European Journal of Sustainable Development (2017), **6**, 2, 111-120 ISSN: 2239-5938
Doi: 10.14207/ejsd.2017.v6n2p111

The Impact of Official Aid on Poverty Reduction: Empirical Evidence from Nigeria (1981-2014) Using The ARDL and Bound Test Approach

By Ugwuanyi, Uche Boniface, Ezeaku, Hillary Chijindu, Imo G. Ibe

Abstract
Aid flows to developing countries is ultimately intended to help recipient countries attain sustainable development especially in the area of capital development, sustained economic growth, poverty reduction and reduced mortality rate. The justifications for increasing official aid to the poor countries of the world have constantly come under scrutiny and have generated intense debate among researchers. Against this background, this study is aimed at assessing the impact of official aid on poverty reduction in Nigeria from 1981 to 2014. The ARDL and the error correction model (ECM) were used to estimate for long-run and short-run dynamics respectively, while the Bound test was employed to test for long-run relationship between our variables of interest. Result of the Bound test showed that there exist a long-run relationship between official aid flows and poverty. Both long-run and short-run regression estimates revealed that official aid has non-significant positive impact on poverty reduction within the period. There is however strong sign of convergence toward long-run equilibrium as the speed of adjustment is significantly high. The results further showed that population growth exerted negative influence on poverty reduction both in the long and short-run whereas labour force participation was found to have relative positive impact on poverty reduction. We therefore conclude that while it is evident that official aid has positive influence on poverty reduction, the influence so established is not significant. We recommend that aid donors and international aid organizations should earmark aids for a specific needs and exhaust every prudential steps in making sure that such aid are used for the targeted aim with fact-based appraisals and implementation reports.

Keywords: Official Aid, Poverty Reduction, ARDL, Bound Test

1. Introduction

The implication of foreign aid for poverty reduction remains a subject of intense debate. Considering the relevance of foreign aid to the economies of the less developing countries, it is needful to understand its contribution to poverty reduction of developing countries. Majority of aid critics assert that aid has sustained corrupt governments in the recipient countries and enriched the elite and government officials. In contrast, some pro-aid groups have come in defence of aid and argued that aid could play major role in poverty reduction, economic growth, and in addressing the issues of income disparity (Nakamura and McPherson, 2005; Ijaiya and Ijaiya, 2004). Increase the amount of aid flowing from both multilateral and bilateral donors to the developing countries has prompted the need for the question, "is aid effective in reducing poverty in the developing countries?" Olofin (2013) contends that despite increase in foreign aid and growing working population, poverty and unemployment persist in the developing countries. Aid as well as grant can influence the economy of a nation from different

fronts; increases in investment, physical and human capital, and increases in the capacity to import capital goods and technology. Aid is associated with technological transfers which promotes endogenous technical changes, fosters increase in capital productivity (Morrissey, 2001). Given the massive scale of poverty, aid might be argued to be just a drop in the ocean. However, by adjusting for differences in purchasing power, utilization of aid for a simple consumption transfer would ultimately eliminate extreme poverty (White, 1996).

Developing countries have growing resource problems. Debt profile of most of these countries is alarming, and their dependence on foreign aid and grants seem eternal. Unfortunately, as aid continues to flow, debt burden is literally overwhelming. Official development assistance flows to recipient poor countries over the past decade is on the decline, and there is the need for developing countries to seek alternative ways of fixing the serious issues of resource problem, articulate ways of effective aid utilization through the right policies and finding innovative ways of attracting additional aids (Ekanayake and Chatrna, 2015). McGillivray (2006) opines that the numerous developmental objectives that aid is targeted to achieve are based on the fundamental assumption that aid works in reducing poverty. Thus far, the effectiveness of aid in alleviating poverty and attaining other related developmental outcomes has come under serious scrutiny and many has questioned aid's impact in addressing expected developmental goals. As a result, some critics are of the opinion that aid is a failure, harmful and counterproductive in terms of the yardsticks used in measuring its effectiveness. Basically, not only the amount and features of aid matter in its effectiveness, appropriate use of funds received in the form of aid or grant also plays a major role.

Tarp (2009) emphasizes that to improve living standards significantly, poor countries must increase its productivity. In order to achieve this goal, there must be a sustained long run acquisition and efficient utilization of physical capital, human capital and technology, and support for institutions that facilitate growth. Increase in production level is dependent on investment, and investment itself is a function of domestic savings. Significant level of savings is required to achieve a high level of investment that would drive growth and reduce poverty. The problem faced by developing countries is that domestic savings is often insufficient to support investment drives. According to the dual gap growth theory, the extra fund needed to augment domestic savings is borrowed from abroad. Supporters of aid have argued that when a countries domestic savings is added to foreign aid it will significantly and positively influence investment which would promote economic growth and development.

2. Review of Related Literature

Sachs and George (2009) explain that in response to extreme world poverty, the United Nations, in its Millennium Summit in 2000, agreed upon a set of Millennium Development Goals (MDGs) to be reached by year 2015 as a way of supporting future efforts to address poverty. One of the major commitments required to achieve the MDGs was for wealthy and highly industrialised nations to increase their aid to developing countries to 0.7 percent of gross national income, a target that had been in place since the mid-1960s. However, most of these nations have not achieved that goal.

Literally, some aid donations is not motivated by need for improving conditions in a particular jurisdiction but rather by internal politics and support for a government in the developed country. Such motive, argues Yanguas, 2016), has serious adverse effect on the developing country. According to Bourguignon and Leipziger (2006) one common view is that aid has a positive effect on growth, but only if recipient countries demonstrate certain characteristics, such as good policy and reforms, good institutional environments and political and economic stability.

Lawson (2016) contends that foreign aid programs, in some specific instances, have been considered to be evidently unsuccessful, or even detrimental to the intended recipient governments. Aid detractors vehemently argue that foreign aid is often diverted or misallocated by aid beneficiaries. Reference is often made to long years of aid to corruption developing countries, where little is done to address fundamental economic issues and improve the lives of vast poor population but, at the same time, the leaders enrich themselves from proceeds of foreign aid. Foreign aid may well be adjudged to be still successful on some respects where the lot of the poorer segments in beneficiary countries has been improved. It may help to alleviate poverty and narrow income disparities. In the post colonial era, foreign aid is viewed as a vehicle for the wealthy and developed countries to promote quality of live and living condition in less developed poor countries, alleviate poverty and equalize income distribution (Calderon, Chong and Gradstein, 2006; Guillaumont and Wagner, 2014; Ridwell, 2014).

Some empirical literatures have explored the nexus between foreign aid and poverty reduction and have come up with mixed findings. For instance, Olofin (2013) studied the effect of foreign aid on 8 West African countries and the results indicate that foreign aid has significant positive impact on poverty reduction in West Africa. Nakamura and Macpherson (2005) focused on the Sub-Saharan Africa. The study employed cross-sectional and panel data in examining the linkage between foreign aid and poverty reduction using several poverty indexes. The results indicate that while real per capita income has significant positive impact on poverty reduction, aid has no significant effect on poverty reduction in Sub-Saharan Africa. The findings pointed that Sub-Saharan Africa is less likely to achieve MDG of halving poverty by 2015. Ijaiya and Ijaiya (2004) carried out similar study on Sub-Saharan Africa (SSA) and found that foreign aid does not contribute significantly to poverty reduction in SSA. In contrast however, Azam et al, (2015) suggests that foreign aid and debt contribute significantly to poverty expansion. The study applied the fully modified OLS (FMOLS) on 39 developing countries over the period 1990 to 2014.

Pattillo, Polak, and Roy (2007) used regression estimate based on interaction variable (IAV) in examining the effectiveness of foreign aid on growth and poverty reduction. Criteria for decision rule were based on the significance of coefficient for the IAV. The results reveal that IAV coefficient is statistically significant an indication that foreign aid exert positive influence on the dependent variable.

Masud and Yontcheva (2005) assessed the effect of foreign aid in reducing poverty through its impact on human development indicators. A dataset of both bilateral aid and Non-governmental (NGO) aid flows was used. Our results showed that NGO aid reduces infant mortality and did so more effectively than official bilateral aid, while aid impact on illiteracy was less significant. The were mixed evidence of a substitution effect

as the study attempted to find out if foreign aid reduces government efforts in achieving developmental goals and find mixed evidence of a substitution effect.
Girma (2015) utilised the Autoregressive Distributed Lag (ARDL) approach to co-integration as he examined whether aid effectiveness is conditional on stable macroeconomic policy environment. The study used time series data for the period 1974 to 2011. The results showed that while separate foreign aid had negative impact on economic growth, aid policy index was found to have contributed positively to economic growth in Ethiopia if supplementation takes place under stable macroeconomic policy environment. This finding is in line with the results in Woldekidan (2015) which used the vector error correction model (VECM) and time series data spanning 1975 to 2010. Moreover, in the context of Papua New Guinea, Feeny (2003) added that level of inequality reduces the impact of growth on poverty.
De and Becker (2015) evaluated the allocation and impact of foreign aid with emphasis on disaggregated estimates from Malawi. The impact results of foreign aid on poverty reduction revealed distinct sub-national framework which was found to have sufficient granularity, and geographic living standards information should be used as a guide in future aid allocation. The propensity score matching methods reveal potential positive impact of educational aid on school enrollment. Health aid was found to have positive effect in decreasing disease severity as water aid has significant impact in reducing diarrhea prevalence.

3. Data and Methodology

Data for this study were collated from secondary sources. The annualized time series data from 1981 to 2014 were estimated using the Auto Regressive Distributed Lagged (ARDL) model. We used the Bound Test to determine if there is long run relationship between the regressand and the regressors, following the Pesaran criteria of bound limits. If the variables are cointegrated, we estimate for long run ARDL and also find the speed of adjustment. One of the merits of the bound test is that it accommodates possible structural breaks which may have adverse implications on the existence of a long run association between the explained variable and the explanatory variables (Mehdi and Reza, 2011). ARDL model has methodological advantage over the normal single co-integration procedures. Under ARDL, long run and short run coefficients for the model are estimated simultaneously, and model can be developed and utilised for co-integration test even if all the variables are not stationary after first differencing 1(1), or at level i.e 1(0). In other words, the underlying assumption is that some variables are integrated at order one, 1(1) and at level, 1(0) but none is integrated at second differencing, 1(2). ARDL model can be developed when this condition is met then.

Table 1. Description of Variables

Variable	Description	Measure	Source
RHCE	Real Household Final Consumption Expenditure	% of GDP	World Bank national accounts data, and OECD National Accounts data files
ODA	Net Development Assistance	Per capita	Development Co-operation Report, and International Development Statistics database.

GOP	Population growth	Annual % change	United Nations Population Division. World Population Prospects
LFPR	Labour Force Participation Rate	% of economically active population ages 15 and above	International Labour Organization, Key Indicators of the Labour Market database

3.1 Model Specification

Model for this paper will follow the primary linear model form in Nakamura and McPherson (2005) which attempted to ascertain if foreign aid is effective in reducing poverty. The model for the study was represented as,

$$PI_{ct} = \alpha_0 + \alpha_1 y_{ct} + \alpha_2 X_{ct} + \varepsilon_{ct} \quad (1)$$

Where c and t denote country and time respectively, PI_{ct} is the logarithm of poverty index, y_{ct} is the logarithm of per capital income and X_{ct} is a set of conditioning variables, and ε_{ct} is the error term.

Equation (1) will be modified to reflect the peculiarity of our study and variables selected. The long run model is therefore expressed as,

$$RHCE_t = \beta_0 + \beta_1 ODA_t + \beta_2 LFPR_t + \beta_3 GOP_t + \varepsilon_t \quad (2)$$

Where t indexes time, RHCE is real household final consumption expenditure and proxy for poverty reduction, ODA is the ratio of official development assistance to GDP, LFPR is labour force participation rate, GOP is growth of population, ε_t is error term, β_0 is intercept, β_1- β_3 are parameter estimates.

The ARDL model with error correction parameter and short-run dynamic model can be derived from equation (2) and presented as,

$$\Delta RHCE_{t,j} = b_0 + \sum_{i=1}^{n1} b_{1i,j} \Delta RHCE_{t-1,} + \sum_{i=0}^{n2} b_{2i,j} \Delta ODA_{t-1,j} + \sum_{i=0}^{n3} b_{3i,j} \Delta LFPR_{t-1,j} + \sum_{i=0}^{n4} b_{4i,j} \Delta GOP_{t-1,j} + ect_{t-1,j} + \mu_t \quad (3)$$

Where Δ denotes first differencing operator, b_0 is constant, b_{1-4} are coefficients of short run dynamics, I and j are lag lengths, n is the number of lags, ect_{t-1} is error correction term and speed of adjustment.

From the foregoing, a representation of the ARDL approach to co-integration or bound test can be expressed as,

$$\Delta RHCE_{t,j} = c_0 + \sum_{i=1}^{m1} c_{1i,j} \Delta RHCE_{t-1,} + \sum_{i=0}^{m2} c_{2i,j} \Delta ODA_{t-1,j} + \sum_{i=0}^{m3} c_{3i,j} \Delta LFPR_{t-1,j} + \sum_{i=0}^{m4} c_{4i,j} \Delta GOP_{t-1,j} + c_5 RHCE_{t-t,j} + c_6 ODA_{t-1,j} + c_7 GOP_{t-1,j} + v_t \quad (4)$$

We are guided by Pesaran, *et al.* (2001) to determine the presence of long run association among the variables. Here we apply the bound test, which is essentially based on the F-test, compared with bound limits criteria.

Unit root test will be conducted on our variables to determine there stationarity status. This is important since our data set is a time series data and the coverage period is long. For ARDL model to stand, the variables will either be purely integrated of order Zero, 1(0), or order one, 1(1) or a mixture of 1(0) and 1(1), but none on the variable will be integrated of order two, 1(2).

The general model for Augmented Dickey-Fuller unit root test can be represented thus,

$$\Delta y_t = \beta_0 + \beta_1 t + \lambda y_{t-1} + \sum_{j-1}^{p} \delta_j \Delta y_{t-j} + \mu_t \quad \text{---------- (5)}$$

Where y_{t-1} is lagged value of $y_t$at first difference, and Δy_{t-j} = a change in lagged value, δ is measure of lag length, while Δy_t is first difference of y_t, and μ_t = white error term.

4. Results and Discussion

Table 2. Augmented Dickey-Fuller (ADF) Unit Test Results

VARIABLES	ADF @ LEVEL	CRITICAL VALUE			P Value	Order of Integration
		1%	5%	10%		
RHCE	-4.663295	-3.646342	-2.954021	-2.615817	0.0007	1(0)
ODA	-3.167689	-3.639407	-2.951125	-2.614300	0.0309	1(0)
LFPR	-9.019564	-3.653730	-2.957110	-2.617434	0.0000	1(1)
GOP	-3.796291	-3.699871	-2.976263	-2.627420	0.0080	1(0)

Source: Authors'

Table 2 presents the stationarity test results for the respective variable. It can be duly observed that the variables attained stationarity at different points of integration. Besides labour force participation rate (LFPR) that is stationary after first difference, the rest of the variables are stationary at level. This state of stationarity satisfies the assumptions for ARDL hence the estimation procedures for co-integration may proceed.

Table 3. ARDL Bound test for co-integration

F-statistic	6.639330	
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

Source: Authors' 2016.

Table 3 demonstrates that results of F-test for co-integration. The F-statistic is greater than critical value of bounds, which indicated than there exists a long-run relationship among the variables.

Table 4. Estimated long run coefficients ARDL

Variables	**Coefficients**	**t-Statistic**	**P-Value**
ODA	0.005998	0.073377	0.9424
LFPR	0.434030	0.104960	0.9176
GOP	-391.2585	-2.281534	0.0357
R-Squared		**0.651677**	
Prob(F-statistic)		**0.032670**	
DW		**2.328739**	

Source: Authors', 2016.

Table 4 presents the long-run estimate having established cointegration. ODA has positive but non-significant effect on poverty reduction as measured by real household final consumption expenditure (RHCE). The results indicate that one percent change in official development assistance (ODA) results in only approximately 0.006% change in poverty reduction. Labour force participation rate equally has non-significant positive impact on poverty reduction and taken separately brings about 0.43% change in poverty reduction. Population growth (GOP) on the other hand was found to have negative and significant impact on poverty reduction in Nigeria over the period captured by this study.

Table 5. Estimated short-run coefficients (Error Eorrection Model)

Variable	Coefficient	t-Statistic	Prob.
D(ODA)	0.093624	1.125932	0.2713
D(LFPR)	4.334495	1.008267	0.3234
D(GOP)	-88.21031	-1.237349	0.2279
ECM(-1)	-1.599613	-5.114860	0.0000
R-squared = 0.56, Prob(F-statistic) = 0.000000, Durbin-Watson stat = 2.13			

Source: Authors' 2016.

The short-run dynamics in table 5 shows that ODA and LFPR have positive effect on poverty reduction though the estimated influence are not significant. GOP on the other hand has negative effect on poverty reduction. GOP has negative impact on poverty reduction as one percent change in GOP results in 88.2% decrease in poverty reduction. The error correction term has the expected signs, and reveals that the speed of adjustment to long-run equilibrium is quite high. The result indicated that approximately 160% of deviation from long-run equilibrium is corrected each year.

Table 5. Diagnostic tests for long-run and short-run model

	Short run		**Long run**	
Tests	Statistic	P value	Statistic	P value
Breush-Godfrey serial Correlation LM	3.33	0.19	5.71	0.057
Heteroskedasticity test	3.40	0.49	16.09	0.19
Jarque Bera Normality Test	1.06	0.58	2.26	0.32
Ramsey Reset Log Likely hood Ratio	0.59	0.45	0.80	0.38

Source: Authors' 2016.

As can be observed from table 5 both long run and short run model pass all the respective diagnostic tests of serial correlation (Breusch-Godfrey test), heteroskedasticity, and normality test. The Ramsey RESET test also suggests that the model is well specified.

4.1 Stability Test

Cumulative sum of recursive residuals (CUSUM) and the CUSUM of square (CUSUMSQ) is applied to determine the parameter stability.

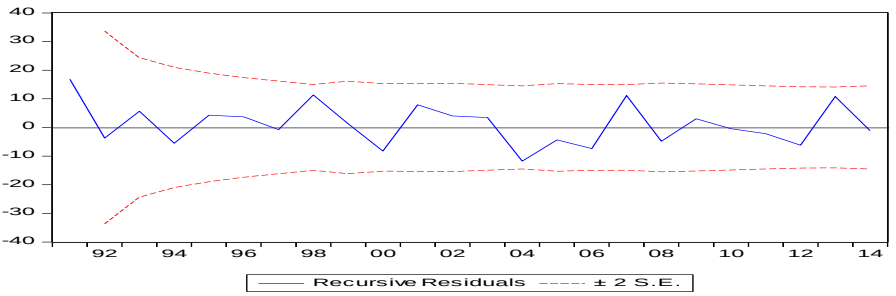

Fig. 1. Recursive Estimates.

Figure 1 presents the recursive estimate for residuals and shows the coefficients passed stability test. The absence of instability was confirmed by the plot of the CUSUM statistic and the CUSUM of square (CUSUMSQ) which fall inside and between the critical bounds of the 5% confidence interval of parameter stability.

5. Conclusion

Aid flows to developing countries is ultimately intended to help recipient countries attain sustainable development especially in the area of capital development, sustained economic growth, poverty reduction and reduced mortality rate. The justifications for increasing official aid to the poor countries of the world have constantly come under scrutiny and have generated intense debate among researchers. Against this background, this study is aimed at assessing the impact of official aid on poverty reduction in Nigeria from 1981 to 2014. We tested for cointegration using the Bound test and observed that there exist a long-run relationship between official aid flows and poverty. Both long-run and short-run regression estimates revealed that official aid has non-significant positive impact on poverty reduction within the period. There is however strong sign of convergence toward long-run equilibrium as the speed of adjustment is significantly high. The results further showed that population growth exerted negative influence on poverty reduction both in the long and short-run whereas labour force participation was found to have relative positive impact on poverty reduction. We therefore conclude that while it is evident that official aid has positive influence on poverty reduction, the influence so established is not significant. We recommend that aid donors and international aid organizations should earmark aids for a specific needs and exhaust every prudential steps in making sure that such aid are used for the targeted aim with fact-based appraisals and implementation reports.

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