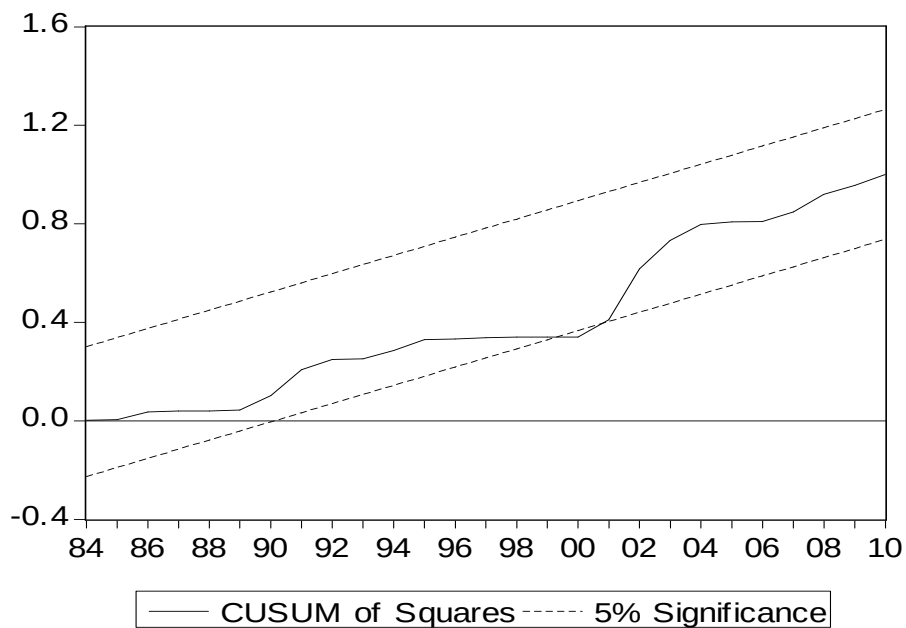
Heteroskedasticity test result showed no evidence of heteroskedasticity in the model implying that the conditional variances of the error terms are equal. The Jarque – Bera statistic showed that the error term is normally distributed since the Jarque-bera statistic is not significant at 5% level.

Finally, we examine the stability of the long run parameter of the model. Thus we rely on Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) test proposed by Borenstein et al (1995). The same has been used by Pesaran and Pesaran (1997) and Mohsen et al (2002) to test the stability of the long run. The results are presented in figures below:

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363 As observed in the figures, the plot of CUSUM and CUSUMSQ statistics stay within the
364 critical 5% bound for the period.

365

366 5.0 Conclusion and Policy Recommendations

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368 The study has investigated the impact of international remittances on the Nigerian
369 economy. Following the behavioural pattern of the variables, we adopted Autoregressive
370 Distributed Lagged model (ARDL) in the study.

The result of the Auto Regressive Distributed Lagged (ARDL) model showed that international remittance inflow has positive and significant impact on the Nigerian economy. The result of cointegration suggested is long run relationship between international remittances and economic growth in Nigeria.

In the light of the findings of this study, the following recommendations are considered necessary for short and long term implementations.

Since international remittance has positive and significant impact on Nigerian economy, policies that will enhance international remittance should be pursued. To achieve this, policy should focus on:

- ❖ Improve access to remittance services as it will improve rural access to remittance services and thereby discourages migrants from remitting through informal sector and hence foster economic growth.
- ❖ Increase competition to reduce remittance service cost in the financial sector. According to Agu (2010), the financial sector charges more than 10% of the total amount sent by migrant. This includes increasing the number of remittance service provider.
- ❖ Unnecessary administrative bottleneck in the financial sector should be eliminated to enhance remittance inflow through the right channel.
- ❖ Government should improve on the operational environment and regulation of remittance service, particularly as they relate to improving competition, reducing charges, improving access and enhancing the use of remittance proceeds in order to deepen the financial sector development and sustain momentum for growth.

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469

THE IMPACT OF INTERNATIONAL REMITTANCES ON THE NIGERIAN ECONOMY

ABSTRACT

The study investigated the impact of international remittances on the Nigerian economy. The recent global surge in remittance flows and the twin consequences of migration and remittances on economic development have become contemporary topical issues. Thus the need to obtain evidence based information to drive policy formulation on the impact of remittances on the Nigerian economy. Following the behavioural pattern of the variables, we adopted Autoregressive Distributed Lagged model (ARDL) due to Pesaran and Shin (1999) in the study. The result of the Auto Regressive Distributed Lagged (ARDL) model showed that international remittance inflow has positive and significant impact on the Nigerian economy. It further showed that there is a long run relationship between international remittances and the Nigerian economy. The ADP test suggested that the series in the model are random walk processes in their level form. The CUSUM and CUSUMSQ tests showed evidence of long run stability of the parameters of the model.

Keywords: International Remittances, Economic growth, ARDL.

1.0 Introduction

Financial flows in most economies have complemented earnings from trade especially exports of goods and services, to finance economic development. These flows include foreign aid, foreign direct investment, foreign portfolio investments, overseas development assistance and workers' remittances. In the last three decades, developing economies witnessed massive migrant flows of both skilled and unskilled persons into developed economies, an aftermath of harsh economic reforms embarked upon by most depressed economies aimed at addressing the global recession of the early 1980s. These migrants have become the main source of huge worker's remittances into developing countries. According to the World Bank, in 2004 the flow of international remittances to developing countries surpassed 125 billion US dollars, and are growing at rates higher than 10% and in 2008 remittances sent to developing countries reached 300 billion US dollars. These have become the major source of income for many developing countries. Nigeria receives the highest amount of remittance in Africa (World Bank, 2004). The country receives about 65% of officially recorded remittance flow to the region and about 2% of global remittance flows (Orozco, 2003). Remittances inflows into the country has outpaced foreign direct investment (FDI), official development assistance (ODA) and other flows into the country and currently rank second to oil receipts as a foreign exchange earners (CBN, 2007).

Remittances are both financial and non-financial resources freely sent to migrant's households in the home countries. They have contributed immensely in financing domestic investments as well as providing home-keep funds for dependent relatives, thereby alleviating poverty in developing economies (CBN, 2008). According to the International Monetary Fund (IMF) Balance of Payment Manual 5 (BPM5), remittances is defined as that portion of international migrant workers' earnings sent home from the country of employment to the country of origin.

A growing academic literature has therefore been devoted to analyze the microeconomic and macroeconomic effects of remittances in developing countries across various dimensions (see Schiff and Ozden, 2006, 2007; Shahbaz et al, 2007). The effects of remittances on receiving countries seem enormous. At a microeconomic level, remittances have been found to boost investment in human capital and educational attainments, thereby reducing poverty in many developing countries. Furthermore, there is significant evidence that remittances increase not only consumption but tend also to raise health levels and to increase investment in public infrastructure. At a macroeconomic level, the existence of a positive relationship between remittances and

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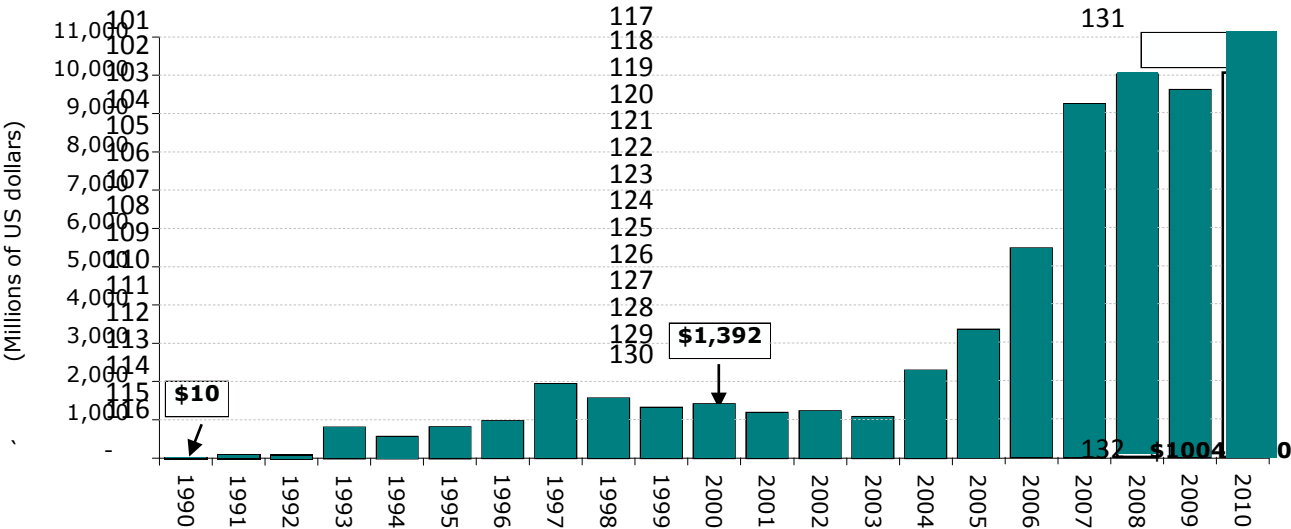
There is no general consensus on the impact of remittances on economic development as it appears somewhat ambiguous (Shahbaz et al, 2007). Hinojosa-Ojeda, (2003) argues that banking remittances recipients will help in multiplying the developmental impact of remittance flow (see also Terry and Wilson, (2005); and World Bank, (2006)). Two different studies by Guiliano and Ruiz-Arranz (2005) and Mundaca (2005) show that the impact of remittances on growth depends on the level of financial sector development in a country. However, these studies reached different conclusions. Guiliano and Ruiz-Arranz (2005) show that remittances help to promote growth in less financially developed countries, arguing that agents compensate for the lack of development of local financial markets using remittances to ease liquidity constraints and to channel resources towards productive uses that enhance economic growth. On the hand, Mundaca (2005) concludes that financial development leads to better use of remittances, thus boosting growth.

On one hand, well functioning financial markets having lower costs of transactions may help direct remittances yield the highest returns and therefore enhance financial sector development. On the other hand, remittances can also compensate for a bad financial system; by loosening liquidity constraints, potential entrepreneurs could use remittances whenever the financial system does not help them and start productive due to lack of collateral or because of high lending costs. This problem is mostly seen in developing countries where informal channels are more often efficient and cheaper than the formal sectors.

The diagram below shows formal remittances inflows to Nigeria between 1990 and 2010. It is very obvious that from 2003 to 2010, remittance inflows increased while from 1990 to 2002 there had been fluctuations in the flow of remittances to Nigeria. The volume of remittances into Nigeria has been on the increase for about a decade now. From a meagre \$1.8 billion in 1999, remittances inflow to the country increased to \$9.98 billion in 2008. This is second to oil receipts as the country's prime foreign exchange and in 2010 it increased by 4.2% (CBN, 2008; WDI, 2010). Remittances as a ratio of GDP out performed foreign direct investments, non-oil exports receipts and portfolio investments from 2004 to 2005 and in 2007. It grew from 5.8 in 2005 to 10.7 in 2007.

FIG 1 Formal Remittances Inflows: Nigerian Profile.

Source: World Development Indicators, World Bank, 2011.



The recent global surge in remittance flows and the twin consequences of migration and remittances on economic development have become contemporary topical issues. Against this backdrop, it becomes relevant to investigate the impact of international remittances on economic development using ARDL framework for Nigeria. The paper is organized as follows: section 2 reviews related literature, section 3 specifies the model, section 4 presents the empirical result and discussion, and section 5 is the conclusion and policy recommendations.

2.0 Literature Reviews

Giuliano and Ruiz-Arranz (2007) used a newly constructed cross-country data series for remittances covering a large number of developing countries over the period 1975-2002 and found that remittances have promoted growth in less financially developed countries. This finding controls for the endogeneity of remittances and financial development using SGMM approach and does not depend on the particular measure of financial sector development used, and is robust to a number of robustness tests. Their results suggested that remittances help alleviate credit constraints on the poor, substituting for the lack of financial development, improving the allocation of capital, and therefore accelerating economic growth. Their result further shows that there is an investment channel through which remittances can promote growth where the financial sector does not meet the credit needs of the population.

Demirgüç-Kunt *et al* (2010) use municipality-level data for Mexico for 2000, in one of the very few empirical studies on the relationship between remittances and financial development to show that remittances are strongly associated with greater banking breadth (measured by number of branches and deposit accounts per capita) and depth (measured by the volume of deposits and credit to GDP). These effects are found to be statistically significant and robust to the potential endogeneity of remittances.

Cooray (undated) investigating the influence of migrant remittances on two dimensions of the financial sector, namely, size and efficiency interest. In his study, migrant remittances have a positive significant impact on deposit money bank assets, private credit and liquid assets to GDP in the low government bank ownership group. Remittances also have a positive significant impact on deposit money bank assets and private credit in the high government bank ownership group.

The study of Shahbax, Qureshi and Aamir (2007) investigates the query whether remittances promote the financial sector development both in short run as well as in long run. They employed two techniques (ARDL and Johansen Co-integration approaches) and unrestricted Error correction model (UECM) to test the robustness of long run relationships among the concerned variables. The results indicate that remittances promote the financial sector in long run and financial sector's development also improves by the policies in previous periods significantly. Rise in inflation deters the performance of financial sector through its detrimental channels. In addition their result shows that increase in real GNP per capita and rise in exports lead to promote the efficiency of financial institutions.

Ahmed, Zaman and Shah (2011) in trying to estimate the impact of remittances, exports, money supply on economic growth for Pakistan, used time series data from 1976-2009 and

employed Bounds testing approach. Their result suggested that remittances have both the long and short-run relationship with economic growth of Pakistan.

Ezra and Nwosu (2008) in his study of impacts of remittances on growth for Nigeria estimated growth, investment, human and private capital using data for the period 1990-2007. They employed the simultaneous equation system based on a two –stage Least Squares Instrumental Variable [2SLSIV] approach to control for endogeneity problem that arises from utilization of lag independent variables. One important finding from their paper is that remittances have a positive impact on economic growth in Nigeria through investment in private and human capital, with a pass-through effect on private consumption. Even though the ratio of remittances to private capital investment is small compared with consumption, a combination of the two could cause a reduction in poverty through the multiplier effect. Another key policy reference from their work is that remittances should not be seen as a substitute for other source of growth but a complement.

Adam and Page (2003) using data from 74 low and middle-income developing countries found that international migration has a strong statistical impact on reducing poverty; on average, a 10% increase in the share of international migrants in a country's population will lead to a 1.9% decline in the share of people living in poverty. Thus, international remittances strongly affect poverty and they tend to minimize the negative effects of economic shocks in an economy.

Jongwanich (2007) examined the impact of workers' remittances on growth and poverty reduction in developing Asia-Pacific countries using panel data over the period 1993–2003. The result showed that, while remittances do have a significant impact on poverty reduction through increasing income, smoothing consumption and easing capital constraints of the poor, they have only a marginal impact on growth operating through domestic investment and human capital development.

Ziesemer (2006) examines the role of remittances on economic growth, by using two different open economy models. He used a general method of moments with pooled data for four remittances countries receiving. He finds that the countries that benefit the most from remittances are those with per capita income below \$1,200. For these countries, remittances contribute about 2 percent to steady state level of GDP per capita while the effect of remittances on growth in richer countries is found to be much smaller.

Glytsos (2005) uses a Keynesian model to estimate short and long run multipliers of remittances, and then determines the impact of remittances on growth in five Mediterranean countries. He maintains that remittances can have a positive impact on growth, not only if they are directed towards investment, but also through the increased consumption and imports. He considers only the demand impact of remittances, but finds great fluctuations across time and countries for the effect of remittances on growth.

3.0 Definition of Model Variables and Methodology

Annual series data were used for this analysis and were sourced from Central Bank of Nigeria statistical bulletin (2011) and World Development Indicators (2011). The study covered the period 1981 to 2011

Following the adaptive expectation hypothesis which posits that investors form their expectations based on past market information, the Autoregressive Distributed Lag (ARDL)

model due to Pesaran and Shin (1999) is employed to capture the effect of the previous state of the economy. The rationale for this model is predicated on the fact that the present state of the economy is also enhanced by the policies and programmes in the country in the previous period. The functional form is stated as:

$$GDP = f(GDP(-1), INR, RER, RIR, \dots) \quad (1)$$

where $GDP(-1)$ = previous state of the economy, INR = international remittances to the country, RIR = real interest rate, RER = real exchange rate of the Nigerian naira vis-a-vis the US dollar. RER and RIR are used as control variables to avoid the problem of omitted variable bias in the model. In order to estimate equation 1, we specify it in econometric form as:

$$GDP = \beta_0 + \beta_1 GDP(-1) + \beta_2 INR + \beta_3 RER + \beta_4 RIR + \mu \dots (2)$$

Where β_0 = intercept, β_i (where $i = 1, 2, \dots, 4$) = parameters to be estimated, μ = iid stochastic error term.

Following Cameron (1994) and Ehrlich (1996) that suggested that a log-linear form is more likely to find evidence of a deterrent effect than a linear form, we therefore log-linearized equation 2 as:

$$\ln GDP = \beta_0 + \beta_1 \ln GDP(-1) + \beta_2 \ln INR + \beta_3 \ln RER + \beta_4 \ln RIR + \mu \dots (3)$$

$\ln$ = natural log of their respective variables.

To fully explore the data generating process, we first examined the time series properties of model variables using the Augmented Dickey-Fuller test.

The ADF test regression equations with constant are:

$$\Delta Y_T = \alpha_0 + \alpha_1 Y_{T-1} + \sum_{j=1}^k a_j \Delta Y_{T-1} + \varepsilon_T \dots (4)$$

where Δ is the first difference operator ε_T is random error term that is iid k = no of lagged differences Y = the variable. The unit root test is then carried out under the null hypothesis $\alpha = 0$ against the alternative hypothesis of $\alpha < 0$. Once a value for the test statistics

$$ADF_\tau = \frac{\hat{\alpha}}{SE(\alpha)} \dots \dots \dots (5)$$

is computed we shall compare it with the relevant critical value for the Dickey-Fuller Test. If the test statistic is greater (in absolute value) than the critical value at 5% or 1% level of significance, then the null hypothesis of $\alpha = 0$ is rejected and no unit root is present. If the variables are non-stationary at level form and integrated of the same order, this implies evidence of co-integration in the model. The co-integration equation is stated in equation 6 as:

Co integrated equation

$$\left[\eta_m \log FSD_t = \alpha_1 + \sum_{i=2}^p \alpha_i \eta_m Z_t - \left[\eta_m \log FSD_t - \sum_{i=1}^n \beta X_{t-i} + v_{2t} \right] \right] \dots \dots \dots (6)$$

$$\left[\eta_m \log FSD_t - \sum_{i=1}^n \beta X_{t-i} \right]$$

is the linear combination of the non co integrated vectors, X is a vector of the non co integration variables. The individual influence of the co integrated variables can only be separated with an error correction mechanism through an error

correction model as shown below. **The Error Correction Model**

$$Equation \left[\eta_m \log FSD_t = \alpha_1 + \sum_{i=2}^p \alpha_i \eta_m Z_t - (\lambda ECM_{t-i} + v_{4t}) \right] \dots \dots \dots (7)$$

Where $-\lambda_{ecm}$ is the error correction mechanism, $-\lambda$ is the magnitude of error corrected each period specified in its a priori form so as to restore $\eta_m \log IRM_t$ to equilibrium

4.0 Result and Discussions

Unit Root Test Result

Arising from the above discussion, we started the modeling by running the Augmented Dickey – Fuller (ADF) unit root test of stationarity on the levels of the variables and at their difference form. The result is shown in Table 1 below:

Table 1: ADF Unit Root Test Result

Variable	DGDP	DINR	DRER	DRIR
I ~ (d)	1	1	1	1
Lag length	1	1	1	1
Level form	-0.611192	-1.232924	-1.568349	-2.18624
t – adf				
Ist diff.	-3.57946*	-4.24983**	-4.3166**	-5.65424**
t – adf				
Critical @ 5% & 1% values	-3.6852	-3.6752	-3.675	-3.685
	-2.9705	-2.9665	-2.967	-2.971

NB ** indicates significance at both 5% and 1% critical value

* indicates significance at 5%

D= number of differencing

As shown in Table 1; all the variables examined were stationary (significant) at first differenced; that is, it was integrated of order one (I ~ (1)). In effects, the order of integration as shown by the unit root clearly left us with the suspicion of evidence of co-integration from the variables. And for this reason, we conduct co-integration test using Engle-Granger procedure. The result is shown in table 2 below:

Results from Co-Integration Test

Given the unit root properties of the variables, we proceed to implement the Engle-Granger co-integration procedure. All the variables have the same order (I ~ (1)) of integration; we estimate their linear combination at their level form with the intercept term and obtain their residual which is then subjected to co integration test as shown in Table 2

Table 2: Co-Integration Tests

Model	Variable	t-adf	Lag	5%Critical val	1% Critical val
1	Residual	-3.859060	1	-2.9665	-3.6752

From the table above, the residual t-adf of -3.859060 at lag length 1 is greater than 5% critical value of 2.9665 it means that the residual is stationary at level form and hence there is long-run linear relationship or co-integration among the variables. Consequently, we estimated long run relationship among the variables.

To check the robustness in the long run relationship among the variables, we turn to ARDL model. The result of the ARDL is shown in table below:

Table 3: ARDL Test Result

Dependent variable: GDP				
Variables	Coefficient	Std. Error	t-stat	Prob.
Constant	2.641***	0.742	3.56	0.008
Log (INR)	0.1183***	0.019	6.23	0.004
Log (RER)	0.033*	0.019	1.75	0.095
Log (RIR)	-0.3262***	0.12	-2.7	0.014
GDP(-1)	0.321**	0.139	2.3	0.042
ECM (-1)	-0.275**	0.104	-2.6	0.041
F- Stat.	8.86***			0.0001
R ² = 0.878 Adj. R ² = 0.822	Durbin Watson = 1.684			

***[**] (*) denotes significant of variable at 1% [5%] (10%) significance level respectively.

The estimated model can be shown as:

$$GDP = 2.641 + 0.1183 + 0.033RER - 0.326RIR + 0.321GDP (-1)...(8)$$

From the results in model 1, international remittance has a positive and significant impact on the Nigerian economy proxied by GDP. Specifically, a dollar increase in remittances inflows into the country will increase Nigeria's GDP by 0.1 billion naira through

household consumption and private investment. The implication of this finding is that if there is proper utilization of remittances inflows into the country, it will enhance the growth of the Nigerian economy. This can be done by diversification of proceed into productive purposes.

This is consistent with theoretical postulates implying that increase in international remittance inflow will enhance economic growth through private investment. This result corroborates the findings of Ziesemer (2006) for four different countries and Ezra and Nwosu (2008) for Nigeria.

Interestingly, previous state of the economy has both positive and significant impact on its present state implying that previous year's programmes and policies of the government will have a positive impact on present state of the Nigerian economy.

As expected, exchange rate has positive and significant impact on the Nigerian economy. This is in line with "a priori" expectation validating the Mundell-Flemming rule which says that depreciation in exchange rate increases export, and hence increase in output and income of the nation. This result corroborates the findings of Adam and Tweneboah (2008) and Okpara and Odionye (2012).

Interest rate has negative but significant impact on financial sector development implying that a rise in interest will increase investment and hence increase in output.

The results show that the error correction term (ECM) for the estimated equation is statistically significant and negative. Thus, it will rightly act to correct any deviations from long-run equilibrium. Specifically, if actual equilibrium value is too high, the ECM will reduce it, while if it is too low, the ECM will raise it. The coefficient of -0.275 denotes that 27.5% of any past deviation will be corrected in the current period. Thus, it will take about three years and six months for any disequilibrium caused remittances to be corrected.

The coefficient of determination and its adjusted are 0.875 and 0.822 respectively implying that there exists goodness of fit in the model. This means that about 87.5% of the deviations in GDP is accounted for by variation in the exogenous variables. The overall regression is significant at 1% level of significance implying that the joint effects of all the included variables were significant.

The Durbin Watson statistic shows evidence of no first order serial autocorrelation in the model given that it is approximately 2.

Short and Long run Diagnostic Test

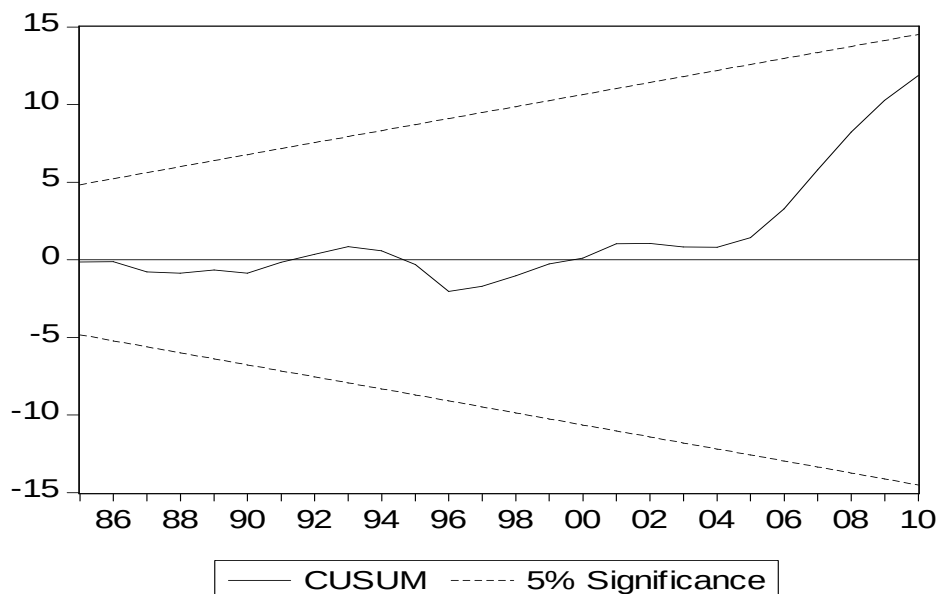
Short and long run diagnostic test were also carried out to know the validity of these results. The summary of the result is presented in table 6 below:

Heteroskedasticity Test = 2.03422 (0.141412)
Jarque- Bera = 2.015688 (0.364674)

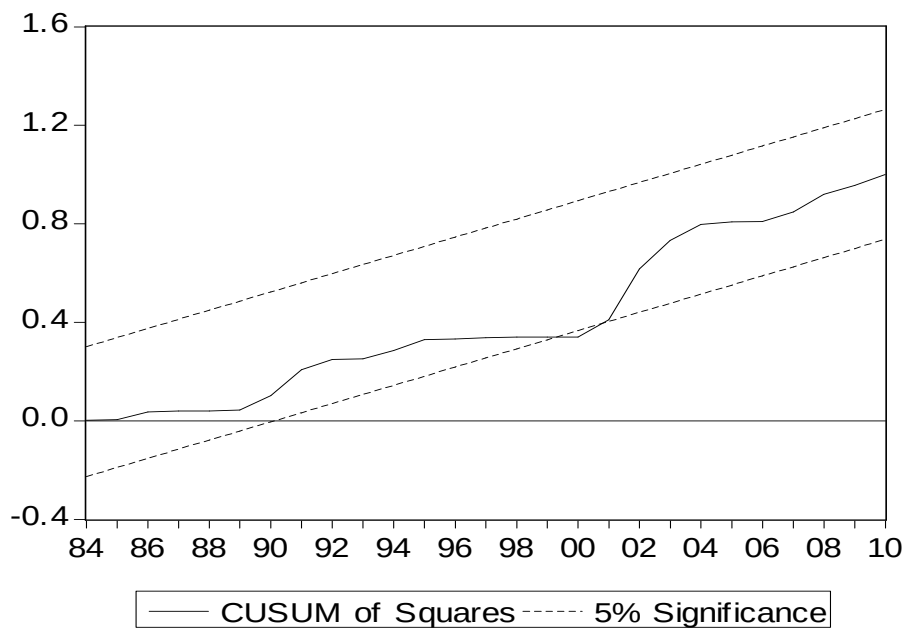
Heteroskedasticity test result showed no evidence of heteroskedasticity in the model implying that the conditional variances of the error terms are equal. The Jarque – Bera statistic showed that the error term is normally distributed since the Jarque-bera statistic is not significant at 5% level.

Finally, we examine the stability of the long run parameter of the model. Thus we rely on Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) test proposed by Borenstein et al (1995). The same has been used by Pesaran and Pesaran (1997) and Mohsen et al (2002) to test the stability of the long run. The results are presented in figures below:

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363 As observed in the figures, the plot of CUSUM and CUSUMSQ statistics stay within the
 364 critical 5% bound for the period.

365

366 **5.0 Conclusion and Policy Recommendations**

367

368 The study has investigated the impact of international remittances on the Nigerian
 369 economy. Following the behavioural pattern of the variables, we adopted Autoregressive
 370 Distributed Lagged model (ARDL) in the study.

The result of the Auto Regressive Distributed Lagged (ARDL) model showed that international remittance inflow has positive and significant impact on the Nigerian economy. The result of cointegration suggested is long run relationship between international remittances and economic growth in Nigeria.

In the light of the findings of this study, the following recommendations are considered necessary for short and long term implementations.

Since international remittance has positive and significant impact on Nigerian economy, policies that will enhance international remittance should be pursued. To achieve this, policy should focus on:

- ❖ Improve access to remittance services as it will improve rural access to remittance services and thereby discourages migrants from remitting through informal sector and hence foster economic growth.
- ❖ Increase competition to reduce remittance service cost in the financial sector. According to Agu (2010), the financial sector charges more than 10% of the total amount sent by migrant. This includes increasing the number of remittance service provider.
- ❖ Unnecessary administrative bottleneck in the financial sector should be eliminated to enhance remittance inflow through the right channel.
- ❖ Government should improve on the operational environment and regulation of remittance service, particularly as they relate to improving competition, reducing charges, improving access and enhancing the use of remittance proceeds in order to deepen the financial sector development and sustain momentum for growth.

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