The Effects of Foreign Aids on Infrastructural Development and Poverty Alleviation in The Developing Countries: A Case Study of Nigeria

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Abstract. Concept of foreign aid was examined. Nigeria was receiving foreign aid for long time and some improvements have been done in economic development. Our investigation was on the point how deep it was impacted. Following the empirical literature, this study adopts the model employed by Ajisafe (2017) and Chotia and Roa (2017) to examine the impact of foreign aid and infrastructural development on poverty reduction. The study makes use of annual dataset to examine the impact of foreign aid and infrastructural development on poverty reduction in Nigeria over the period of 1981 to 2016. Data on foreign aid measured by Total Official Development Assistance received (constant 2010 US$), infrastructural development (proxy by total electricity net generation. Electric power and distribution losses as a ratio of output, mobile cellular subscriptions, Internet subscribers per 100 population, improved sanitation facilities as a ratio of population with access. Improved water facilities as a ratio of population with access, the total road network in km per square km of the exploitable land area), poverty (proxy by household consumption per capita). This study provides an analysis of the impacts of foreign aid and infrastructural development on poverty reduction in Nigeria. The major findings of the study are three: one, foreign aid exerts a positive impact on poverty reduction in Nigeria in both short and long terms. Two, the infrastructural development also impacts positively on poverty reduction in Nigeria both in the short and long run; and three, the interaction of foreign aid inflows with infrastructural development yields a negative impact on poverty reduction in Nigeria. The study, therefore, concluded that foreign aid alone could not by itself reduce poverty, but has to be strengthened by infrastructural development. Some recommendations for policymakers were done.

To cite this article
[Hamidu, N., Jelilov, G. Isik, A. & Akyuz, M. (2020). The Effects of Foreign Aids on Infrastructural Development and Poverty Alleviation in The Developing Countries: A Case Study of Nigeria. *The Journal of Middle East and North Africa Sciences*, 6(09), 25-35]. (P-ISSN 2412- 9763) - (e-ISSN 2412-8937). www.jomenas.org**. 5**

Keywords: Development, FFDI, Poverty Reduction, Nigeria.
JEL Code: E0, E6, I13, O1

1. Introduction:

A foreign aid according to DAC is the financial flows, technical assistance, and commodities that are designed to promote economic development and welfare in developing countries (OECD, 2012a). The primary objective of the donors in providing aid is to fill the saving-investment gap, the foreign exchange gap,the fiscal gap and thus help developing countries to achieve economic growth and poverty reduction. The donors expect that if international aid appropriately used, it can increase the savings and reduce foreign exchange constraints and thus increase investments in infrastructure development, economic growth and reduce poverty. In Africa's low-income countries, external grants and concessional loans provide crucial resources to support the expansion of public investment in infrastructure development programmes.

Poverty, according to the United Nations (1998) is a fundamental denial of choices and opportunities, a violation of human dignity resulting in lack of vital capacity to effectively participate in the society. Extreme poverty has become a problem in developing countries like Nigeria, particularly since the 1980s despite several measures which have been taken at both macro and micro level to combat it. Dauda and Makinde (2014) observed that the realisation of the intended gains on poverty reduction efforts remains elusive as poverty in Nigeria has assumed an increasing trend despite successive governments' initiatives aimed at poverty reduction. For instance, poverty incidence in Nigeria rose from 46.3 percent in 1985 to 69.0 percent in 2010 and the actualisation of the International Development Targets to reduce the percentage of people living below 1 dollar a day from 30 percent to 15 percent of the developing world population has remained a mirage in Nigeria.Investment in

infrastructure development such as telecommunications, transport, energy, water, health, housing and education identified in the economic literature as an important factor in attaining economic growth and improvement. In welfare, because it stimulates positive externalities through available production facilities by reducing costs associated with trade payments and generate employment opportunities for the people which enhance growth quality and reduces poverty level (Aschauer,1989; Estache, 2006; and Ogunlana *et al*., 2016). However, insufficient public investment in infrastructure development (good roads, functional railway networks, water, electricity, schools, houses, hospitals) impede sustainable growth and development and possibly worsen poverty level.

The empirical literature on the relationship between foreign aid and poverty remain inconclusive. While Masud and Yontcheva (2005); Bahmani-Oskooee and Oyolola (2009); Kaya, Kaya and Gunter (2013); Alvi and Senbeta (2014); Woldekidan (2015); and Ugwuanyi et al. (2017) found that foreign aid reduces poverty and improves the welfare indicators in aid-recipient countries. The second strand claims that foreign aid increase unproductive public consumption, worsen inequality and poverty in aid-recipient developing nations. Examples of such studies are Asra, Kim and Quibria (2005); Chong, Gradstein, and Calderon (2009); Olofin (2013), Azam *et al*. (2016); and Irfan and Nehra (2016). A large body of evidence from the literature has argued that poverty reduction enhanced through public investment in infrastructure development. For instance, Anderson, Renzio and Levy (2006) explained that public investment in infrastructure development induced a reduction in poverty by creating direct welfare benefits in the form of increased quantity and quality of final goods and services, higher employment by crowding in private investment. Other scholars have equally confirmed this position (Seetanah *et al.,* 2009;Ali, 2010; Ogun, 2010; Marinho *et al.,* 2017; and Chotia and Roa, 2017) whose studies observed that higher public investment in infrastructure development not only enhance economic growth but also reduces poverty. Also, the primary objective of the donors in providing aid is to supplement domestic savings and increase public investment in infrastructure development in LDCs which largely transformed to economic growth and reduces poverty.

This study aims to test the importance of infrastructural development in the aid-poverty relationship. This study attempted to examine the joint impact of foreign aid and infrastructural growth on poverty reduction to accentuate the role infrastructural development plays with assistance in the poverty model in Nigeria. The study employed the ADL model between 1990 and 2015. The study structured into five sections; Section I is the introduction. Part II is the review of relevant literature. Section III presents the methodology employed to investigate research problem and achieve the objective. Section IV shows the estimation results and discussion. The final chapter concludes the study and offers policy recommendation.

2. Review of Literature:

The subject of foreign aid effectiveness in developing countries has led to a plethora of studies on the international aid-poverty nexus. For example, Gomanee, Mosley, Morrissey and Verschoor (2003) found that aid potentially benefits the poor in 39 aid-recipient developing countries over the period 1980 to 1998. Gomanee *et al*. (2005) re-examined the effect of support on aggregate welfare for 104 aid recipient countries using infant mortality and Human Development Index (HDI) as welfare indicators over the period of 1980-2000. They found that aid has a direct effect on welfare or indirectly through growth. Masud and Yontcheva (2005) evaluated the impact of two different kinds of aid (bilateral and Non-Governmental Organization (NGO) aid) on infant mortality and illiteracy rates for 58 developing countries between 1990 and 2001. The results showed that NGO aid significantly reduces infant mortality and does so more efficiently than official bilateral assistance.

Bahmani-Oskooee and Oyolola (2009) applied the random effect models and the Two-Stage Least Square (2SLS) estimation techniques to examine the impact of foreign aid on poverty, which was proxied by headcount ratio for 49 aid-recipient countries for the period 1981 to 2002. The study found that international support reduced poverty in aid-recipient nations and concluded that inequality was harmful in reducing poverty. Applying fixed effect and S-GMM estimators for a panel of 112 aid recipient countries for 1995–2011, Lee and Lim (2014) investigate the responsiveness of health aid to the recipients' needs regarding infant mortality, child mortality, and HIV prevalence. Their empirical result showed that an increase in infant or child death of a recipient country increases the total value of health aid committed to this country. As a result, of more health aid projects it receives while a rise in HIV prevalence leads to increase in the total value of health aid concerning both number of projects and the average project value.

Using data from 75 developing countries spanning 1981-2010, Alvi and Senbeta (2014) employed quintile regression to investigate the effect of foreign aid on poverty reduction. The result of the study indicates that foreign aid, financial development, openness to trade and international remittances have strong direct poverty-reducing effects in developing countries. Focusing on West Africa countries, Olofin (2013) examined the impact of different types of foreign aid on poverty levels in eight West African countries between 1975 and 2010. By employing both the Augmented Mean Group estimator (AMGe) and Common Correlated Effects Mean Group estimator (CCEMGe), which allows cross-section dependence econometrics methods of panel unit root test and co-integration test. The

results revealed that total foreign aid and food aid impact positively on poverty, while technical assistance reduces poverty.

Azam, Haseeb, and Samsudin (2016) investigated the effect of foreign remittances along with some other variables (foreign aid, debt, human capital, inflation and income) on poverty in 39 lower middles, upper middle and high-income countries covering the period of 1990-2014. The result of the Panel Fully Modified OLS (FMOLS) revealed that aid and debt worsen poverty. Also, GDP per capita, foreign remittances, foreign debt and human capital Granger cause hardship in the lower middle-income countries while foreign aid does not Granger cause poverty. Focusing on 96 high mortality countries, Wilson (2011) employed GMM estimator to examine the effectiveness of health aid on mortality trajectory over the period of 1975 to 2005. The result of the study indicates that health aid does not affect mortality while economic growth has a substantial adverse impact on mortality. Using difference-in-difference-in-differences (DDD) approach, Nunnenkamp and Ohler (2011) assessed the effect of foreign aid in alleviating HIV/AIDS epidemics measured by the number of AIDS-related deaths of adults and children, and the number of new HIV infections in 13 developing countries spanning 1998 and 2007. They found that foreign aid has been insufficient to minimize the number of new HIV infections. Kaya, Kaya and Gunter (2013) focused on the relationship between support given to the agricultural sector and poverty reduction proxied by poverty headcount ratio at US$ 1 a day for a panel of 46 developing aid recipient countries from 1980 to 2003. Using fixed effects and Three-Stage Least Square (3SLS) estimation techniques, he found that aid directed to the agricultural sector of a developing country improves the welfare of the poor, by reducing the headcount poverty ratio both directly and indirectly.

The study by De Matteis (2015) explored the nexus among foreign aid, economic growth, poverty and governance in 78 developing countries over the period of 1980 and 2008. The result of the simultaneous estimator revealed that assistance reduces debt and boost growth in a conducive environment. Edrees *et al*. (2015) examined the impact of government spending, economic growth, trade, foreign aid and foreign direct investment on poverty reduction in Africa over the period of 1974 and 2013. The result of the GMM estimation technique revealed that foreign direct investment, economic growth, trade and government spending on education and health are positively related to poverty reduction while foreign aid negatively contributed to the poverty reduction in Africa. However, in a specific country study, Woldekidan (2015) examined the role of international aid in reducing poverty proxied by infant mortality rate, gross primary enrollment ratio and real household final consumption expenditure over the period of 1975-2010 in Ethiopia using Johansen maximum likelihood estimation technique. The study found that foreign aid has a significant impact on poverty by reducing infant mortality rate and increasing household consumption expenditure while economic growth has a substantial contribution to poverty reduction and poor quality of governance exacerbate poverty. In Nigeria, Ajisafe (2017) explored the relationship between foreign aid and poverty level in Nigeria spanning 1980 and 2015. The result of the ARDL estimation technique disclosed that international assistance insignificantly reduces poverty level in Nigeria. Likewise, Ugwuanyi *et al.* (2017) employed ARDL technique to examine the effect of foreign aid on poverty level in Nigeria between 1980 and 2014 and found that international support reduces poverty marginally both short and long run.

On the other hand, few other studies (e.g. Asra, Estrada e*t al*., 2005; Nakamura, and McPherson, 2005; Williamson, 2008; and Asiama and Quartey, 2009) found that foreign aid is ineffective in reducing poverty in aid recipient countries. For instance, Asra, Estrada, Kim and Quibria (2005) examined the impact of aid effectiveness in lowering debt from 1960 to 1998 using panel data for 49 developing countries. They found that aid is useful when it is relatively moderate but becomes ineffective and fungible when it is larger than the recipient country's absorptive capacity. They concluded that assistance has not been useful in sub-Saharan African countries compared with other regions because there are other factors beyond macroeconomic policy and governance that are responsible for aid ineffectiveness in SSA region. Also, Nakamura and McPherson (2005) found that aid has no significant impact on several poverty indexes regardless of the decomposition of assistance while real per capita income has a substantial effect on poverty reduction in 49 countries over the period of 1970 until 2001. Williamson (2008) found that foreign aid is ineffective at increasing overall health and is an unsuccessful human development tool using fixed effect estimation technique. To test whether increases in human welfare (infant mortality, life expectancy, death rate, and immunizations (DPT and measles)achieved through the health sector of specific foreign aid. In 216 aid-recipient countries, over the period of 1973 and 2004. Also, Asiama and Quartey (2009) found that aggregate bilateral cooperation flows to Sub-Saharan Africa do not have a significant direct effect on human development indicators (welfare and poverty) using GMM estimation technique. To investigate the impact of foreign aid on the human development indicators (poverty and health) for 39 SSA countries over the period of 1975 to 2003.

The *polarized* view between foreign aid and poverty, it is expedient to assess those pieces of literature that examine the impact of infrastructural development on poverty reduction. Douzounet and Urbain (2013) examined the effects of foreign aid on capital investment (human capital, physical capital) in 37 sub-Sahara African countries over the period 2000-2010. The results of the study showed that international assistance positively

affected the physical capital accumulation in the countries under review. Also, Donaubauer and Nunnenkamp (2016) appraise whether foreign aid increases infrastructure (transportation, communication, energy, and finance). In aid recipient countries over the period of 1999 and 2011 and the empirical result showed that aid is ineffective in increasing infrastructure because focused on financing new physical construction rather than on maintaining or improving existing infrastructure. Seetanah *et al.* (2009) employed dynamic panel and Hurlin and Venet (2004) Granger causality test to evaluate the significance of support on urban poverty in a 20-country over the period of 1980 and 2005. They discovered that infrastructure development (transports and communications) are useful tools in reducing poverty in metropolitan areas. Also, the result of the causality test revealed that infrastructure granger causes poverty. Likewise, S-GMM estimation technique, as well as Hurlin and Venet (2004) Granger causality, were utilized by Marinho *et al*. (2017). The result is to assess the influence of infrastructure investments (transports, energy and mineral resources, communications and health and sanitation) in alleviating poverty in Brazil over the period of 1995 to 2011. The empirical result disclosed that infrastructure, the per capita GDP and the average schooling years diminished poverty levels. Further, the result of the Granger causality showed that infrastructure investments granger cause poverty level. In a more related study, Chotia and Roa (2017) examined the long run as well as a causal relationship between infrastructure development (measured by Transport, Water and Sanitation, Telecommunications and Energy) and poverty reduction in India spanning 1991 and 2015. The result of the ARDL estimation technique revealed that infrastructure development alleviates poverty in India. Further, the result of the Toda and Yamamoto Granger causality test indicates that causality runs from infrastructure development to economic growth and poverty reduction. In Nigeria, Ogun (2010) investigated the relative effects of physical and social infrastructure on poverty indicators over the period of 1970 to 2005 using Structural Vector Autoregressive (SVAR) estimation technique. The study found that support, in general, reduces poverty, social infrastructure explains a higher proportion of the forecast error in poverty indicators relative to physical infrastructure. Similarly, Osundina Ebere and Osundina (2014) analyzed the relationship between government spending on infrastructure and poverty reduction in Nigeria spanning 1970-2012. They used Vector Error Correction model and found that there was a long run relationship between public spending on infrastructure and poverty reduction in Nigeria. Also, the result showed that government spending on building and construction reduces poverty whereas government spending on transportation, education and health hurt poverty reduction in Nigeria. On the nexus between transport infrastructure, economic growth and poverty in Nigeria over the period of 1980 and 2012, Oladipo and Olomola (2016) utilized cointegration test and vector error correction model and found that there exists a long run relationship among road transport infrastructure development, economic growth and poverty reduction in Nigeria. Further, the result indicates that expansion in road transport infrastructure marginally reduced poverty level.

In summary, from the empirical literature surveyed above, most of the previous studies have focused on either the effect of foreign aid on poverty level or the effect of infrastructural development on poverty level. Also, most of the studies within and outside Nigeria failed to consider the role of infrastructural development as a transmission mechanism between foreign aid and poverty reduction. In the light of this observation, this study intends to fill the gap in the literature by examining the relationship amongst foreign aid, infrastructural development and poverty level in Nigeria.

2. Methodology:

Following the empirical literature, this study adopts the model employed by Ajisafe (2017) and Chotia and Roa (2017) to examine the impact of foreign aid and infrastructural development on poverty reduction. The model specified:

$$POV_t = f(FA_t, IFDI_t) \quad (3.1)$$

Where POV is poverty, FA denote foreign aid and IFD is infrastructural development. Other variables such as economic growth, financial development, inflation rate and governance as adopted by Bahmani-Oskooee and Oyolola (2009), and Goff and Singh (2014) also seem to influence poverty level. Incorporating these variables into Eq. (3.1) gives:

$$POV_t = f(FA_t, IFDI_t, GDP_t, FD_t, INF_t, GOV_t) \quad (3.2)$$

Where POV is poverty, FA denote foreign aid and $IFD$is infrastructural development, $GDP$is GDP per capita which measures overall economic growth, FD measured financial depth, INF is inflation rate which estimates macroeconomic uncertainty while GOV is an indicator of institutional quality at time t.

The log-linear form of equation (3.2) expressed as:

$$InPOV_t = \alpha_0 + \beta InFA_t + \delta InIFDI_t + \phi InGDP_t + \varphi InFD_t + \gamma INF_t + \eta GOV_t + \varepsilon_t \quad (3.3)$$

All the variables are as already defined before and $\varepsilon_t$are a remaining term assumed to be white noise.

To examine the direct impact of foreign aid and infrastructural development on poverty reduction in Nigeria. This study employs Autoregressive Distributed Lag (ARDL) approach to cointegration developed by Pesaran *et al.* (1997, 2001). This technique is applied because it can accommodate different orders of integration I(0), I(1) or I(0)/I(1). Furthermore, the ARDL approach integrates the short run dynamics with the long run

equilibrium without losing any extended run information. Also, the ARDL approach provides better results for small sample data set compared to other traditional methods to cointegration (Engle and Granger, 1987; Johansen and Juselius, 1990; and Phillips and Hansen, 1990). Lastly, ARDL approach gets rid of endogeneity problem due to the selection of appropriate lag selection. Hence, residual correlation. The general ARDL representation of Eq (3.3) formulated as:

$$\Delta InPOV_t = \alpha_0 + \sum_{j=1}^{p} \theta_j \, \Delta InPOV_{t-j} + \sum_{j=0}^{q} \beta_j \, \Delta InFA_{t-j} + \sum_{j=0}^{q} \delta_j \, \Delta InIFDI_{t-j} + \sum_{j=0}^{q} \varphi_j \, \Delta InGDP_{t-j} + \sum_{j=0}^{q} \gamma_j \, \Delta FD_{t-j} + \sum_{j=0}^{q} \eta_j \, \Delta INF_{t-j} + \sum_{j=0}^{q} \lambda_j \, \Delta GOV_{t-j} + \pi_1 InPOV_{t-1} + \pi_2 InFA_{t-1} + \pi_3 InIFDI_{t-1} + \pi_4 InGDP_{t-1} + \pi_5 FD_{t-1} + \pi_6 INF_{t-1} + \pi_7 GOV_{t-1} + \varepsilon_t \quad (3.4)$$

Where Δ represents first difference operator, $\pi_1 - \pi_7$ are the long-run multipliers, and $\theta_j, \beta_j, \delta_j, \varphi_j, \gamma_j, \eta_j$ a λ_j re the short-run dynamic coefficients, ε_t is white noise errors, α_0 is an example of drift term, p and q are the optimal lag lengths for the dependent and independent variables respectively. The existence of long-run relationships ascertained by conducting an F-test for the joint significance of the constants of the lagged values of the variables taking into account the null hypothesis of no cointegration, $H_0: \pi_f = 0$, against the alternative $H_a: \pi_f \neq 0$ where $f = 1,2.....7$. The Wald test applied in cases where there is more than one short-run coefficient of the same variable. The F-statistics compared with the upper and lower bounds critical values. If the F-statistic exceeds the high significant value, we conclude in favour of a long run relationship or otherwise. However, if the F-statistic lies between the lower and upper critical bounds, the inference would be inconclusive.

4.1. Data and Analysis:

The study will make use of annual dataset to examine the impact of foreign aid and infrastructural development on poverty reduction in Nigeria over the period of 1981 to 2016. Data on foreign aid measured by Total Official Development Assistance received (constant 2010 US$), infrastructural development (proxy by total electricity net generation. Electric power and distribution losses as a ratio of output, mobile cellular subscriptions, Internet subscribers per 100 population, improved sanitation facilities as a ratio of population with access. Improved water facilities as a ratio of population with access, the total road network in km per square km of the exploitable land area), poverty (proxy by household consumption per capita). Economic growth measured by GDP per capita (constant 2010 US$), financial deepening (Domestic credit to private sector as a ratio of GDP) and inflation rate (Annual percentage change in consumer prices) sourced from the World Bank's World Development Indicators. The 2017 edition while governance which is an institutional quality indicator (proxy control of corruption) obtained from World Governance Indicators, 2017 edition.

Lastly, in order to measure infrastructural development, this study will make use of principal component analysis (PCA) to generate infrastructural development index from seven indicators. Namely, total electricity net generation, electric power transmission and distribution losses as a ratio of output, mobile cellular subscriptions, Internet subscribers per 100 population. Improved sanitation facilities as a ratio of population with access, improved water facilities as a ratio of population with access, the total road network in km per square km of exploitable land area. This index hereafter denoted by infrastructural development index. According to Pearson (1901), the principal component analysis is a mathematical procedure that uses an orthogonal transformation to convert some set observations of possibly correlated variables into a set of linearly uncorrelated variables. It creates variables that are the linear combination of the original variables. The motivation for using PCA to generate infrastructure development index *(IFDI)* are first, modeling various indicators of infrastructure development in the same equation may lead to a severe problem of multicollinearity. Also, utilizing the aggregate effect of these signs is likely a better approach than modeling each indicator separately. Second, there is no consensus as to which measure of infrastructure development is most appropriate. Therefore, having a summary measure of infrastructure development that includes all the relevant infrastructure development proxies (data permitting) to capture several aspects of infrastructure development at the same time. These are total electricity net generation, electric power transmission and distribution losses as a ratio of output, mobile cellular subscriptions, Internet subscribers per 100 population, improved sanitation facilities as a ratio of population with access. Improved water facilities as a ratio of population with access, the total road network in km per square km of the exploitable land are will provide better information on infrastructure development. It is believed that this new index of infrastructure development can capture most of the data from the original data and is a better indicator than the individual variables.

3. Results and Discussion

3.1 Preliminary Analyses

Before estimation of the ARDL model, we conduct preliminary analyses on the data. These involve the descriptive statistics to reveal the salient characteristics of the series (i.e. mean, standard deviation, skewness and kurtosis) (see Table 1) and the stationarity tests (Augmented Dickey-Fuller and Pillips-Perron) to show time series properties of the variables (see Table 2).

Deducible from the analyses, the mean and median of all the variables in the data set lie within the maximum and minimum values. All the seven variables are positively skewed. The kurtosis statistics turn up a mixture of leptokurtic (those with kurtosis values greater than 3) and mesokurtic distributions (those with values less than 3). Accordingly, poverty, infrastructural development index, GDP per capita and governance are mesokurtic while the other three variables (foreign aid, financial deepening, and inflation rate) is leptokurtic.

Table 1: Descriptive Statistics

	POV	FA	IFDI	GDP	FD	INF	GOV
Mean	1295.21	1.71	0.92	260668.1	14.95	18.88	-1.12
Median	1303.89	4.46	0.56	210517.9	13.16	11.89	-1.13
Maximum	1736.00	1.29	2.80	385227.6	38.38	72.83	-0.80
Minimum	933.71	2.20	-0.33	186781.0	8.70	5.38	-1.33
Std. Dev.	282.03	2.75	0.98	75767.72	6.97	18.09	0.13
Skewness	0.10	3.04	0.65	0.44	2.35	1.86	0.37
Krtosis	1.51	12.16	2.08	1.51	7.75	5.18	2.85
Jarque-Bera	2.44	131.07	2.77	3.25	48.61	20.20	0.42
Probability	0.29	0.00	0.24	0.19	0.00	0.00	0.80

Note: POV, FA, IFDI represents poverty, foreign aid, and infrastructural development index. Other variables like GDP, FD, INF, and GOV represents GDP per capita, financial deepening, inflation, and governance respectively. Source: Author's Computation.

Table 2:Stationarity Tests

	ADF Test			PP Test		
Variables	**Level**	**First Diff**	**Status**	**Level**	**First Diff**	**Status**
LPOV	-0.9877	-8.6992	I(1)	-1.4563	-9.6078	I(1)
	[0.7408]	[0.0000]*		[0.5386]	[0.0000]*	
LFA	-0.8526	-5.0827	I(1)	-1.2644	-4.7191	I(1)
	[0.7845]	[0.0005]*		[0.6295]	[0.0010]*	
IFDI	-1.4065	-7.1146	I(1)	-1.1498	-7.4957	I(1)
	[0.5628]	[0.0000]*		[0.6792]	[0.0001]*	
LGDP	0.4920	-3.8600	I(1)	0.2887	-3.8600	I(1)
	[0.9829]	[0.0076]*		[0.9728]	[0.0076]*	
FD	-2.3671	-4.3263	I(1)	-2.3671	-4.3096	I(1)
	[0.1870]	[0.0026]*		[0.1606]	[0.0027]*	
INF	-2.2766	-4.0218	I(1)	-2.0297	-3.9857	I(1)
	[0.1876]	[0.0052]*		[0.2731]	[0.0057]*	
GOV	-1.4671	-15.3258	I(1)	-3.4282	-15.4987	I(0)
	[0.5326]	[0.0000]*		[0.0195]	[0.0000]*	

Note 1: POV, FA, IFDI represents poverty, foreign aid and infrastructural development index. Other variables like GDP, FD, INF, and GOV represents GDP per capita, financial deepening, inflation, and governance respectively. Note 2: The values in the square bracket [ ] are the probability values; (*) indicates significant at 1% level, (**) indicates significant at 5% and (***) indicates significant at 10%. Source: Author's Computation

Also, the analysis of Jarque–Bera normality test shows that poverty, infrastructural development index, GDP per capita and governance series normally distributed. The result implies that the series seems to have homoscedastic variance. Furthermore, the results of the ADF and PP unit root test presented in Table 2 indicate that all the series are stationary at first difference. The result implies that all the variables integrated into I (1). The result postulates that all the variables have the same order of integration, i.e. I (1) which conforms with the assumptions of the ARDL bounds testing approach to cointegration.

Table 3 present the result of the ARDL bounds approach to cointegration. The result indicates that the computed value of the F-statistics equal to 4.3243.Thisvalueis higher than the upper bound value (see Table3) at 5%. This result confirms that there is a long-run relationship among foreign aid, infrastructural development, and poverty reduction in Nigeria.

To assess the short run and long-run impact of foreign aid and infrastructural development on poverty reduction in Nigeria, we estimate the ARDL method. The result of the short and long run estimates reported in Table 4. The results indicate that foreign aid has an insignificant positive effect on poverty both in the short and long run. This result suggests that foreign aid does not reduce poverty level in Nigeria. This is as a result of weak institutions, diversion of funds and lack of accountability in aid delivery mechanism in Nigeria. This result has been confirmed by many scholars in the economic literature who found that foreign aid has no significant impact on several poverty indexes and is an unsuccessful human development tool (Chong *et al*., 2009; Olofin, 2013; Azam *et al*., 2016; and Irfan and Nehra, 2016). Further, results seem to suggest that infrastructural development worsen poverty level in Nigeria in the short and long run. This outcome negates the findings of Ogun (2010) in Nigeria; Marinho *et al*. (2017) in Brazil; Chotia and Roa (2017)in India. However, when we interacted foreign aid with infrastructural development, we obtained negative and significant impact on poverty reduction both in the short

Table 3: Bound Test Result

Variables	**F-Statistics**	**Cointegration**
F(POV/FA,IFDI)	4.3243	cointegration
Critical Value	Lower Bound	Upper Bound
1%	3.15	4.43
5%	2.45	3.61
10%	2.12	3.23

Source: Author's Computation

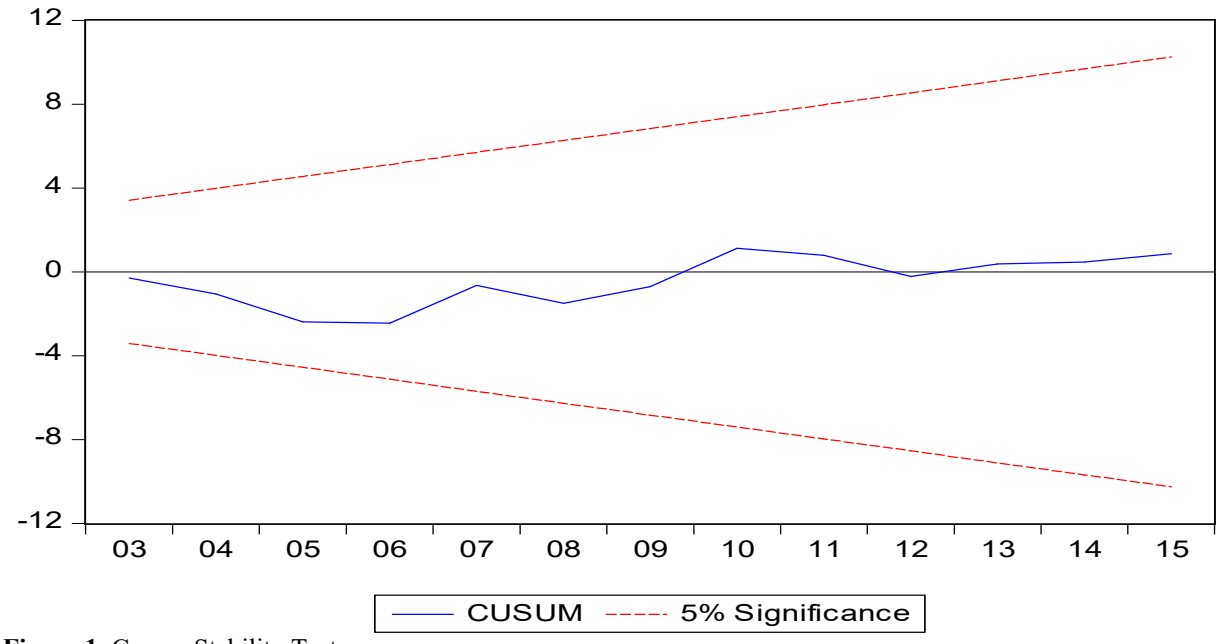

Figure 1. Cusum Stability Test

and long run. The result shows that investing foreign aid in infrastructural development rather than consumption would bring about improvement in welfare and reduction in poverty in Nigeria. Also, economic growth, inflation rate and governance have the negative impact on poverty reduction in Nigeria both in the short and long run while financial deepening seems to worsen poverty level in Nigeria. The estimate of the lagged error term (ECT) is negative (-0.98), and it is statistically significant at the 5% level. The result implies that the adjustment from the short-run to the long-run equilibrium path is 98%. Lastly, the diagnostic test results showed that there is no serial correlation, no problem of heteroskedasticity, and the residual normally distributed. Also, Figs. 1 and 2 show results of stability tests that is, Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ). The results of CUSUM and CUSUMsq tests indicate that graphs of both are between the critical bounds at 5% level of significance.

Table 4: The Result of the ARDL

Dep Var: LPOV	Coefficient	T-Stat	P-Value
Long-run Estimate			
LFA	0.0309	0.7519	0.4630
IFDI	1.9728	1.8959	0.0762
LFA*IFDI	-0.0955	-2.8887	0.0172
LGDP	-0.7056	-2.2098	0.0420
FD	0.0034	0.9592	0.3517
INF	-0.0003	-0.0353	0.9722
GOV	-0.1034	-1.8027	0.0903
C	-2.3450	-0.6796	0.5064
Short-run Estimate			
Δ LFA	0.0304	0.7197	0.4820
Δ IFDI	1.9385	2.1999	0.0429
Δ LFA*IFDI	-0.0938	-2.1879	0.0439
Δ LGDP	-0.6933	-2.2130	0.0418
Δ FD	0.0034	0.9654	0.3487
Δ INF	-0.0005	-0.0353	0.9723
Δ GOV	-0.1016	-1.7478	0.0996
ECT(-1)	-0.9825	-4.0306	0.0010*
R^2	0.8424		
F-Stat	10.6926		0.0000***

Diagnostic Test Statistic		
Test	Value	P-value
χ^2 Normal	1.0171	0.6013
χ^2 Serial	5.1274	0.0770
χ^2 ARCH	0.9731	0.3239

Source: Author's Computation, 2017.

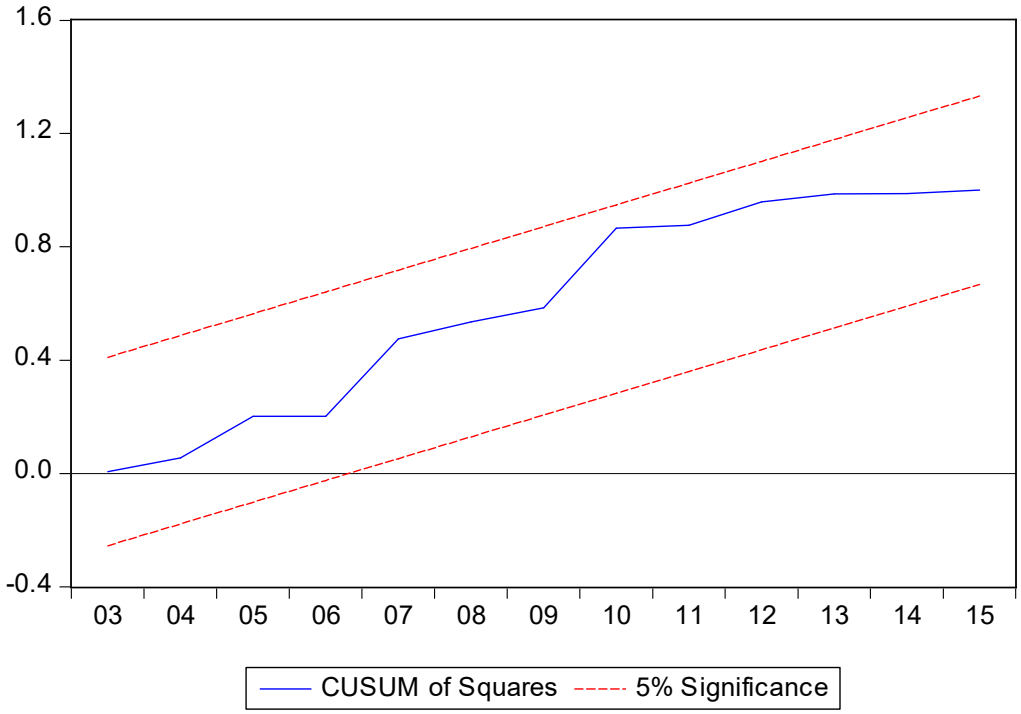

Figure 2. Cusum of Square Stability test.

4. Conclusion and Policy Implications

This study provides an analysis of the impacts of foreign aid and infrastructural development on poverty reduction in Nigeria. We aim to examine whether foreign aid inflows channeled to infrastructural development reduces poverty in Nigeria. The major findings of the study are three: one, foreign aid exerts a positive impact on poverty reduction in Nigeria in both short and long terms. Two, the infrastructural development also impacts positively on poverty reduction in Nigeria both in the short and long run; and three, the interaction of foreign aid inflows with infrastructural development yields a negative impact on poverty reduction in Nigeria. The study, therefore, concluded that foreign aid alone could not by itself reduces poverty, but has to be strengthened by infrastructural development.

The general and particular findings in this study have necessitated some policy directions which may be using the government and policymakers in Nigeria. First, it recommends that foreign aid donors should give high priority to sectors that benefit the poor such as agriculture and infrastructure development to facilitate poverty reduction. By doing so, Nigeria has a better chance of achieving sustainable transition out of poverty while promoting growth in both short and long run. Also, the government should increase the proportion of their budgetary allocation to the investment in social infrastructure which comprises investment in power, education and health, since investment in these areas can help to improve the welfare of people and reduce poverty level in both short and long run.

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Received July 30, 2020; reviewed August 15, 2020; accepted August 22, 2020; published online September 01, 2020